# Nuclear Medicine Technology Demonstration Facility

Application Number: **01862** Commencement Date: **01/06/2023** Status: **Locked**

# 1. About the project

## 1.1 Project details

**1.1.1 Project title ***

Nuclear Medicine Technology Demonstration Facility

**1.1.2 Project industry type ***

Commonwealth

**1.1.3 Project industry sub-type**

—

**1.1.4 Estimated start date ***

07/05/2025

**1.1.4 Estimated end date ***

08/02/2027

# 1.2 Proposed Action details

**1.2.1 Provide an overview of the proposed action, including all proposed activities. ***

The proposed action is for the construction of a Nuclear Medicine Technology Demonstration Facility (**NMTD**) at the Lucas Heights Science and Technology Centre (**LHSTC**), managed by the Australian Nuclear Science and Technology Organisation (**ANSTO**). The land is Commonwealth-owned land, managed by ANSTO. The NMTD will be constructed within an existing Building, Number 22 which is managed by ANSTO at the LHSTC. The NMTD will operate under the existing Australian Radiation Protection and Nuclear Safety Agency (**ARPANSA**), facility license F0262, issued for ANSTO Health Products.

Repurposing B22 to house the NMTD within the building structure offers minimum impact to environmental concerns outside of the current B22 footprint.

To facilitate this addition to ARPANSA license (F0262), a submission will be made pursuant to section 63 of the Australian Radiation Protection and Nuclear Safety Regulations 2018 (**ARPANS Regulations**).

Currently, Building 22 consists of facilities to support the Centre for Accelerator Science (**CAS**) and National Deuteration Facility (**NDF**). The CAS operations are licensed as a prescribed radiation facility under ARPANSA license F0316. Operations permitted under this license include the operation of the 2 megaelectron volt STAR linear accelerator, which is located next to the proposed siting of the NMTD. ARPANSA facility license F0316 will not apply to the NMTD.

The primary function of the NMTD is to provide the physical workspace and testing equipment to support the ANSTO Nuclear Medicine Manufacturing Program and planned Nuclear Medicine Manufacturing Facility (**NMMF**) by:

- Undertake the Good Engineering Practices test plans,
- Supplying training facilities to production staff, quality technicians and maintenance staff in anticipation of validation activities,
- Physically install hot cell containment areas and demonstration manufacturing line equipment and processes,
- Demonstrating safe operation and maintenance of equipment and processes
- Assisting in the engagement with regulators,
- Assisting in the definition of operational limits and waste characterisation,
- Validating modular and automation equipment (where permitted), and
- Running statistical demonstration of process variability and controls.

***Facility Overview***

**Built form**

The NMTD will be constructed as a fully contained, purpose built physical workspace within the existing Building 22 structure, effectively a building within a building. The Building 22 structure as a whole is considered the project area (0.29 hectares), as other areas of the building may be affected from time to time throughout the preparation and construction phases. Existing facilities within Building 22 will be utilised as far as reasonably practicable, including: water and electricity; compressed air; industrial gases; low-level radioactive liquid waste discharge (B-line); liquid trade waste discharge (C-line); in-bound truck bay. The disturbance area (0.09 hectares) consists of the main working areas of the of the proposed NMTD facility, specifically comprising four main areas: radioactive working area; plant room; wet chemistry area (non-radioactive); and gowning area. An overview of the built form of the NMTD is provided in **Att A – NMTD Facility Functional Description, Section 4: Facility Description.** The primary areas of the NMTD are listed below:

Radioactive working area (~275 m2)

The radioactive working area is where all the radioactive testing activities are located. This includes the receipt of radioactive materials, testing preparation, materials testing, and quality control. Additional activities on this area include storage of radioactive waste and primary exhaust filtration. The radioactive working area is enclosed by a secondary containment structure designed to prevent the release of radioactive contamination in abnormal circumstances to other areas of Building 22. Radioisotopes intended to be used within this area are molybdenum-99/technetium-99m, iodine-131 and lutetium-177.

Plant room area (~140 m2)

The internal plant room shall occupy the existing rooms 0024 and 0025 on the ground floor of Building 22 and contains all elements of the radioactive ventilation system and heating, ventilation and air conditioning (**HVAC**) equipment not included in the radioactive working area. The external plant room including ventilation system exhaust stack will be situated adjacent to the internal plant room.

Wet chemistry area (~28 m2)

This laboratory is used for non-radioactive reagent preparation, quality control and sampling checks of non-radioactive materials, and some retention sample storage, including decayed samples.

**Source materials.**

The existing Open-Pool Australian Light water (**OPAL**) nuclear reactor and the existing Mo-99 processing facility (ANSTO Nuclear Medicine (**ANM**)) are located to the west of the proposed NMTD. These buildings are where all on-site source materials for the NMTD will originate.

***Key Activities***

The key activities involved with the establishment of the NMTD will be:

- Detailed design of the NMTD
- Hot cells design and modifications.
- Regulatory approvals, commissioning and handover
- Procurement and engagement of a principal construction contractor
- Project management, safety and reliability assurance
- Procurement of key plant and equipment
- Construction of the NMTD
- Hot cell installation and commissioning
- Operation of the NMTD.

The ultimate decommissioning of the NMTD is excluded from the scope of this referral and will be referred at such time when decommissioning plans are known for the facility.

The construction and operation of the NMTD are the stages of the project identified as having potential or likely impacts.

***Direct and indirect impacts***

ANSTO has identified the following activities as likely to have minor impacts to the environment at the construction and operational stages of the NMTD:

***Construction of the NMTD***

**Activity:**

Negligible increase in demand on surrounding road infrastructure during the site preparation and construction phases.

Removal and or encapsulation of residual asbestos materials

**Impact:**

During site preparation and construction, there will be a minor increase in heavy vehicle ingress and egress to the LHSTC. While the timing will be determined by the Principal Contractor in consultation with ANSTO, it is anticipated the additional demand on local roads (primarily New Illawarra Road and Heathcote Road) will be <1 heavy vehicles per hour during peak activity times. It is estimated the increased demand on public roads will be negligible.

Regulated disposal of small amounts of residual asbestos materials.

***Operation of the NMTD***

**Activity:**

Emission of low levels of radioactive materials to air and water

No impact on fauna due to NMTD being constructed within an existing fenced facility located away from native bushland.

**Impact:**

Low levels of gaseous radioactive contaminants will be produced in the NMTD. The NMTD facility's active ventilation extraction system will remove radionuclides through an extensive abatement system of charcoal (Standard Iodine Adsorption Module – **SIAM**) filters and high efficiency particulate air (**HEPA**) filters, ensuring atmospheric release of radionuclides are minimised as far as reasonably practicable **Att A – NMTD Facility Functional Description, Section 10: Active Ventilation system and HVAC**. Final discharges through the stack will be continuously monitored in line with ANSTO's Environmental Monitoring Program.

The NMTD Asset Management Plan will describe the requirements for regular inspections of the active ventilation extraction system and the criteria for the replacement or change-out of the filtration systems as per ANSTO guidelines. Both exhaust and supply filters of the active ventilation system will be tested and replaced to ensure integrity of the NMTD ventilation system. Frequency of replacement will be in line with supplier's recommendations and the ANSTO's internal ventilation system requirements.

Low level liquid radioactive contaminants will be generated through the preparation of radioisotopes in the NMTD. Low level liquid waste will be disposed through the ANSTO Waste Management System. **Att A – NMTD Functional Description, Section 11: Waste Management**.

### 1.2.2 Is the project action part of a staged development or related to other actions or proposals in the region?

No

### 1.2.6 What Commonwealth or state legislation, planning frameworks or policy documents are relevant to the proposed action, and how are they relevant? *

ANSTO is a statutory body of the Commonwealth. Commonwealth land is not subject to state or territory law (Section 52(2) of the *Australian Constitution*). As such, NSW legislation does not apply and approvals by State or local authorities are not required. Further, the project is not subject to formal development approval from Sutherland Shire Council under the NSW planning process.

Section 7A of the *Australian Nuclear Science and Technology Organisation Act 1987* (**ANSTO Act**) further stipulates that State (i.e. NSW) law does not apply to the organisation, its property or transactions or anything done by or on behalf of the organisation. This includes the use or proposed use of land or premises, or the environmental consequences of the use of the land or premises.

Notwithstanding, ANSTO must comply with Commonwealth environmental legislation, including the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) and relevant regulatory framework, including the *Australian Radiation Protection and Nuclear Safety Act 1998* (**ARPANS Act**), administered by the ARPANSA.

***Environment Protection and Biodiversity Conservation Act 1999***

ANSTO has reviewed the proposed action its potential impacts to the environment against the requirements of Part 3 of the EPBC Act, specifically with regards to whether the proposed action may have a significant impact on Matters of National Environmental Significance (MNES), and consequently whether the proposed action should be referred to the Minister for the Environment. To assist in informing ANSTO's view on whether the proposed action should be referred, ANSTO consulted the following documents:

- **Ref 1 – Significant Impact Guidelines 1.1 - Matters of National Environmental Significance**
- **Ref 2 – Significant impact guidelines 1.2 - Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.**

ANSTO has completed a self-assessment on the potential impacts to both MNES and actions by the Commonwealth (**Att B – Self-Assessment on Impacts to the Environment for the NMTD**). In summary, the self-assessment found that the proposed action triggers the requirement for referral under S.22 Nuclear Actions, S.26 Actions on Commonwealth Land, and S.28 Actions by Commonwealth Agencies. ANSTO has self-assessed the impacts and does not believe the impacts are likely to be significant toward the environment and should not be considered as a controlled action. Further details are provided section 4 of this referral and in **Att B – Self-Assessment on Impacts to the Environment for the NMTD**.

***Australian Radiation Protection and Nuclear Safety Act 1998***

In accordance with the ARPANS Act and Regulations, the action will be subject of an application to amend the existing ANSTO Health Products facility licence F0262. ARPANSA's objective, as expressed in the ARPANS Act, is 'to protect the health and safety of people, and to protect the environment, from the harmful effects of radiation'. To meet that principal objective, a framework for regulation of the Commonwealth's radiation and nuclear activities has been developed which reflects international best practice in radiation and nuclear regulation. This objective and regulatory framework is consistent with the requirements for radiation protection and nuclear safety within Australian State and Territory regulatory authorities.

The regulatory framework adopted by ARPANSA's Operations Services Branch:

- assesses applications for licences against accepted standards for radiation protection and nuclear safety,
- makes recommendations to the CEO on the issuing of licences,
- undertakes inspections of licensed activities to confirm compliance with legislative requirements, and
- takes any enforcement actions necessary to ensure compliance, the safety of people and protection of the environment.

The ARPANSA planning framework for this project will involve an amendment to the ANSTO Health Products licence F0262. This process will enable submission of application under Section 63 of the ARPANS Regulations, to obtain approval from the ARPANSA Chief Executive Officer for the planned

change. The submission under a S.63 change will include updates to the existing Plans and Arrangement for managing safety of the NMTD which will include an update to the ANSTO Heath Products -Safety Analysis Report. These Plans and Arrangements will include plans for protection of the environment from radiation, and the Plans and Arrangements for Management of Radioactive Wastes. The Plans and Arrangements are required to be updated to reflect any changes to ARPANSA requirements.

To ensure compliance with the ARPANSA environmental protection requirements, ANSTO regularly monitors its liquid, gaseous and solid waste discharges with the objective of minimising its environmental footprint and maintaining compliance with the regulations. This is overseen by ANSTO's Environmental Monitoring team.

ANSTO collaborates and shares information openly with the public (**Ref 3 – Local Environmental Monitoring**) as well as government owned statutory corporations such as the Sydney Water Corporation which authorises a trade waste discharge consent. **Att C – Sydney Water Trade Waste Agreement #4423**

This discharge consent is periodically reviewed to provide assurance that ANSTO's discharges remain within authorised radiological and non-radiological limits and pose no threat to the environment.

Waste containing radioactivity is managed by ANSTO Waste Management Services (**WMS**). This covers all radioactive waste generated at ANSTO from all research activities including the production of industrial radioisotopes and radiopharmaceuticals. WMS operates its facilities and conducts waste management processes in line with requirements set by ARPANSA, provided in **Ref 4 – ARPANSA Radiation Protection Series F-1: Protection Against Ionising Radiation**, to ensure that radioactive contamination and radiation dose levels are as low as reasonably achievable and within regulatory constraints.

### 1.2.7 Describe any public consultation that has been, is being or will be undertaken regarding the project area, including with Indigenous stakeholders. Attach any completed consultation documentations, if relevant. *

Consultation with key internal stakeholders has been carried out regarding potential impact to current operations within B22 and other neighbouring buildings. ANSTO plans to consult shortly with local Indigenous groups discussing a range of upcoming projects at LHSTC, including the NMTD.

# 1.3.1 Identity: Referring party

**Privacy Notice:**

Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

By completing and submitting this form, you consent to the collection of all personal information contained in this form. If you are providing the personal information of other individuals in this form, please ensure you have their consent before doing so.

The Department of Climate Change, Energy, the Environment and Water (the department) collects your personal information (as defined by the Privacy Act 1988) through this platform for the purposes of enabling the department to consider your submission and contact you in relation to your submission. If you fail to provide some or all of the personal information requested on this platform (name and email address), the department will be unable to contact you to seek further information (if required) and subsequently may impact the consideration given to your submission.

Personal information may be disclosed to other Australian government agencies, persons or organisations where necessary for the above purposes, provided the disclosure is consistent with relevant laws, in particular the Privacy Act 1988 (Privacy Act). Your personal information will be used and stored in accordance with the Australian Privacy Principles.

See our Privacy Policy to learn more about accessing or correcting personal information or making a complaint.

Alternatively, email us at privacy@awe.gov.au.

☑ **Confirm that you have read and understand this Privacy Notice ***

### 1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

| | |
|---|---|
| **ABN/ACN** | 47956969590 |
| **Organisation name** | AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION |
| **Organisation address** | New Illawarra Road, Lucas Heights 2234 NSW |

Referring party details

| | |
|---|---|
| **Name** | Michael Baker |
| **Job title** | Manager, Regulatory Affairs and Compliance - Environment and Sustainability |
| **Phone** | 0429155994 |
| **Email** | mhb@ansto.gov.au |
| **Address** | 178 New Illawarra Road, Lucas Heights NSW 2234 |

# 1.3.2 Identity: Person proposing to take the action

### 1.3.2.1 Are the Person proposing to take the action details the same as the Referring party details? *

No

### 1.3.2.2 Is Person proposing to take the action an organisation or business? *

Yes

Person proposing to take the action organisation details

| | |
|---|---|
| **ABN/ACN** | 47956969590 |
| **Organisation name** | AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION |
| **Organisation address** | New Illawarra Road, Lucas Heights NSW 2234 |

Person proposing to take the action details


| | |
|---|---|
| **Name** | Jakob Vujcic |
| **Job title** | General Manager, Regulatory and Governance |
| **Phone** | 02 9717 3844 |
| **Email** | vujcicj@ansto.gov.au |
| **Address** | New Illawarra Road, Lucas Heights NSW 2234 |

**1.3.2.14 Are you proposing the action as part of a Joint Venture? ***

No

**1.3.2.15 Are you proposing the action as part of a Trust? ***

No

**1.3.2.17 Describe the Person proposing the action's history of responsible environmental management including details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the Person proposing to take the action. ***

ANSTO has a strong track record of environmental stewardship largely due to its investment in an Environmental Management System (EMS). The processes, procedures and minimum requirements for environmental protection prescribed within ANSTO's EMS will underpin all the actions conducted during this work ensuring that there is no significant impact to the environment. ANSTO's commitment to minimising its environmental footprint is detailed within the ANSTO Health, Safety, Community and Environmental Policy (**Att C –Health Safety Community and Environment Policy**). The process for identifying environmental risk, assessing and controlling environmental aspects and reviewing and monitoring environmental control measures to ensure compliance obligations are embedded within all processes and systems throughout ANSTO.

ANSTO is subject to strict ongoing radiological environmental regulation by the ARPANSA. To comply with the ARPANS Act, ANSTO is required to obtain approval from ARPANSA for Plans and Arrangements, including an Environmental Protection Plan, for controlled facilities including ANSTO Health Products and the planned NMTD under the ANSTO Health Products licence. Plans and Arrangements are periodically reviewed and updated by ANSTO. ANSTO's commitment to the environment is also demonstrated through its certification to the International Environmental Management Standard, ISO14001. Part of this commitment is through ongoing resourcing of the Environmental Monitoring Group which provides an ongoing and regular program of monitoring environmental pathways, including air, surface water and groundwater. Under the ANSTO environmental monitoring program samples of ocean biota at marine locations near to the Potter Point sewer outfall are taken to assess ANSTO's trade waste discharge following treatment at the Cronulla Water Resource Recovery Facility. In addition, ANSTO has demonstrated its ability to work with government departments to ensure environmental safety outcomes are met.

ANSTO's Environmental Sustainability Strategy (**Ref 5 – Environmental Sustainability Strategy**) describes the organisation's high-level environmental goals and targets. This Strategy includes long-term, ambitious objectives which seek to significantly reduce ANSTO's greenhouse gas emissions, water consumption and waste production. The Strategy also includes objectives to improve ecological outcomes within ANSTO's Bushland Perimeter.

In 1992, ANSTO was subject to action under the NSW *Environmental Planning and Assessment Act 1979* in the NSW Land and Environment Court. The action related to a breach of NSW planning law. No adverse environmental impacts were alleged or found.

No legal proceedings under Commonwealth environmental laws have been made against ANSTO.

Previous EPBC referrals submitted are provided below:

- 2023/10072 – Decommissioning of the National Research Cyclotron Facility, Camperdown
- 2023/9756 – Transport of OPAL Spent Fuel to France in 2025
- 2023/9748 – New nuclear medicine manufacture and production facility at Lucas Heights
- 2022/9355 – Legacy Mineral Sands Remediation and Disposal
- 2022/9352 – Phase A HIFAR Decommissioning
- 2021/9025 – Intermediate Level Solid Waste Storage Facility
- 2021/8998 – Return of Australian Intermediate Level Radioactive Waste from the UK
- 2016/7841 – Transport of OPAL Spent Fuel to France in 2018 and 2025
- 2016/7733 – Extensions to Building 27 and Building 20B
- 2015/7437 – Transport of Intermediate Level Wastes to Lucas Heights
- 2012/6697 – Synroc Waste Treatment Facility
- 2012/6598 – ANM Mo-99 Facility at Lucas Heights
- 2012/6564 – Interim Waste Store at Lucas Heights in Oct 2012
- 2010/5645 – Decommissioning of NMC and Camperdown Facility
- 2008/4615 – Decommissioning of the MOATA Reactor
- 2008/4459 – Construction of Nuclear Materials Store

- 2007/3672 – Shipment of Spent Nuclear Fuel to USA
- 2006/2740 - Upgrade of Nuclear Production Equipment B54
- 2003/1114 – Extension to Building 23 (Radiopharmaceuticals production facility)
- 2001/405 – Placement of fill excavated from the site for the Replacement Research Reactor
- 2001/342 – Construction of Building 20B (Radioactive Waste Processing Facility).

### 1.3.2.18 If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

ANSTO's commitment to the protection of the environment from its activities is directed by the ANSTO Health, Safety, Community and Environmental Policy (**Att D – Health Safety Community and Environment Policy**). For construction, decommissioning or maintenance activities, ANSTO has in place a planning framework to ensure activities such as the Proposed Activity, are conducted to prevent harm to the environment (detailed in **Att E – AP-5400 Project Environmental Protection Requirements**). Initially, all construction and decommissioning projects must complete a screening checklist (**Att F – AF-1376 Project Environmental Planning Checklist**) to determine what degree of regulatory approvals may be required, and what further environmental planning is required. It is at this stage, the self-assessment to determine whether an EPBC Referral is conducted. Prior to the commencement of works, ANSTO will prepare a Project / Construction Environmental Management Plan (**Att G – AF-5947 Project - Construction Environmental Management Plan**) to identify and mitigate the components within the site preparation and construction phase which may have an impact on the environment. For specific tasks, a Safe Work Method and Environmental Statement (**Att H – AF-2315 Safe Work Method and Environmental Statement (SWMES)**) will be completed which will provide further information on the identification and mitigation of specific hazards to the environment.

## 1.3.3 Identity: Proposed designated proponent

### 1.3.3.1 Are the Proposed designated proponent details the same as the Person proposing to take the action? *

Yes

Proposed designated proponent organisation details

| | |
|---|---|
| **ABN/ACN** | 47956969590 |
| **Organisation name** | AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION |
| **Organisation address** | New Illawarra Road, Lucas Heights NSW 2234 |

Proposed designated proponent details

| | |
|---|---|
| **Name** | Jakob Vujcic |
| **Job title** | General Manager, Regulatory and Governance |
| **Phone** | 02 9717 3844 |
| **Email** | vujcicj@ansto.gov.au |
| **Address** | New Illawarra Road, Lucas Heights NSW 2234 |

### 1.3.4 Identity: Summary of allocation

## Confirmed Referring party's identity

The Referring party is the person preparing the information in this referral.

| | |
|---|---|
| ABN/ACN | 47956969590 |
| Organisation name | AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION |
| Organisation address | New Illawarra Road, Lucas Heights 2234 NSW |
| Representative's name | Michael Baker |
| Representative's job title | Manager, Regulatory Affairs and Compliance - Environment and Sustainability |
| Phone | 0429155994 |
| Email | mhb@ansto.gov.au |
| Address | 178 New Illawarra Road, Lucas Heights NSW 2234 |

## Confirmed Person proposing to take the action's identity

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

| | |
|---|---|
| ABN/ACN | 47956969590 |
| Organisation name | AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION |
| Organisation address | New Illawarra Road, Lucas Heights NSW 2234 |
| Representative's name | Jakob Vujcic |
| Representative's job title | General Manager, Regulatory and Governance |
| Phone | 02 9717 3844 |
| Email | vujcicj@ansto.gov.au |
| Address | New Illawarra Road, Lucas Heights NSW 2234 |

## Confirmed Proposed designated proponent's identity

The Person proposing to take the action is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

## 1.4 Payment details: Payment exemption and fee waiver

**1.4.1 Do you qualify for an exemption from fees under EPBC Regulation 5.23 (1) (a)? ***

No

**1.4.3 Have you applied for or been granted a waiver for full or partial fees under Regulation 5.21A? ***

No

**1.4.5 Are you going to apply for a waiver of full or partial fees under EPBC Regulation 5.21A?**

No

**1.4.7 Has the department issued you with a credit note? ***

No

**1.4.9 Would you like to add a purchase order number to your invoice? ***

No

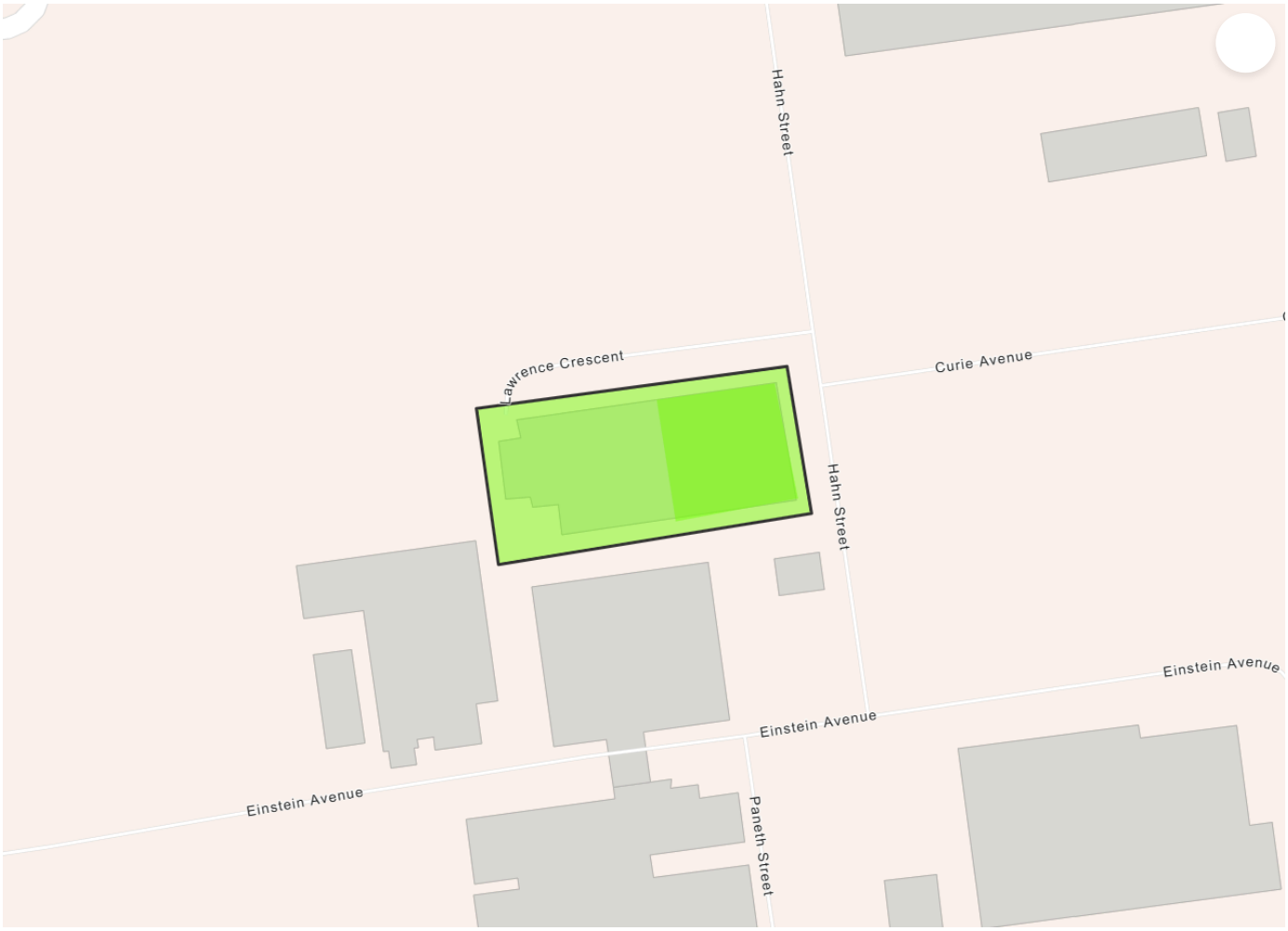
## 1.4 Payment details: Payment allocation

**1.4.11 Who would you like to allocate as the entity responsible for payment? ***

Referring party

# 2. Location

# 2.1 Project footprint




**Project Area:** 0.29 Ha **Disturbance Footprint:** 0.09 Ha

## 2.2 Footprint details

**2.2.1 What is the address of the proposed action? ***

178 New Illawarra Road Lucas Heights NSW 2234

**2.2.2 Where is the primary jurisdiction of the proposed action? ***

New South Wales

**2.2.3 Is there a secondary jurisdiction for this proposed action? ***

No

**2.2.5 What is the tenure of the action area relevant to the project area? ***

The land where the preparation actions are to take place is Commonwealth-owned land, managed by ANSTO.

# 3. Existing environment

# 3.1 Physical description

### 3.1.1 Describe the current condition of the project area's environment.

ANSTO's main campus within the LHSTC is located along New Illawarra Road at Lucas Heights, about 35 km south-west of the Sydney central business district (**CBD**). The LHSTC is positioned on the Woronora Plateau at an elevation of about 155 metres (Australian Height Datum). The site is approximately 2 km west of the Woronora River and 8 km south of the Georges River and is surrounded by bushland for several kilometres.

The LHSTC was established in the 1950s, with many of its current buildings and much of its site infrastructure dating back to that era, including Building 22, which will house the NMTD. Building 22 currently houses the STAR linear particle accelerator and other scientific laboratories. The LHSTC is approximately 70 hectares of developed area. Surrounding the LHSTC, ANSTO also manages the ANSTO Bushland Perimeter Zone of approximately 430 hectares, which is a combination of landfill, brownfields and bushland. At the time of initial development of the site, the whole of the 70 hectares development area was cleared to bedrock to allow construction of the site.

The 70 hectare fenced area comprises a developed area of surrounded by the bushland zone, centered around the existing High Flux Australian Reactor (**HIFAR**). No residential development is permitted within the ANSTO Bushland Perimeter Zone. The residential suburbs of Barden Ridge and Engadine are located in the north-east to south-east sectors adjacent to the boundary of the ANSTO Bushland Perimeter Zone while the suburban area of Menai is located around 3 km further to the north-east.

The project area is situated on Commonwealth land and is not subject to NSW State environmental legislation (refer to Section 7A ANSTO Act) and local planning provisions.

The project area is situated in south-western Sydney, NSW, approximately 29 km from the Sydney CBD. The nearest suburban areas are Engadine (1.3 km away), Barden Ridge (1.9 km away), and Heathcote (3.1 km away).

The current condition of the environment relative to the project area is that of a well-maintained urban campus fit for car, truck and pedestrian thoroughfare.

The Building 22 structure was constructed in the 1960s to host the MOATA Research Reactor which was decommissioned in 2009 (refer to EPBC 2008/4615 – Decommissioning of the MOATA Reactor).

### 3.1.2 Describe any existing or proposed uses for the project area.

The proposed NMTD will be constructed entirely within the existing Building 22 envelope. This building will easily accommodate the required footprint (~433 m2) for the construction of the NMTD with minimum impact to the existing operations and staff within the building.

Currently, Building 22 hosts the operations from ANSTO's Nuclear Science and Technology research division: Centre Accelerator Science for ion beam analysis and accelerator mass spectrometry and the National Deuteration Facility.

The NMTD will take advantage of existing amenities, truck bay access, services and utilities including electricity, compressed air, water, and trade waste.

The footprint of the primary work areas of the NMTD within Building 22 are:

- Ground Floor - Radioactive Working Area (rooms 0008 and 0009) (including gowning area), ~275 m2
- Ground Floor – Plant Room (rooms 0024 and 0025) and adjacent external plant area and stack, ~140 m2
- Ground Floor – Wet Chemistry Laboratory (room 0023), ~28 m2.

### 3.1.3 Describe any outstanding natural features and/or any other important or unique values that applies to the project area.

There are no features within the project area that are vulnerable, rare or otherwise considered to be of important or unique value.

At the time of initial development of the LHSTC, the whole of the 70 hectare development area was cleared to bedrock to allow construction of the campus.

The residual Lucas Heights soil landscape is characterised by gently undulating crests and ridges on plateau surfaces of the Mittagong formation (alternating bands of shale and fine-grained sandstones). The local relief is to 30 m and slopes are usually <10%. It consists of typically absent rock outcrop and extensively or completely cleared, dry sclerophyll low forest and woodland. Soils are moderately deep (50-150 cm), hard setting Yellow Podzolic Soils and Yellow Soloths with Yellow Earths (Gn2.24) on outer edges. Landscape limitations include stony soil, low soil fertility and low available water capacity. The Triassic Hawkesbury Sandstone is approximately 200 m thick beneath the site and overlies interbedded sandstones and claystones of the Narrabeen Group and Permian Illawarra Coal Measures (**Att I – Consolidated volume of reports on groundwater investigations at the LHSTC to May 2007, Section 2.3: Geology).**

The Hawkesbury Sandstone generally consists of interbedded massive and current bedded layers with cross beds typically ranging from 1.5 to 3 m thick and occasionally up to 15 m thick. Relatively thin, laterally discontinuous shale and siltstone lenses occur throughout the Hawkesbury Sandstone.

Most of the sandstone units within the Hawkesbury Sandstone are composed of medium to coarse quartz sand grains cemented with silica, clay and iron oxides or carbonates to form massive sandstone.

The project area sits near to the high point on the Woronora Plateau, as a result there are no significant natural drainage lines in the project area. Rainwater falling on the lands near the project area, either drain to the north-east into the Georges River catchment, or to the south-east into the Woronora River catchment. The project area is not in any drinking water catchment.

Previous vegetation mapping **(Ref 6 – NSW Government, SEED Initiative: Vegetation Communities Map, 2022**) identified six plant community types (**PCT**) within a 500 metres radius of the project area, being:

- PCT 3593: Sydney Coastal Sandstone Bloodwood Shrub Forest
- PCT 3595: Sydney Coastal Sandstone Gully Forest
- PCT 3619: Sydney Hinterland Enriched Sandstone Bloodwood Forest
- PCT 3813: Sydney Hinterland Dwarf Apple Low Woodland
- PCT 3814: Woronora Plateau Heath-Mallee
- PCT 3924: Sydney Coastal Upland Swamp Heath
- Urban exotic/native.

The external features surrounding Building 22 currently consists of:

- existing campus buildings.
- open grassed areas
- car parks and roadways
- sporadic native vegetation (eucalypt, callistemon, grevillea, Gymea lily, lomandra varieties) to the north of the building (noting no vegetation will be disturbed through during the construction and operation of the NMTD).

No listed threatened ecological communities (under the EPBC Act), national parks, national heritage sites, nature reserves or important conservation areas have been identified to occur within the project site to be impacted by the proposed NMTD.

### 3.1.4 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

The LHSTC is located on an elevated plateau area known as the Woronora Plateau at an elevation of averaging around 155 m. The project area is at an elevation of about 153 m. The NMTD facility will be constructed on the existing concrete slab within Building 22. The project area will have a 0% gradient.

## 3.2 Flora and fauna

**3.2.1 Describe the flora and fauna within the affected area and attach any investigations of surveys if applicable.**

The LHSTC area is located within the Sutherland Shire local government area and is surrounded on the eastern, western and southern sides by intact vegetation.

**Threatened ecological communities.**

A search for threatened species using the Protected Matters Search Tool within the EPBC Referral Portal identified five threatened ecological communities which may be found in the project area. One ecological community is known to exist within the broader area of the LHSTC - Sydney Coastal Upland Swamp Heath (PCT 3924), approximately 500 metres to the north-north east of the project area.

PCT 3924 can form part of Coastal Upland Swamp in the Sydney Basin Bioregion which is listed as endangered under the EPBC Act and the NSW *Biodiversity Conservation Act 2016* (NSW BC Act). This vegetation community is mapped as a small patch along the northern site boundary of the LHSTC near New Illawarra Road. It is not within the vicinity of the project site for the NMTD.

Other (non-threatened) **PCT** known to exist within 500 metres of the project area include (**Ref 6 – NSW Government, SEED Initiative: Vegetation Communities Map, 2022**):

- PCT 3593: Sydney Coastal Sandstone Bloodwood Shrub Forest
- PCT 3595: Sydney Coastal Sandstone Gully Forest
- PCT 3619: Sydney Hinterland Enriched Sandstone Bloodwood Forest
- PCT 3813: Sydney Hinterland Dwarf Apple Low Woodland
- PCT 3814: Woronora Plateau Heath-Mallee
- Urban exotic/native.

**Threatened species.**

A search for threatened species using the Protected Matters Search Tool within the EPBC Referral Portal identified 61 threatened faunal and floral species and 16 migratory species that are possibly found in vicinity of the project area.

BioNet records indicate that a threatened fauna species Phascolarctos cinereus (koala), has been previously recorded within the broader LHSTC. The species is listed as endangered under the EPBC Act and NSW BC Act. In addition, foraging habitat is potentially available for mobile species such as avifauna, microbats and Pteropus poliocephalus (grey-headed flying-fox), which are able to move across large distances to forage.

Fauna generally sighted in the Lucas Heights site and more specifically the project area include: common species of snakes (red bellied black and eastern brown), lace monitors, and birds (Australian raven, masked lapwing and magpies being common). As mentioned previously, Koala have been recorded in the ANSTO Bushland Perimeter, and have been rarely observed (~1 / 5 years) within the Lucas Heights site. Generally, their presence is transient through the site.

While noting the potential for species to occur within the vicinity of the site, the Lucas Heights site was developed from the 1950s and was, based on historical aerial photos, cleared of a majority of its native vegetation around 1955. Therefore, there is limited to no remnant vegetation within the LHSTC.

A 2017 study (**Ref 7 – E-785 ANSTO Screening assessment of dose rates to wildlife, pages 14-15**) reviewed the effect of gaseous and liquid emissions from ANSTO's business as usual operations. The findings were that, despite using overestimates for radioactivity concentrations associated with ANSTO's emissions, results indicate potential risk quotients are below standard benchmarks for all organisms and all pathways considered. The amount of radioactivity and radionuclides likely to be emitted into the environment (by air or waste) will be an order or two below those emitted in other facilities at ANSTO, it is considered these emissions will have a negligible contribution to ANSTO's already very low emissions profile.

### 3.2.2 Describe the vegetation (including the status of native vegetation and soil) within the project area.

It is important to note that construction and operation of the NMTD will occur within the existing building envelope of Building 22 at the LHSTC.

**Vegetation**

The Lucas Heights site was developed from the 1950s and was, based on historical aerial photos, cleared of a majority of its native vegetation around 1955. Therefore, there is limited to no remnant vegetation within the LHSTC.

Current vegetation around Building 22 and the internal project area is limited to mowed native and introduced grasses, garden beds and sporadic native and introduced trees, established at various times since c1960.

**Soil characteristics**

The Wollongong-Port Hacking 1:100,000 Geological Series Sheet 9029-9129 (**Ref 8 – Wollongong Port Hacking 1:100 000 Geological Map**) indicates that the site is underlain by around 200m of the Triassic Hawkesbury Sandstone Formation, overlying the interbedded sandstones and claystones of the Triassic Narrabeen Group. Review of the CSIRO Soil and Landscape Grid of Australia indicates that the site is located within the Lucas Heights Soil Landscape. It consists of gently undulating crests and ridges on plateau surfaces of the Mittagong Formation (alternating bands of shale and fine-grained sandstone).

Minor components of dark grey shale, siltstone and sandstone / siltstone makes up about 5% of the total (**Att I – Consolidated volume of reports on groundwater investigations at the LHSTC to May 2007, Section 2.3**). The sandstone units are composed mainly of medium-coarse quartz grains bound by a secondary quartz-siderite cement with a clay matrix. These shales and siltstones occur mainly as thin units interbedded with the sandstone, however there are some thicker units present such as at the Little Forest area, located at the northern boundary of the ANSTO buffer zone, which have been quarried for brick and tile making. A near-surface low level waste disposal site used by the then Australian Atomic Energy Commission between 1960 and 1968 is located in a 5 - 10 m thick clay/shale lens at Little Forest.

Generally, the soil cover over rock is very shallow and consists of sandy loam, gravel, clay and ironstone. The top layers of sandstone are often soft and underlain by clay seams of varying thickness.

The CSIRO map of acid sulfate soils (**Ref 9 – Australian Soil Resource Information System**) indicate the site is characterised as C4 Extremely Low Probability/Extremely low confidence. Acid sulphate soils are typically estuarine in origin and is therefore generally found at or near sea level, as such due to the elevation of the site, acid sulphate soil conditions are unlikely to be encountered on site.

There is no notable erosion on the LHSTC.

There will be no vegetation clearing and no soil clearing as a result of the proposed action to construct and operate the NMTD, consequently there is expected to be nil impact to soil or vegetation within the or nearby the project area.

# 3.3 Heritage

### 3.3.1 Describe any Commonwealth Heritage Places Overseas or other places recognised as having heritage values that apply to the project area.

The project area shares no geographical vicinity with places listed on the National Heritage List, Commonwealth Heritage List or Lists of Overseas Places of Historic Significance to Australia.

The nearest heritage site listed on the Commonwealth Heritage List is occurs within the wider locality being the Cubbitch Barta National Estate Area (**Att J – NMTD Location)**. This area is a large bushland area which has been identified for its outstanding Indigenous cultural heritage and natural values. The Cubbitch Barta National Estate Area is located adjacent to the Lucas Heights site to the south and west. At its closest point, the area is around 450 metres to the south of the project site (on the south side of Heathcote Road).

In 2004, a nomination was presented to the Commonwealth Minister for the Environment to list HIFAR on the Commonwealth Heritage List (Place File Number - 1/16/035/0032). While the Minister considered that HIFAR was demonstrated to have significant heritage value, wider considerations specific to the safe decommissioning of the nuclear reactor influenced the decision of whether the place should be included in the Commonwealth Heritage List, and consequently, HIFAR was not included in the Commonwealth Heritage List.

### 3.3.2 Describe any Indigenous heritage values that apply to the project area.

The project area is located on Dharawal Country. Traditional Dharawal people's lands are primarily confined to the area south of Botany Bay, extending as far south as the Nowra area, across to the Georges River in Sydney's west.

As described in relation to Commonwealth heritage places overseas, the Cubbitch Barta National Estate Area is located adjacent to the Lucas Heights site to the south and west and, among other attributes, has been identified for its outstanding Indigenous cultural heritage (**Att J – NMTD Location**).

An Aboriginal Heritage Information Management System (AHIMS) search undertaken on 8 September 2022 did not identify any known Aboriginal sites within the project site (which has previously been extensively disturbed as part of the development of the ANSTO facility). Four previously recorded Aboriginal sites were however identified in the bushland area to the south of the project site between the boundary of the Lucas Heights campus and Heathcote Road.

The AHIMS search result will not be published due to sensitivity requirements expressed by the NSW Government – AHIMS Web Services.

# 3.4 Hydrology

**3.4.1 Describe the hydrology characteristics that apply to the project area and attach any hydrological investigations or surveys if applicable. ***

**Surface hydrology**

The surface hydrology is relevant to safety because radioactive material may find its way into drainage channels, creeks or rivers through surface runoff. There are no known private dams in the vicinity that could be fed by runoff from the site and a previous OPAL Siting Safety Assessment concluded that there were no known groundwater bores that could be influenced directly by runoff from the site. The general topographic environment is such that no part of the Lucas Heights Science and Technology Centre (LHSTC) is far removed from a natural drainage channel in the adjacent terrain.

No watercourses occur within the LHSTC area. A small dam is present approximately 420m north-west of the subject site, on the ANSTO Campus, south of New Illawarra Road. The principal surface stream immediately adjacent to the LHSTC is the Woronora River. This river is incised deeply into the sandstone basin and is fed by surface runoff and groundwater. On either bank, there are a number of small tributaries which have steep gradients where they join the river. **(Att I – Consolidated volume of groundwater investigations at the LHSTC to May 2007, Section 2.4: Hydrogeology)** The Woronora River flows generally north-east from the Woronora Dam and passes within 1 km east of the site to an eventual outflow in the Georges River estuary. The river is tidal in its lower reaches.

On the north side of the LHSTC campus, there is a ridge that is drained by the Mill and Barden Creeks. These also empty into the Georges River estuary. The Little Forest Legacy Site is located in the surface water catchment of Barden Creek.

Woronora Dam is also located around 7.5 km south-west of the site. The LHSTC is not within the drinking water of Woronora Dam or other drinking water catchments.

**Groundwater hydrology**

Groundwater occurs in perched horizons within the weathered sandstone, and within deeper, poorly defined sandstone aquifers that occur across the Woronora Plateau.

Groundwater is monitored regularly by the ANSTO Environmental Monitoring Group. Groundwater at the LHSTC indicates that two groundwater levels exist within the vicinity of the proposed NMTD:

- a shallow, perched groundwater level which is variable across the site, and ranges between RL147.1 m AHD to RL153.9 m AHD, approximately 2.5 to 9 m below ground level.
- a long term, deeper groundwater level at RL~144.2 m AHD to RL146.4 m AHD, around 8 to 13 m below ground level.

The shallow, perched groundwater is described as likely to be fracture controlled and perched on clay seams. This perched groundwater may be transient and respond quickly to rainfall events. The flow direction of the shallow groundwater is generally influenced by the local topography, with flows expected to occur towards the south-east towards Woronora River. Flows within the deeper groundwater level are likely to travel towards the north-west towards the Georges River.

Groundwater flow within the perched horizon is limited and is dominated by intergranular flow in the weathered sandstone. In contrast, groundwater flow within the deeper aquifers is along both primary features such as less well cemented zones within the sandstone and secondary structural features such as joints, shears, faults, and bedding plane partings. Bedding plane partings can form localised barriers which cause horizontal flow through porous sandstone. Some flow also occurs in sedimentary structures such as the more permeable cross bedded layers. A topographic influence is expected for both the perched groundwater and to a lesser extent the deeper aquifer zones. The thickness of the weathered sandstone and sandy soil profile is highly variable across the site and may result in discontinuous perched groundwater zones. This is the direct result of jointing and cementation in the sandstone. The fracture pattern in the Hawkesbury Sandstone is highly variable. There is usually a high density of surface joints that are open and transmit groundwater. At depth, many of these joints are closed through iron oxide and clay deposition, and compressional stresses in the rock mass. Very few continuous deep vertical joints

are thought to exist. No large faults, shears or other structure features exist in the area. (**Att I – Consolidated volume of groundwater investigations at the LHSTC to May 2007, Section 2.4: Hydrogeology**)

**Registered bores**

A review of WaterNSW registered bore maps indicated that 36 registered bores are located within a 2 km radius from the site. The registered use of these bores is for monitoring. Of these, none are located within a 500 m radius of the NMTD site.

**Flooding**

Local council flood mapping for the Sutherland Shire indicates the NMTD site (or the broader ANSTO LHSTC) is not within an area that can be expected to be inundated by flooding (**Ref 10 – Sutherland Shire Council - Shire Maps**).

# 4. Impacts and mitigation

# 4.1 Impact details

**Potential Matters of National Environmental Significance (MNES) relevant to your proposed action area.**

| EPBC Act section | Controlling provision | Impacted | Reviewed |
|---|---|---|---|
| S12 | World Heritage | No | Yes |
| S15B | National Heritage | No | Yes |
| S16 | Ramsar Wetland | No | Yes |
| S18 | Threatened Species and Ecological Communities | No | Yes |
| S20 | Migratory Species | No | Yes |
| S21 | Nuclear | Yes | Yes |
| S23 | Commonwealth Marine Area | No | Yes |
| S24B | Great Barrier Reef | No | Yes |
| S24D | Water resource in relation to large coal mining development or coal seam gas | No | Yes |
| S26 | Commonwealth Land | Yes | Yes |
| S27B | Commonwealth Heritage Places Overseas | No | Yes |
| S28 | Commonwealth or Commonwealth Agency | Yes | Yes |

## 4.1.1 World Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

### 4.1.1.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

### 4.1.1.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

***Construction and Operation of the NMTD***

A Protected Matters Search was conducted for the project area, there are no world heritage sites within 10 km of the project site.of the project area. The nearest World Heritage property is the Hyde Park Barracks located approximately 29 km to the north-east of the LHSTC.

The proposed NMTD is unlikely to have a direct and/or indirect impact on World Heritage properties due to the nature of the action and the distance to the closest listing.

## 4.1.2 National Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

### 4.1.2.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

### 4.1.2.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

A Protected Matters Search was conducted for the NMTD project area, there are no national heritage sites or values identified within the vicinity of the LHSTC and therefore no impacts are likely on national heritage sites or values.

The proposed NMTD is unlikely to have a direct and/or indirect impact on National Heritage due to the nature of the action and the distance to the closest listing. There are no National Heritage matters within the LHSTC site, however one occurs within the wider locality being the Royal National Park, located over 3 km to the east of the LHSTC site.

The proposed NMTD is not expected to result in any direct or indirect impacts to the Royal National Park.

In 2004, a nomination was presented to the Commonwealth Minister for the Environment to list HIFAR on the Commonwealth Heritage Register (Place File Number - 1/16/035/0032), which is just to the south-east of the NMTD project site. While the Minister considered that HIFAR was demonstrated to have significant heritage value, wider considerations specific to the safe decommissioning of the nuclear reactor influenced the decision of whether the place should be included in the Commonwealth Heritage List, and consequently, HIFAR was not included in the Commonwealth Heritage List.

## 4.1.3 Ramsar Wetland

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

### 4.1.3.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

### 4.1.3.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

***Construction and Operation of the NMTD***

The proposed NMTD is unlikely to have a direct and/or indirect impact on any Ramsar wetlands due to the nature of the action and the distance to the closest listing. There are no Ramsar wetlands matters within the LHSTC project site, however one occurs within the wider locality being the Towra Point Nature Reserve Park, which is located around 15 km of the project site.

The proposed action will be conducted within an existing building onsite (Building 22).

The sources of emissions resulting from NMTD operations are identified as follow:

- Airborne Emissions: potential airborne release from Iodine-131 and Molybdenum-99/Technetium-99.
- Waste management disposal: radioactive liquid and solid waste generated from isotope testing activities.
- Energy Consumption: facility operations.
- Liquid Effluent Discharge: drainage.

The list below outlines the estimated radioactivity airborne release values from Iodine -131 and Technetium -99m processing in the hot cell (**Att A – NMTD Facility Functional Description, Section 10.1: Source term for Active Ventilation System (AVS)**).

These values are taken for active ventilation system design before filtration (i.e. worst-case scenario)**.**

**Radioisotope** – Molybdenum-99/Technetium-99m, **Normal expected release – 2.77**x 10^7 becquerels (**Bq**), **Accidental release** - 4.73 x 10^7 Bq

**Radioisotope** – Iodine-131, **Normal expected release – 2.25** x 10^8 Bq, **Accidental release** – 4.00 x 10^11 Bq

*NOTE: Lutetium-177 isotope is not considered volatile.*

Liquid waste contaminants will be disposed through the ANSTO B-line system, which is reticulated through to ANSTO Waste Management Services, for storage, treatment and eventual discharge as trade waste to the Sydney Water effluent system. All effluent discharged to trade waste is analysed and discharged to meet the Sydney Water trade waste limits and the relevant Australian and New Zealand Environment and Conservation Council (**ANZECC**) guidelines for fresh and marine water quality. ANSTO also routinely analyses treated effluent and biosolid from the Sydney Water Cronulla Water Resource Recovery Facility (**CWRRF**) and marine biota at Potter Point, near where liquid effluent is discharged from the CWRRF to the marine environment (**Ref 3 – Local Environmental Monitoring**).

Levels of radioactivity in these samples routinely fall well below guideline levels. ANSTO has conducted a screening assessment on dose rates to wildlife which demonstrates the very low impact to the local environment as a result of ANSTO's activities (**Ref 7 – E-785 ANSTO Screening assessment of dose rates to Wildlife**).

The risk of contaminant propagation following the implementation of these controls to the immediate environment is assessed to be very low, with the risk to the Towra Point Nature Reserve being far lower.

ANSTO concludes that significant impacts are not likely on Ramsar listed wetlands.

## 4.1.4 Threatened Species and Ecological Communities

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

### Threatened species

| Direct impact | Indirect impact | Species | Common name |
|---|---|---|---|
| No | No | Acacia baueri subsp. aspera | |
| No | No | Acacia bynoeana | Bynoe's Wattle, Tiny Wattle |
| No | No | Acacia pubescens | Downy Wattle, Hairy Stemmed Wattle |
| No | No | Acacia terminalis subsp. Eastern Sydney (G.P.Phillips 126) | Sunshine Wattle (Sydney region) |
| No | No | Allocasuarina glareicola | |
| No | No | Anthochaera phrygia | Regent Honeyeater |
| No | No | Botaurus poiciloptilus | Australasian Bittern |
| No | No | Caladenia tessellata | Thick-lipped Spider-orchid, Daddy Long-legs |
| No | No | Calidris acuminata | Sharp-tailed Sandpiper |
| No | No | Calidris canutus | Red Knot, Knot |
| No | No | Calidris ferruginea | Curlew Sandpiper |
| No | No | Callocephalon fimbriatum | Gang-gang Cockatoo |
| No | No | Calyptorhynchus lathami lathami | South-eastern Glossy Black-Cockatoo |
| No | No | Chalinolobus dwyeri | Large-eared Pied Bat, Large Pied Bat |
| No | No | Climacteris picumnus victoriae | Brown Treecreeper (south-eastern) |
| No | No | Cryptostylis hunteriana | Leafless Tongue-orchid |
| No | No | Cynanchum elegans | White-flowered Wax Plant |
| No | No | Dasyornis brachypterus | Eastern Bristlebird |
| No | No | Dasyurus maculatus maculatus (SE mainland population) | Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) |
| No | No | Erythrotriorchis radiatus | Red Goshawk |

| Direct impact | Indirect impact | Species | Common name |
|---|---|---|---|
| No | No | Eucalyptus camfieldii | Camfield's Stringybark |
| No | No | Falco hypoleucos | Grey Falcon |
| No | No | Gallinago hardwickii | Latham's Snipe, Japanese Snipe |
| No | No | Genoplesium baueri | Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid |
| No | No | Grantiella picta | Painted Honeyeater |
| No | No | Heleioporus australiacus | Giant Burrowing Frog |
| No | No | Hirundapus caudacutus | White-throated Needletail |
| No | No | Hoplocephalus bungaroides | Broad-headed Snake |
| No | No | Isoodon obesulus obesulus | Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) |
| No | No | Lathamus discolor | Swift Parrot |
| No | No | Leucopogon exolasius | Woronora Beard-heath |
| No | No | Litoria aurea | Green and Golden Bell Frog |
| No | No | Litoria littlejohni | Littlejohn's Tree Frog, Heath Frog |
| No | No | Macquaria australasica | Macquarie Perch |
| No | No | Melaleuca biconvexa | Biconvex Paperbark |
| No | No | Melaleuca deanei | Deane's Melaleuca |
| No | No | Melanodryas cucullata cucullata | South-eastern Hooded Robin, Hooded Robin (south-eastern) |
| No | No | Mixophyes balbus | Stuttering Frog, Southern Barred Frog (in Victoria) |
| No | No | Neophema chrysostoma | Blue-winged Parrot |
| No | No | Notamacropus parma | Parma Wallaby |
| No | No | Numenius madagascariensis | Eastern Curlew, Far Eastern Curlew |
| No | No | Persicaria elatior | Knotweed, Tall Knotweed |
| No | No | Persoonia hirsuta | Hairy Geebung, Hairy Persoonia |
| No | No | Persoonia nutans | Nodding Geebung |

| Direct impact | Indirect impact | Species | Common name |
|---|---|---|---|
| No | No | Petauroides volans | Greater Glider (southern and central) |
| No | No | Petaurus australis australis | Yellow-bellied Glider (south-eastern) |
| No | No | Petrogale penicillata | Brush-tailed Rock-wallaby |
| No | No | Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) | Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) |
| No | No | Pimelea curviflora var. curviflora | |
| No | No | Pomaderris brunnea | Rufous Pomaderris, Brown Pomaderris |
| No | No | Prostanthera densa | Villous Mintbush |
| No | No | Pseudomys novaehollandiae | New Holland Mouse, Pookila |
| No | No | Pteropus poliocephalus | Grey-headed Flying-fox |
| No | No | Pterostylis saxicola | Sydney Plains Greenhood |
| No | No | Pultenaea aristata | |
| No | No | Pycnoptilus floccosus | Pilotbird |
| No | No | Rhizanthella slateri | Eastern Underground Orchid |
| No | No | Rhodamnia rubescens | Scrub Turpentine, Brown Malletwood |
| No | No | Rhodomyrtus psidioides | Native Guava |
| No | No | Rostratula australis | Australian Painted Snipe |
| No | No | Stagonopleura guttata | Diamond Firetail |
| No | No | Syzygium paniculatum | Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry |
| No | No | Thelymitra kangaloonica | Kangaloon Sun Orchid |
| No | No | Thesium australe | Austral Toadflax, Toadflax |
| No | No | Tringa nebularia | Common Greenshank, Greenshank |

## Ecological communities

| Direct impact | Indirect impact | Ecological community |
|---|---|---|
| No | No | Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland |
| No | No | Coastal Upland Swamps in the Sydney Basin Bioregion |
| No | No | River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria |
| No | No | Shale Sandstone Transition Forest of the Sydney Basin Bioregion |
| No | No | Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion |

**4.1.4.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? ***

No

**4.1.4.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. ***

**Threatened ecological communities.**

Five threatened ecological communities are identified as potentially occurring in proximity of the NMTD project site. Of these, one has been previously identified as occurring within the broader LHSTC, being:

- Coastal Upland Swamps in the Sydney Basin Bioregion

This threatened ecological communities has not been identified within the proximity of the project site area of the NMTD. The project site will be within an existing building envelope (Building 22), with minimal site preparation, earthworks or construction occurring just outside of this building.

Given this, the proposal is not considered likely to impact on any threatened ecological communities.

**Threatened species**

A Protected Matters Search was conducted for the project area, with sixty-five (65) listed threatened species identified as potentially being found in proximity of the project area. The only known occurrence of a listed threatened species being found near the NMTD is from infrequent transits of Koalas across the LHSTC (approximately once every five years).

Given that the Building 22 facility is a secure building structure, and during construction of the NMTD, there will be no site preparation, earthworks or construction occurring outside of this building, it is highly unlikely that any threatened species, such as Koalas will interact with the facility.

***Operation of the NMTD***

With respect to air emissions, the NMTD will be designed so that emissions of chemicals and radioactivity will be as low as reasonably achievable and certainly below existing prescribed notification levels for similar APRANSA licensed facilities. The new facility will be fitted with appropriate monitoring and alarm systems such as fire detection, radioactive sensors, ventilation stack filtering and monitoring systems to ensure compliance with regulatory requirements and minimise any impact to the environment. (**Att A – NMTD Facility Functional Description, Section 10.2: Emissions Monitoring)**

With respect to solid and liquid wastes, the NMTD will be integrated with the existing waste management processes within the LHSTC. Any waste from the NMTD will be treated similarly to other radioactive materials onsite and to the same standard for storage or prior to authorized offsite release. (**Att A – NMTD Facility Functional Description , Section 11: Waste Management)**

The development of the NMTD is not expected to impact on the operation or safety aspects of the remainder of the LHSTC.

To support the assertion that the impact from radionuclides released to the environment will be negligible, ANSTO completed a study in 2017 to support the ARPANSA licence for the ANM facility (**Ref 7 – E-785 Screening assessment of dose rates to Wildlife**). This study reviewed the effect of gaseous and liquid emissions from all ANSTO's usual business operations, including that of the existing Building 23 Health Products facility. The findings were that, despite applying overestimates for radioactivity concentrations associated with ANSTO’s emissions, results indicate the potential risk quotients are below standard benchmarks for all reference organisms and all pathways considered.

***Construction of the NMTD***

The construction of the NMTD will be undertaken by a suitably qualified and experienced Principal Contractor who would be managed by ANSTO’s Infrastructure & Engineering Services department. Before commencing the construction work, the Principal Contractor will be required to complete and implement a project /construction environmental management plan (**Att G – AF-5947 Project – Construction Environmental Management Plan**), meeting ANSTO's minimum requirements for protection of the environment (**Att E – AP-5400 Project Environmental Protection Requirements**). Since the construction

activities will be primarily contained within the existing Building 22 envelope and no earthworks or vegetation removal activities will occur, the impact from construction activities on the surrounding environment are expected to be negligible.

***Summary***

Given that the proposed NMTD will be restricted to development within an existing building envelope at the LHSTC, and the area surrounding does not include threatened ecological communities or habitat for identified threatened species, the construction and operation of the proposed NMTD is unlikely to have direct or indirect impacts on threatened species or ecological communities.

Radiological emissions from the NMTD are not expected to substantially contribute to the existing emissions profile for the whole of the LHSTC. It is therefore not expected that there would be any significant impacts to any threatened species or threatened ecological communities.

### 4.1.5 Migratory Species

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

| Direct impact | Indirect impact | Species | Common name |
|---|---|---|---|
| No | No | Actitis hypoleucos | Common Sandpiper |
| No | No | Apus pacificus | Fork-tailed Swift |
| No | No | Calidris acuminata | Sharp-tailed Sandpiper |
| No | No | Calidris canutus | Red Knot, Knot |
| No | No | Calidris ferruginea | Curlew Sandpiper |
| No | No | Calidris melanotos | Pectoral Sandpiper |
| No | No | Cuculus optatus | Oriental Cuckoo, Horsfield's Cuckoo |
| No | No | Gallinago hardwickii | Latham's Snipe, Japanese Snipe |
| No | No | Hirundapus caudacutus | White-throated Needletail |
| No | No | Monarcha melanopsis | Black-faced Monarch |
| No | No | Motacilla flava | Yellow Wagtail |
| No | No | Myiagra cyanoleuca | Satin Flycatcher |
| No | No | Numenius madagascariensis | Eastern Curlew, Far Eastern Curlew |
| No | No | Rhipidura rufifrons | Rufous Fantail |
| No | No | Symposiachrus trivirgatus | Spectacled Monarch |
| No | No | Tringa nebularia | Common Greenshank, Greenshank |

### 4.1.5.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

### 4.1.5.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

**Migratory species**

Sixteen migratory species have been identified as potentially occurring within proximity of the project site. The project site will be within an existing building envelope (Building 22), with minimal site preparation, earthworks or construction occurring just outside of this building.

Given this, the proposal is not considered likely to impact on any migratory species or their habitat.

***Construction of the NMTD***

The construction of the NMTD will be undertaken by a suitably qualified and experienced Principal Contractor who would be managed by ANSTO's Infrastructure & Engineering Services department. Before commencing the construction work, the Principal Contractor will be required to complete and implement a project /construction environmental management plan (P/CEMP - **Att G – AF-5947 Project – Construction Environmental Management Plan**), meeting ANSTO's minimum requirements for protection of the environment (**Att E – AP-5400 Project Environmental Protection Requirements**). Since the construction activities will be primarily contained within the existing Building 22 envelope and no earthworks or vegetation removal activities will occur, the impact from construction activities on the surrounding environment are expected to be negligible.

***Operation of the NMTD***

With respect to air emissions, the NMTD will be designed so that emissions of chemicals and radioactivity will be as low as reasonably achievable and certainly below existing prescribed notification levels for similar APRANSA licensed facilities. The new facility will be fitted with appropriate monitoring and alarm systems such as fire detection, radioactive sensors, ventilation stack filtering and monitoring systems to ensure compliance with regulatory requirements and minimise impacts to the environment (**Att A – NMTD Facility Functional Description, Section 10.1: Source term for AVS)**

With respect to solid and liquid wastes, the NMTD will be integrated with the existing waste management processes within the LHSTC. Any waste from the NMTD will be treated similarly to other radioactive materials onsite and to the same standard for storage or prior to authorized offsite release. (**Att A – NMTD Facility Functional Description, Section 9: Process Overview)**

The development of the new NMTD is not expected to impact on the operation, safety or environmental aspects of the remainder of the LHSTC.

To support the assertion that the impact from radionuclides released to the environment will be negligible, ANSTO completed a study in 2017 to support the ARPANSA licence for the ANM facility (**Ref 7 – E-785 ANSTO Screening assessment of dose rates to Wildlife**). This study reviewed the effect of gaseous and liquid emissions from all ANSTO's business as usual operations. The findings were that, despite applying overestimates for radioactivity concentrations associated with ANSTO's emissions, results indicate the potential risk quotients are below standard benchmarks for all reference organisms and all pathways considered.

**Summary**

Given that the proposed NMTD will be restricted to development within an existing building envelope at the LHSTC, and the area surrounding does not contain any existing vegetation potential that may be used by migratory species, the construction and operation of the proposed NMTD is unlikely to have direct or indirect impacts on threatened species or ecological communities.

Radiological emissions from the NMTD are not expected to substantially contribute to the existing emissions profile for the whole of the LHSTC. It is therefore not expected that there would be any significant impacts to the any migratory species or threatened ecological communities.

## 4.1.6 Nuclear

**4.1.6.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? ***

Yes

**4.1.6.2 Briefly describe why your action has a direct and/or indirect impact on this protected matter. ***

The proposed NMTD will include the establishment of a nuclear installation as defined in section 22(1)(a) of the EPBC Act. Concurrently, ANSTO will be seeking an amendment to incorporate the NMTD into the existing ANSTO Health Products nuclear installation licence (F0262) issued by ARPANSA, enabled through a Section 63 ARPANS Regulations 2018 submission.

The NMTD will be constructed within the existing Building 22 structure and managed by ANSTO at the LHSTC. Currently, Building 22 consists of facilities to support the CAS and the NDF. CAS operations are licensed as a prescribed radiation facility under ARPANSA licence F0316. Operations permitted under this licence include the operation of the 2 megaelectron volt STAR linear accelerator, which is also located next to the proposed NMTD and within Building 22.

The NMTD is being established to allow for the development of emerging radiopharmaceutical techniques and product lines. The NMTD will also allow for process enhancement testing of radiopharmaceutical products currently produced by ANSTO.

The maximum amount of radioactivity that the NMTD will handle at any one time is listed below. (**Att A – NMTD Facility Functional Description, Section 5: Operational Limits)** ANSTO has been assessed whether the proposed action should be considered a nuclear action based on the two-part test of whether a mixture of radioisotopes is considered ‘excessive’ pursuant to section 2.02 of the EPBC Regulations and consequently a nuclear action pursuant to section 22(1) of the EPBC Act.

- **Radioisotope** – Molybdenum-99/Technetium-99m, **activity value (Schedule 1 ARPANS Regulations)** = 1x10^6 Bq (Mo-99), **expected maximum activity per batch** = 5x10^11 Bq, **activity value division steps** = 5x10^5 (Mo-99)
- **Radioisotope** – Iodine-131, **activity value (Schedule 1 ARPANS Regulations)** = 1x10^6 Bq, **expected maximum activity per batch** = 4x10^11 Bq, **activity value division steps** = 4x10^5
- **Radioisotope** – Lutetium-177, **activity value (Schedule 1 ARPANS Regulations)** = 1x10^7 Bq, **expected maximum activity per batch** = 1.5x10^12 Bq, **activity value division steps** = 1.5x10^5

**Sum activity value division steps** = 1.05x10^6 (marginally greater than 1x10^6 for a mixture of unsealed sources, section 2.02(2) EPBC Regulation 2000).

The unsealed source activity concentration value will be greater than one (section 2.02(2) EPBC Regulation 2000). Therefore, the proposed action meets the two-part test for ‘excessive’, and therefore is being referred as a nuclear action. It should be noted that the half-lives for all of these radioisotopes are in the order of hours to days.

For comparison to other referred actions determined to be nuclear actions, the maximum radioactivity proposed to be used within the Nuclear Medicine Manufacturing Facility (refer to EPBC 2023/09748) are approximately two orders of magnitude higher than that proposed to be used in the NMTD. For example, the expected activity of technetium-99m to be used in the NMMF per week is 2.5x10^14 Bq/batch/week (200 units/batch), 500 times higher than in the NMTD. Similarly, the amount of activity proposed to be used in the NMMF for lutetium-177 and iodine-131 will be 13 times more and 62 times more respectively than the NMTD. Further comparison to the current ANSTO Health Products (B23) facility at Lucas Heights, the relative total maximum amount of activity currently processed in the B23 facility is 250 times higher for Molybdenum-99/Technetium-99m, 5 times higher for Iodine-131 and 2 times higher for Lutetium-177, than will be processed in the NMTD.

### 4.1.6.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

### 4.1.6.6 Describe why you do not consider this to be a Significant Impact. *

The testing activities will be performed in a bank of five (5) hot cells providing adequate structural shielding to ensure routine operations will remain below a target of 3μSv/hour (6mSv/year) at cell-face for full occupancy. The NMTD is also provided with shielded fume cupboards for small samples (10 ml) quality control activities.

All radioactive materials are enclosed by a secondary containment structure designed to prevent any release of active contamination under normal and abnormal circumstances to other areas of Building 22 and to the external environment.

ANSTO will prepare radioactive waste management and environmental protection plans and arrangements to support the section 63 submission to amend ARPANSA licence F0262. These plans and arrangements will comply with **Ref 11 – ARPANSA Regulatory Guide GDE-1735: Plans and arrangements for managing safety** and will be reviewed and updated from time to time to reflect operations within the facility and demonstrate compliance to ARPANSA requirements.

The NMTD active ventilation extraction system removes radionuclides through an extensive abatement system of carbon and high efficiency particulate air (HEPA) particulate filters, ensuring atmospheric release of radionuclides are minimised as far as reasonably practicable (**Att A – NMTD Facility Functional Description, Section 10: Active Ventilation System and HVAC).** Final discharges through the stack will be regularly monitored.

The NMTD asset management plan will indicate the requirements for regular inspections of the active ventilation extraction system and the criteria for replacement or change-out of the filtration systems as per ANSTO requirements. Both exhaust and supply filters of the active ventilation system will be replaced at regular intervals.

With respect to solid and liquid wastes, the new facility will be integrated with the existing waste management systems connected to Building 22 and transfer processes at the LHSTC.

The flora and fauna around the NMTD (Building 22) is best characterised as cultivated grasses, garden beds and sporadic native and introduced trees. Fauna sighted in the vicinity of the building include common species of snakes (Red Bellied Black and Eastern Brown), Lace Monitor goannas, and birds (Masked Lapwing and Magpies being common). The proposed routine use of the facility to conduct radioactive process development experiments will not have a direct or indirect impact on flora and fauna species.

### 4.1.6.7 Do you think your proposed action is a controlled action? *

No

### 4.1.6.9 Please elaborate why you do not think your proposed action is a controlled action. *

The proposed NMTD is expected to have a negligible effect on the health of members of the public and to the surrounding environment.

The EPBC Act requires for nuclear actions that have, would have, or are likely to have a significant impact on the environment, to be referred. It is considered that the action will not have any significant impact on the environment and the action is therefore not a controlled action. The basis for this conclusion is that:

- The NMTD will be specifically designed within the existing envelope of Building 22 at the LHSTC and is based on known technologies to safely process and manufacture radiopharmaceuticals.
- All planned radioactive testing activities are performed in hot cells and other equipment providing adequate structural shielding. All radioactive material activates are performed within a secondary containment which is maintained at negative pressure relative to atmosphere.
- All processing equipment (i.e. hot cells and fume cupboards) will be connected to the NMTD active ventilation extraction system removing radionuclides though a high efficiency – high reliability filtration system (i.e., carbon and HEPA filters) to minimised any potential release of radionuclides to the atmosphere. (**Att A – NMTD Facility Functional Description, Section 10: Active Ventilation System and HVAC)**

To support the assertion that any radiological emissions to the environment are likely to be negligible, ANSTO completed a study in 2017 to support the ARPANSA licence for the ANM facility (**Ref 7 – E-785 ANSTO Screening assessment of dose rates to wildlife**). This study reviewed the effect of gaseous and liquid emissions from all ANSTO's business as usual operations. The findings were that, despite using overestimates for radioactivity concentrations associated with ANSTO's emissions, results indicate potential risk quotients below standard benchmarks for all organisms and all pathways considered. Given the NMTD will have maximum holdings an order or two below that of the existing Building 23 (ANSTO Health Products) and the future Nuclear Medicine Manufacturing Facility (EPBC 2023/09748), emissions from the NMTD are not likely to contribute significantly to LHSTC site-wide emissions. Further since the NMTD will employ known present-day technology to eliminate or minimise radiological emissions to the environment, it can be said with confidence that this action is unlikely to have a significant radiological impact on the surrounding environment. This study is supported by regular local air and water emissions sampling (**Ref 3 – Local Environmental Monitoring**).

Liquid effluent from the NMTD will be directed to existing B- (low level radioactive liquid waste) and C-lines (trade waste) to ANSTO's Waste Management Services effluent plant for holding (delay and decay), treatment and testing prior to release into the trade waste effluent system (**Att A – NMTD Facility Functional Description, Section 11.2 Liquid Waste)**. Sydney Water conducts independent testing of liquid trade waste effluent discharges, and the Trade Waste Agreement is periodically reviewed to provide assurance that ANSTO's discharges remain within authorised radiological and non-radiological limits and pose no threat to the environment.

### 4.1.6.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

***Construction of the NMTD***

**Traffic Management During Construction**

To ensure the safety and well-being of ANSTO workers, contractors and visitors who may be exposed to risks associated with plant and equipment movements, the traffic management plan for the construction stage of the project will include:

- risks associated with parking private vehicles
- set down and storage areas
- protocols associated with construction works

Plans will show temporary traffic paths and walkways, the delineation, and the position of traffic control or warning devices. Plans will also include:

- details of after-hours traffic arrangements
- all necessary instructions for the installation, operation, between stage re-arrangement and ultimate removal of devices at the end of the project.

The effectiveness of the traffic management plan is to be reviewed throughout the project by the Site Safety Officer.

**Traffic Management During Operations**

During operations, any transportation of radioactive wastes will be conducted fully under ANSTO's control and complies to the relevant intent of the ARPANSA Code for the Safe Transport of Radioactive Material (**Ref 12 – ARPANSA Radiation Protection Series C-2: Code for the Safe Transport of Radioactive Material**) and NSW transport regulations, in line with routine approved operations on the LHSTC.

***Operation of the NMTD***

The NMTD will be fitted with appropriate monitoring and alarm systems including fire detection, radioactive sensors, ventilation stack filtering and monitoring systems to ensure compliance with regulatory requirements and minimise impacts to the environment. The facility will be operated in accordance with established ANSTO procedures and ARPANSA regulations. Critical elements of these procedures include:

**Radiation protection**

The requirements will be set to comply with ANSTO's procedures for handling and storage of radioactive materials.

**Gaseous emissions**

The facility will be designed so that emissions of chemicals and radioactivity will be either zero or below prescribed limits. Monitoring devices will ensure compliance with regulatory requirements.

- The design of the NMTD will ensure that airborne contamination can only be discharged via the active ventilation system.
- The active ventilation will maintain a negative pressure within the NMTD with respect to the atmosphere sufficient to ensure appropriate flow of air into the building and prevent egress of airborne contamination out of the building.
- All air extracted will be passed through HEPA filters and/or charcoal SIAM filters where required (**Att A – NMTD Facility Functional Description, Section 10: Active Ventilation System and HVAC)**
- Charcoal SIAM filters are required when there is a potential to release volatile radioactive materials such as vapours from iodine-131.
- The ventilation system will have mechanical redundancy.

**Solid and liquid waste**

Solid and liquid waste will be stored within shielded containment for transfer to Waste Management Services after an appropriate decay time for short-lived isotopes or for longer term storage for long-lived isotopes. Secondary containment and radiation and contamination monitoring for leakage will be provided, where appropriate (**Att A – NMTD Facility Functional Description, Section 11: Waste Management).**

### 4.1.6.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

No offsets are proposed for this action.

## 4.1.7 Commonwealth Marine Area

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

### 4.1.7.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

### 4.1.7.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

A Protected Matters Search was conducted for the project area, there are no Commonwealth marine areas identified within the vicinity of the project area. The proposed NMTD is unlikely to have a direct and/or indirect impact on a Commonwealth Marine Area due to the nature of the action, construction activities being conducted within the envelope of an existing building structure and the distance to the closest listing.

Similarly to the assessment on possible impacts on Ramsar listed wetlands, the risk of contaminants propagating into the Woronora River catchment is assessed as very low and therefore the risk to contaminants entering Commonwealth marine areas is also considered as very low.

## 4.1.8 Great Barrier Reef

#### 4.1.8.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

#### 4.1.8.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

There is no risk to the Great Barrier Reef as a result of this project due to the vast distance.

### 4.1.9 Water resource in relation to large coal mining development or coal seam gas

#### 4.1.9.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

#### 4.1.9.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

This project does not involve coal mining or coal seam gas extraction.

### 4.1.10 Commonwealth Land

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

| Direct impact | Indirect impact | Commonwealth land area |
|---|---|---|
| Yes | No | Commonwealth Land - |
| Yes | Yes | Commonwealth Land - Australian Nuclear Science & Technology Organisation |

### 4.1.10.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

### 4.1.10.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

ANSTO has conducted a self-assessment (**Att B – Self-Assessment on Impacts to the Environment for the NMTD** ) to determine the likelihood of significant impacts to the environment on Commonwealth from the proposed action using **Ref 2 – Significant impact guidelines 1.2 - Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies**. The conclusion of this self-assessment is that there will likely be limited impacts to the whole of the environment on Commonwealth land from the NMTD, but none which are likely to be significant.

The NMTD will be sited within the building envelope of the existing Building 22 structure at the already established LHSTC and managed by ANSTO. The LHSTC was established in the mid-1950's for the establishment of the HIFAR nuclear reactor. The LHSTC is currently used for numerous licensed nuclear installations, and prescribed radiation and waste facilities, including the existing Building 22, which is primarily used by ANSTO's Nuclear Science and Technology division, principally for the operation of the STAR linear accelerator and NDF.

The NMTD will be constructed within Building 22, alongside the existing STAR accelerator. The construction of the NMTD will use the existing concrete slab within Building 22. No external earthworks or clearing will be conducted.

There is a possibility of localised minimal construction impacts (primarily to other ANSTO occupants within Building 22) as a result of increased noise, vibration and air quality (construction dust). These impacts will be temporary in nature and managed in accordance with standard construction guidelines.

The proposed NMTD will have direct impacts on a portion of the following blocks of Commonwealth land owned by ANSTO:

- Lot 11 DP 1042901

The proposed NMTD may also have minor impacts on a portion of the following blocks of Commonwealth land, also owned by ANSTO, adjacent to the project site:

- Lot 2 DP233333
- Lot 4 DP233333

The total area of Commonwealth Land impacted by construction works would be approximately 0.29 ha.

***Construction of the NMTD***

**Activity:**

Small increase demand on surrounding road infrastructure during the site preparation and construction phases.

**Impact:**

During site preparation and construction, there will be a small increase in heavy vehicle ingress and egress to the LHSTC. While the timing and utilisation will be determined by the Principal Contractor in consultation with ANSTO, it is anticipated the additional demand on local roads (primarily New Illawarra Road and Heathcote Road) will be <1 heavy vehicles per hour during peak activity times. It is estimated the increased demand on public roads will be negligible.

***Operation of the NMTD***

**Activity:**

Emission of low levels of radioactive materials to air and wastewater

**Impact:**

Low levels of radioactive contaminants will be generated through the preparation of radioisotopes in the NMTD. Small quantities of liquid low level radioactive waste will be produced throughout the lifecycle of the NMTD.

There are two sources of potential radiological impact on the environment resulting from NMTD, both of which may lead to potential contamination of land and waters and doses to people and wildlife: airborne emissions and liquid effluent discharges.

The estimated accidental radioactivity airborne release values from I-131 and Tc-99m processing in the hot cell before filtration and after filtration is presented in the table below. For comparison, the anticipated activity discharged from the facility under normal operating conditions is also shown (**Att A – NMTD Facility Functional Description, Section 10.1: Source Term for AVS)**. Included in the table below are the activities considered as the maximum inventory for the NMTD based on the maximum working product and worst-case total waste inventory. The Bounding Case Accident is based on the extreme scenario of a total loss of the structure and materials by fire.

**Radioisotope** – Molybdenum-99/Technetium-99m

- Reference normal expected release - 2.77 x 10^7 Bq
- Accidental release at cell-face without filtration - 4.73 x 10^7 Bq
- Accidental release after HEPA filtration (99.5% efficiency) - 2.30 x 10^5 Bq
- Bounding Case Accident release of Total Inventory Product and Waste – 1.00 x 10^12Bq**

**Radioisotope** – Iodine-131

- Reference normal expected release – 2.25 x 10^8 Bq
- Accidental release at cell-face without filtration – 4.00 x 10^11 Bq
- Accidental release after carbon filtration in-cell (90.0% efficiency) – 4.0 x10^10 Bq
- Accidental release after second carbon filtration (99.5% efficiency) – 2.00 x10^9 Bq
- Bounding Case Accident release of Total Inventory Product and Waste – 1.00 x 10^12Bq**

** Note 1: Lutetium-177 isotope is not considered volatile. Any lutetium emissions are filtered by the built-in HEPA filter in the cell (in-cell HEPA filter).*

*** Note 2: Bounding Case Accident activities used in the NMTD Safety and Security Consequence Analysis – are based on theoretical total inventory of working products and worst-case waste storage. Bounding Case Accident release of Lutetium-177 based on 3.00 x 10^12 Bq.*

By way of comparison the relative percentage of radionuclide expected to be released under normal conditions from the NMTD is 0.01% for Molybdenum-99/Technetium-99m and 0.09% for Iodine-131 compared to the approved discharge limits for the ANSTO Health Products, Building 23A stack.

Liquid effluent from the NMTD will be directed to existing B- and C-lines as part of the ANSTO Waste Management Services for holding (delay and decay), treatment and testing prior to release into the trade waste effluent system (**Att A – NMTD Facility Functional Description, Section 11.2: Liquid Waste)**. Sydney Water conducts independent testing of liquid trade waste effluent discharges, and the Trade Waste Agreement is periodically reviewed to provide assurance that ANSTO's discharges remain within authorised radiological and non-radiological limits and pose no threat to the environment.

Liquid and Solid waste from testing activities (hot cells) are stored in-cell and/or in a shielded tank for decay prior being picked-up for further treatment by ANSTO Waste Operations. (**Att A – NMTD Facility Functional Description , Section 11: Waste Management)**

### 4.1.10.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

**4.1.10.6 Describe why you do not consider this to be a Significant Impact. ***

Through ANSTO's self-assessment process, the impacts listed in 4.1.10.2 of this referral have been assessed for significance as follows:

***Construction of the NMTD***

**Activity:**

Increase demand on surrounding road infrastructure during the site preparation and construction phases. (**Att B – Self-Assessment on Impacts to the Environment for the NMTD, Section 4.1.7**)

**Mitigation controls:**

A traffic management plan will be required to be implemented by the Principal Contractor to minimise traffic demand, particularly at peak traffic times.

**Significance assessment:**

While the timing and utilisation will be determined by the Principal Contractor in consultation with ANSTO, it is anticipated the additional demand on local roads (primarily New Illawarra Road and Heathcote Road) will be <1 heavy vehicles per hour during peak activity times. While the control effectiveness is determined to be medium due to the extent of the demand not fully understood yet, due to the size of the project being relatively small in comparison to a large precinct or housing development, the impact to local roads is expected to be minimal. This should not trigger the requirement for referral in isolation.

***Operation of the NMTD***

**Activity:**

Emission of low levels of radioactive materials to air and water. (**Att B – Self-Assessment on Impacts to the Environment for the NMTD, Section 4.2.5, 4.6.1 & 4.7.1**)

**Mitigation controls:**

The facility will be designed so that emissions of chemicals and radioactivity will be either zero or below prescribed limits. Monitoring devices will ensure compliance with regulatory requirements.

- The design of the NMTD will ensure that airborne contamination can only be discharged via the active ventilation system.
- The active ventilation will maintain a negative pressure within the NMTD with respect to the atmosphere, sufficient to ensure appropriate flow of air into the building and prevent egress of airborne contamination out of the building.
- All air extracted will be passed through HEPA filters and/or charcoal SIAM filters where required (**Att A – NMTD Facility Functional Description, Section 10: Active Ventilation System and HVAC)**
- Charcoal SIAM filters are required when there is a potential to release volatile radioactive materials such as vapours of I-131.
- The ventilation system will have mechanical redundancy.

Solid and liquid waste will be stored within shielded containment for transfer to Waste Management Services after an appropriate decay time for short-lived isotopes or longer-term storage for long-lived isotopes. Secondary containment and radiation and contamination monitoring for leakage will be provided, where appropriate (**Att A – NMTD Facility Functional Description, Section 11: Waste Management)**

**Significance assessment:**

The NMTD will have one or two orders of magnitudes lesser holdings of radioisotopes compared to the same isotopes used within the existing Building 23 ANSTO Health Products facility. With present-day controls being implemented the radioactive emissions to the atmosphere are expected to have a negligible contribution to the LHSTC site-wide emissions profile. It is considered that significant impacts to reference organisms is highly unlikely, consistent with previous ecological dose screening assessments.

ANSTO does not believe that the proposed action will generate and release substantial amounts of radioactive substances which would have a significant impact on reference organisms, the community or the environment as a whole. This should not trigger the requirement for referral in isolation, noting however that the proposed action is being referred as a nuclear action under s.22 of the EPBC Act.

### 4.1.10.7 Do you think your proposed action is a controlled action? *

No

### 4.1.10.9 Please elaborate why you do not think your proposed action is a controlled action. *

The NMTD will be a small-scale development, establishing a new fully contained facility within an existing building (B22) at the LHSTC. The radioactivity proposed to be used within the NMTD will be an order or two less than holdings within other areas at the LHSTC (depending on the isotope), such as the existing ANSTO Health Products facility. The quantity of holdings and any emissions to the atmosphere or trade waste will not significantly increase upon existing levels, previously determined in **Ref 7 – ANSTO-E-785 Screening assessment of dose rates to wildlife**). ANSTO does not expect that the addition of the NMTD will significantly increase ANSTO's dose rate profile to reference organisms that would see the cumulative dose rate exceed the lowest level screening level threshold of 10 microgray/hour as prescribed in **Ref 13 – ARPANSA Guide RPS G-1: Radiation Protection of the Environment**.

The construction of the NMTD will have negligible localised impacts to the environment, as detailed in section 4.1.10.2 of this referral and **Att B – Self-Assessment on Impacts to the Environment for the NMTD.**

The inherent nature of the proposed action is unlikely to have significant impacts to Commonwealth land or to the environment as a whole.  ANSTO will however be implementing sufficient controls to reduce any potential impact, including implementation of air and liquid waste containment systems and infrastructure, and a project Construction Environmental Management Plan for the construction of the NMTD. ANSTO considers the likelihood of significant impacts to the whole of the environment to be low and therefore does not consider the proposed action should be a controlled action.

### 4.1.10.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

The construction of the NMTD will be undertaken by a suitably qualified and experienced Principal Contractor. Before commencing the construction work, the Principal Contractor will be required to complete and implement a project /construction environmental management plan (**Att G – AF-5947 Project – Construction Environmental Management Plan**), meeting ANSTO's minimum requirements for protection of the environment (**Att E – AP-5400 Project Environmental Protection Requirements**). Given the nature of the construction activities being confined within the envelope of the existing Building 22 facility, impacts to the environment from construction will be minimal, however controls to manage noise, dusts (including existing asbestos), contaminants entering drains, landfill waste (i.e. diversion to recyclable) will be implemented. Energy efficiency fixtures and systems will be implemented to align with Australian Government Climate Action in Government Organisations requirements.

NMTD active ventilation extraction system removing radionuclides though a high efficiency – high reliability filtration system (i.e., carbon and HEPA filters) to minimise any potential release of radionuclides to the atmosphere.

### 4.1.10.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

No offsets are proposed for this action.

## 4.1.11 Commonwealth Heritage Places Overseas

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

### 4.1.11.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

### 4.1.11.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

**Commonwealth Heritage Places Overseas**

This project will not have any impact on Commonwealth heritage places overseas due to the vast distance.

**Other Commonwealth Heritage Places**

The proposed NMTD is unlikely to have a direct and/or indirect impact on any Commonwealth Heritage Places due to the nature of the action and the distance to the closest listing. There are no National Heritage matters within the project site, however one occurs within the wider locality being the Cubbitch Barta National Estate Area. This area is a large bushland area which has been identified for its outstanding Indigenous cultural heritage and natural values. The Cubbitch Barta National Estate Area is located on adjacent to the wider Lucas Heights site and buffer zone area to the south and west. At its closest point, the area is around 450 metres to the south of the project site (on the south side of Heathcote Road.

The location of the Cubbitch Barta National Estate Area in relation to the project site is shown in **Att J – NMTD Location**.

The proposed NMTD facility is not expected to significantly increase ANSTO’s radioactive emissions profile and therefore is not expected to pose any potential impacts to the Cubbitch Barta National Estate Area or any other Commonwealth heritage places.

Likewise, the proposed NMTD is not expected to result in any direct or indirect impacts to the Royal National Park, which is located ~3 km to the south-east.

## 4.1.12 Commonwealth or Commonwealth Agency

**4.1.12.1 Is the proposed action to be taken by the Commonwealth or a Commonwealth Agency? ***

Yes

**4.1.12.2 Briefly describe the nature and extent of the likely impact on the whole of the environment. ***

ANSTO has completed a self-assessment on the potential impacts from the NMTD on Commonwealth land and by a Commonwealth agency consulting **Ref 2 – Significant impact guidelines 1.2- Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencie**s, ANSTO has identified the following possible impacts to the environment, and subsequently assessed the significance of these impacts. In summary the impacts assessed for significance are;

***Construction of the NMTD***

**Activity:**

Small increase demand on surrounding road infrastructure during the site preparation and construction phases.

**Impact:**

During site preparation and construction, there will be a small increase in heavy vehicle ingress and egress to the LHSTC. While the timing and utilisation will be determined by the Principal Contractor in consultation with ANSTO, it is anticipated the additional demand on local roads (primarily New Illawarra Road and Heathcote Road) will be <1 heavy vehicles per hour during peak activity times. It is estimated the increased demand on public roads will be negligible.

**Mitigation controls:**

A traffic management plan will be required to be implemented by the Principal Contractor to minimise traffic demand, particularly at peak traffic times.

**Traffic Management During Operations**

During operations, any transportation of radioactive wastes will be conducted fully under ANSTO's control and complies to the relevant intent of the ARPANSA Code for the Safe Transport of Radioactive Material (**Ref 12 – ARPANSA Radiation Protection Series C-2: Code for the Safe Transport of Radioactive Material**) and NSW transport regulations, in line with routine approved operations on the Lucas Heights campus.

**Significance assessment:**

While the timing and utilisation will be determined by the Principal Contractor in consultation with ANSTO, it is anticipated the additional demand on local roads (primarily New Illawarra Road and Heathcote Road) will be <1 heavy vehicles per hour during peak activity times. While the control effectiveness is determined to be medium due to the extent of the demand not fully understood yet, due to the size of the project being relatively small in comparison to a large precinct or housing development, the impact to local roads is expected to be minimal. This should not trigger the requirement for referral in isolation.

***Operation of the NMTD***

**Activity:**

Emission of low levels of radioactive materials to air and wastewater

**Impact:**

Low levels of radioactive contaminants will be generated through the preparation of radioisotopes in the NMTD. Small quantities of liquid low- level radioactive waste will be produced throughout the lifecycle.

**Mitigation controls:**

The NMTD will be designed so that emissions of chemicals and radioactivity will be either zero or below prescribed limits. Monitoring devices will ensure compliance with regulatory requirements.

- The design of the NMTD will ensure that airborne contamination can only be discharged via the active ventilation system.

- The active ventilation will maintain a negative pressure within the NMTD with respect to the atmosphere, sufficient to ensure appropriate flow of air into the building and prevent egress of airborne contamination out of the building.
- All air extracted will be passed through HEPA filters and/or charcoal SIAM filters where required (**Att A – NMTD Facility Functional Description, Section 10 Active Ventilation System and HVAC**.
- Charcoal SIAM filters are required when there is a potential to release volatile radioactive materials such as vapours from I-131.
- The ventilation system will have mechanical redundancy.

Solid and liquid waste will be stored within shielded containment for transfer to Waste Management Services after an appropriate decay time for short-lived isotopes or for longer term storage for long-lived isotopes. Secondary containment and radiation and contamination monitoring for leakage will be provided, where appropriate **Att A – NMTD Facility Functional Description, Section 11 Waste Management)**.

**Significance assessment:**

Since the NMTD will have one or two orders of magnitudes lower holdings of radioisotopes to the same isotopes used within the existing Building 23 ANSTO Health Products facility, with the controls being implemented, the radioactive emissions to the atmosphere are expected to have a negligible contribution to the LHSTC site-wide emissions profile. There it is considered that significant impacts to reference organisms is highly unlikely, consistent with previous ecological dose screening assessments.

ANSTO does not believe that the proposed action will generate and release substantial amounts of radioactive substances which would have a significant impact on reference organisms, the community or the environment as a whole. This should not trigger the requirement for referral in isolation, noting however that the proposed action is being referred to as a nuclear action under s.22 of the EPBC Act.

Overall, the impact to the whole of the environment is expected to be negligible from the establishment of the NMTD. The radioactive emissions profile will only have a small increase to ANSTO's overall profile, which is already well below (**Ref 7 – ANSTO - E-785 Screening assessment of dose rates to wildlife**) ecological dose screening thresholds (**Ref 13 – ARPANSA Guide G-1: Radiation Protection of the Environment).** Direct or indirect impacts from construction of the NMTD are expected to be minimal, due to the nature that the facility will be constructed within an existing building envelope (Building 22) at the LHSTC. A project /construction environmental management plan (P/CEMP - **Att G – AF-5947 Project – Construction Environmental Management Plan**) will be prepared and implemented, meeting ANSTO's minimum requirements for protection of the environment (**Att E – AP-5400 Project Environmental Protection Requirements**).

# 4.2 Impact summary

## Conclusion on the likelihood of significant impacts

You have indicated that the proposed action will likely have a significant impact on the following Matters of National Environmental Significance:

*None*

## Conclusion on the likelihood of unlikely significant impacts

You have indicated that the proposed action will unlikely have a significant impact on the following Matters of National Environmental Significance:

- World Heritage (S12)
- National Heritage (S15B)
- Ramsar Wetland (S16)
- Threatened Species and Ecological Communities (S18)
- Migratory Species (S20)
- Nuclear (S21)
- Commonwealth Marine Area (S23)
- Great Barrier Reef (S24B)
- Water resource in relation to large coal mining development or coal seam gas (S24D)
- Commonwealth Land (S26)
- Commonwealth Heritage Places Overseas (S27B)
- Commonwealth or Commonwealth Agency (S28)

## 4.3 Alternatives

### 4.3.1 Do you have any possible alternatives for your proposed action to be considered as part of your referral? *

No

### 4.3.8 Describe why alternatives for your proposed action were not possible. *

To support the supply to the Australian community of the current suite of high quality radiopharmaceuticals produced by ANSTO Health Products and the future Nuclear Medicine Manufacturing Facility, a new purpose-built technology demonstration asset is required. ANSTO investigated a number of options at the LHSTC which could accommodate the NMTD, including establishing new free-standing structure at the LHSTC, repurposing existing radioisotope production facilities, or utilising other internal free space.

**Option 1 – Current NMTD proposal**

**Option 2 – New free-standing structure**

ANSTO determined that the cost of establishing a new free-standing structure for the NMTD was not viable for the scope and scale of product development research which the NMTD would facilitate. This option would also introduce other impacts including excavation works and new service connections, such as electricity, water, trade waste. Development of a new free-standing structure would require a significant extension of time to the program, limiting the capability to develop operator skill and techniques for the future NMMF.

**Option 3 – Retrofitting existing radiopharmaceutical facilities or other 'free-space' areas**

ANSTO explored options to retrofit existing radiopharmaceutical production areas, however the amount of space available could not feasibly accommodate the NMTD. Other 'free space' areas at the LHSTC were also explored, however the current Building 22 was found to be the most suitable due to the access to existing services and building height.

**Option 4 – Do nothing**

The option to do nothing was also considered, however the benefit to the Australian people through the continued supply of quality radiopharmaceuticals was determined to not be in line with ANSTO's Strategic Objective 2 within its Corporate Plan (**Ref 14 – ANSTO Corporate Plan 2023–2027, page 30**), and therefore concluded to not be a desirable outcome.

The current NMTD proposal is considered to represent the best option for product and process development of nuclear medicines to achieve the Nuclear Medicine Manufacturing Program objective to improve the health of Australia by supporting access to current and future nuclear technologies for diagnostic, therapeutic and innovative treatments for current and emerging diseases.

# 5. Lodgement

## 5.1 Attachments

1.2.1 Overview of the proposed action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 29/11/2024 | No | High |

1.2.6 Commonwealth or state legislation, planning frameworks or policy documents that are relevant to the proposed action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att B – Self-Assessment on Impacts to the Environment for the NMTD.pdf<br>ANSTO's EPBC self-assessment of the NMTD incorporating the significance assessment against thresholds from EPBC Significance Guidelines 1.1 and 1.2. | 11/12/2024 | No | High |
| #2. | Document | Att C - Sydney Water Trade Waste Agreement #4423.pdf<br>Trade waste discharge consent between ANSTO and Sydney Water Corporation - redacted version | 22/08/2022 | No | High |
| #3. | Document | Att C (SENSITIVE) - Sydney Water Trade Waste Agreement #4423.pdf<br>Trade waste discharge consent between ANSTO and Sydney Water Corporation - sensitive version | 22/08/2022 | Yes | High |
| #4. | Link | Ref 1 - Significant Impact Guidelines 1.1 - Matters of National Environmental Significance<br>https://www.dcceew.gov.au/sites/default/files/do.. | | | High |
| #5. | Link | Ref 2 - Significant impact guidelines 1.2 - Actions on, or impacting upon, Commonwealth land and Act<br>https://www.dcceew.gov.au/sites/default/files/do.. | | | High |
| #6. | Link | Ref 3 - Local Environmental Monitoring<br>https://www.ansto.gov.au/science/environment/env.. | | | High |

| | | | | |
|---|---|---|---|---|
| #7. | Link | Ref 4 - ARPANSA Radiation Protection Series F-1: Protection Against Ionising Radiation https://www.arpansa.gov.au/regulation-and-licens.. | | High |

1.3.2.17 (Person proposing to take the action) Proposer's history of responsible environmental management

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att D - Health, Safety, Community and Environmental Policy.pdf<br>ANSTO's high level policy detailing its commitments to prevent or minimise its impacts on the environment. | 17/06/2021 | No | High |
| #2. | Link | Ref 5 - ANSTO Environmental Sustainability Strategy https://www.ansto.gov.au/science/environment/env.. | | | High |

1.3.2.18 (Person proposing to take the action) If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att D - Health, Safety, Community and Environmental Policy.pdf<br>ANSTO's high level policy detailing its commitments to prevent or minimise its impacts on the environment. | 16/06/2021 | No | High |
| #2. | Document | Att E - AP-5400 Project Environmental Protection Requirements.pdf<br>This document provides the overarching planning framework and requirements for the protection of the environment from project, construction, decommissioning and maintenance activities at ANSTO. | 01/10/2024 | No | High |
| #3. | Document | Att F - AF-1376 Project Environmental Planning Checklist.pdf<br>This checklist informs project planners to understand the environmental regulatory approvals requirement and internal planning requirements for any project conducted at ANSTO. | 30/10/2024 | No | High |
| #4. | Document | Att G - AF-5947 Project - Construction Environmental Management Plan.pdf<br>This form is completed for all major | 01/11/2024 | No | High |

| | | | | | |
|---|---|---|---|---|---|
| | | projects conducted at ANSTO which may have an impact on the environment. This form may be complemented by a Principal Contractor's own environmental management plan. | | | |
| #5. | Document | Att H - AF-2315 Safe Work Method and Environmental Statement (SWMES).pdf This form assists any staff member of ANSTO (or contractors) to identify, mitigate, and risk assess safety and environmental hazards for high risk or non-routine activities. | 29/04/2024 | No | High |

3.1.3 Natural features, important or unique values that applies to the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att I - Consolidated volume of reports on groundwater investigations at the LHSTC to May 2007.pdf Summarises the findings from numerous hydrogeological studies performed in the Lucas Heights area prior to 2007. | 30/06/2007 | No | High |
| #2. | Link | Ref 6 - Vegetation Communities Map https://datasets.seed.nsw.gov.au/dataset/nsw-sta.. | | | High |

3.2.1 Flora and fauna within the affected area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Link | Ref 6 - Vegetation Communities Map https://datasets.seed.nsw.gov.au/dataset/nsw-sta.. | | | High |
| #2. | Link | Ref 7 - E-785 ANSTO Screening assessment of dose rates to Wildlife https://apo.ansto.gov.au/dspace/bitstream/10238/.. | | | High |

3.2.2 Vegetation within the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| #1. | Document | Att I - Consolidated volume of reports on groundwater investigations at the LHSTC to May 2007.pdf<br>Summarises the findings from numerous hydrogeological studies performed in the Lucas Heights area prior to 2007. | 29/06/2007 | No | High |
| #2. | Link | Ref 8 - Wollongong Port Hacking 1:100 000 Geological Map<br>https://shop.regional.nsw.gov.au/products/137 | | | High |
| #3. | Link | Ref 9 - Australian Soil Resource Information System<br>https://www.asris.csiro.au/themes/AcidSulfateSoi.. | | | High |

3.3.1 Commonwealth heritage places overseas or other places that apply to the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att J - NMTD Location.pdf<br>Location of the NMTD Facility in relation to the Cubbitch Barta National Estate Area and Engadine | 27/05/2024 | No | High |

3.3.2 Indigenous heritage values that apply to the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att J - NMTD Location.pdf<br>Location of the NMTD Facility in relation to the Cubbitch Barta National Estate Area and Engadine | 26/05/2024 | No | High |
| #2. | Document | Att X (SENSITIVE) - AHIMS search result.pdf<br>Search result for Indigenous heritage sites in proximity the LHSTC including the proposed NMTD facility | 08/09/2022 | Yes | High |

3.4.1 Hydrology characteristics that apply to the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att I - Consolidated volume of reports on groundwater investigations at the LHSTC to May 2007.pdf<br>Summarises the findings from numerous hydrogeological studies performed in the Lucas Heights area prior to 2007. | 29/06/2007 | No | High |

| | | | | |
|---|---|---|---|---|
| #2. | Link | Ref 10 - Sutherland Shire Council – Shire Maps https://mapping.ssc.nsw.gov.au/ShireMaps/ | | High |

4.1.3.3 (Ramsar Wetland) Why your action is unlikely to have a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 28/11/2024 | No | High |
| #2. | Link | Ref 3 - Local Environmental Monitoring https://www.ansto.gov.au/science/environment/env.. | | | High |
| #3. | Link | Ref 7 - E-785 ANSTO Screening assessment of dose rates to Wildlife, pages 14-15 https://apo.ansto.gov.au/dspace/bitstream/10238/.. | | | High |

4.1.4.3 (Threatened Species and Ecological Communities) Why your action is unlikely to have a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 28/11/2024 | No | High |
| #2. | Document | Att E - AP-5400 Project Environmental Protection Requirements.pdf<br>This document provides the overarching planning framework and requirements for the protection of the environment from project, construction, decommissioning and maintenance activities at ANSTO. | 27/10/2021 | No | High |
| #3. | Document | Att G - AF-5947 Project - Construction Environmental Management Plan.pdf<br>This form is completed for all major projects conducted at ANSTO which may have an impact on the | 27/10/2021 | No | High |

| | | | | |
|---|---|---|---|---|
| | | environment. This form may be complemented by a Principal Contractor's own environmental management plan. | | |
| #4. | Link | Ref 7 - E-785 ANSTO Screening assessment of dose rates to Wildlife, pages 14-15 https://apo.ansto.gov.au/dspace/bitstream/10238/.. | | High |

4.1.5.3 (Migratory Species) Why your action is unlikely to have a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 28/11/2024 | No | High |
| #2. | Document | Att E - AP-5400 Project Environmental Protection Requirements.pdf<br>This document provides the overarching planning framework and requirements for the protection of the environment from project, construction, decommissioning and maintenance activities at ANSTO. | 27/10/2021 | No | High |
| #3. | Document | Att G - AF-5947 Project - Construction Environmental Management Plan.pdf<br>This form is completed for all major projects conducted at ANSTO which may have an impact on the environment. This form may be complemented by a Principal Contractor's own environmental management plan. | 27/10/2021 | No | High |
| #4. | Link | Ref 7 - E-785 ANSTO Screening assessment of dose rates to Wildlife, pages 14-15 https://apo.ansto.gov.au/dspace/bitstream/10238/.. | | | High |

4.1.6.2 (Nuclear) Why your action has a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | | | | |

| | | | |
|---|---|---|---|
| Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 28/11/2024 | No | High |

4.1.6.6 (Nuclear) Why you do not consider the direct and/or indirect impact to be a Significant Impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 28/11/2024 | No | High |
| #2. | Link | Ref 11 - ARPANSA Regulatory Guide GDE-1735 - Plans and arrangements for managing safety https://www.arpansa.gov.au/regulation-and-licens.. | | | High |

4.1.6.9 (Nuclear) Why you do not think your proposed action is a controlled action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 28/11/2024 | No | High |
| #2. | Link | Ref 3 - Local Environmental Monitoring https://www.ansto.gov.au/science/environment/env.. | | | High |
| #3. | Link | Ref 7 - E-785 ANSTO Screening assessment of dose rates to Wildlife, pages 14-15 https://apo.ansto.gov.au/dspace/bitstream/10238/.. | | | High |

4.1.6.10 (Nuclear) Avoidance or mitigation measures proposed for this action

| Type | Name | Date | Sensitivity | Confidence | |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 28/11/2024 | No | High |
| #2. | Link | Ref 12 - Radiation Protection Series C-2 ARPANSA Code for the Safe Transport of Radioactive Material https://www.arpansa.gov.au/regulation-and-licens.. | | | High |

4.1.10.2 (Commonwealth Land) Why your action has a direct and/or indirect impact on the identified protected matters

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 28/11/2024 | No | High |
| #2. | Document | Att B – Self-Assessment on Impacts to the Environment for the NMTD.pdf<br>ANSTO's EPBC self-assessment of the NMTD incorporating the significance assessment against thresholds from EPBC Significance Guidelines 1.1 and 1.2. | 10/12/2024 | No | High |
| #3. | Link | Ref 2 - Significant impact guidelines 1.2 - Actions on, or impacting upon, Commonwealth land and Act https://www.dcceew.gov.au/sites/default/files/do.. | | | High |

4.1.10.6 (Commonwealth Land) Why you do not consider the direct and/or indirect impact to be a Significant Impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the | 28/11/2024 | | High |

| | | | | | |
|---|---|---|---|---|---|
| | | NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | | | |
| #2. | Document | Att B – Self-Assessment on Impacts to the Environment for the NMTD.pdf<br>ANSTO's EPBC self-assessment of the NMTD incorporating the significance assessment against thresholds from EPBC Significance Guidelines 1.1 and 1.2. | 10/12/2024 | No | High |

4.1.10.9 (Commonwealth Land) Why you do not think your proposed action is a controlled action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att B – Self-Assessment on Impacts to the Environment for the NMTD.pdf<br>ANSTO's EPBC self-assessment of the NMTD incorporating the significance assessment against thresholds from EPBC Significance Guidelines 1.1 and 1.2. | 10/12/2024 | No | High |
| #2. | Link | Ref 13 – ARPANSA Guide G-1: Radiation Protection of the Environment<br>https://www.arpansa.gov.au/regulation-and-licens.. | | | High |
| #3. | Link | Ref 7 - E-785 ANSTO Screening assessment of dose rates to Wildlife, pages 14-15<br>https://apo.ansto.gov.au/dspace/bitstream/10238/.. | | | High |

4.1.10.10 (Commonwealth Land) Avoidance or mitigation measures proposed for this action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att E - AP-5400 Project Environmental Protection Requirements.pdf<br>This document provides the overarching planning framework and requirements for the protection of the environment from project, construction, decommissioning and maintenance activities at ANSTO. | 27/10/2021 | No | High |
| #2. | Document | Att G - AF-5947 Project - Construction Environmental Management Plan.pdf | 27/10/2021 | No | High |

| |
|---|
| This form is completed for all major projects conducted at ANSTO which may have an impact on the environment. This form may be complemented by a Principal Contractor's own environmental management plan. |

4.1.11.3 (Commonwealth heritage places overseas) Why your action is unlikely to have a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att J - NMTD Location.pdf<br>Location of the NMTD Facility in relation to the Cubbitch Barta National Estate Area and Engadine | 26/05/2024 | No | High |

4.1.12.2 (Commonwealth or Commonwealth Agency) Nature and extent of the likely impact on the whole of the environment

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A - NMTD Facility Functional Description.pdf<br>Provide a functional description of the NMTD, specifically describing: built-form of the facility; process overview; active ventilation; waste management; and security. | 28/11/2024 | No | High |
| #2. | Document | Att B – Self-Assessment on Impacts to the Environment for the NMTD.pdf<br>ANSTO's EPBC self-assessment of the NMTD incorporating the significance assessment against thresholds from EPBC Significance Guidelines 1.1 and 1.2. | 10/12/2024 | No | High |
| #3. | Document | Att E - AP-5400 Project Environmental Protection Requirements.pdf<br>This document provides the overarching planning framework and requirements for the protection of the environment from project, construction, decommissioning and maintenance activities at ANSTO. | 27/10/2021 | Yes | High |
| #4. | Document | Att G - AF-5947 Project - Construction Environmental Management Plan.pdf<br>This form is completed for all major projects conducted at ANSTO which may have an impact on the environment. This form may be complemented by a Principal | 27/10/2021 | | High |

| | | | |
|---|---|---|---|
| Contractor's own environmental management plan. | | | |
| #5. | Link | Ref 12 - ARPANSA Radiation Protection Series C-2: Code for the Safe Transport of Radioactive Materia https://www.arpansa.gov.au/regulation-and-licens.. | High |
| #6. | Link | Ref 13 – ARPANSA Guide RPS G-1: Radiation Protection of the Environment https://www.arpansa.gov.au/sites/default/files/l.. | High |
| #7. | Link | Ref 2 - Significant impact guidelines 1.2 - Actions on, or impacting upon, Commonwealth land and Act https://www.dcceew.gov.au/sites/default/files/do.. | High |
| #8. | Link | Ref 7 - E-785 ANSTO Screening assessment of dose rates to Wildlife, pages 14-15 https://apo.ansto.gov.au/dspace/bitstream/10238/.. | High |

4.3.8 Why alternatives for your proposed action were not possible

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Link | Ref 14 – ANSTO Corporate Plan 2024–2028 https://www.ansto.gov.au/about/governance/corpor.. | | | High |

## 5.2 Declarations

## Completed Referring party's declaration

The Referring party is the person preparing the information in this referral.

| | |
|---|---|
| ABN/ACN | 47956969590 |
| Organisation name | AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION |
| Organisation address | New Illawarra Road, Lucas Heights 2234 NSW |
| Representative's name | Michael Baker |
| Representative's job title | Manager, Regulatory Affairs and Compliance - Environment and Sustainability |
| Phone | 0429155994 |
| Email | mhb@ansto.gov.au |
| Address | 178 New Illawarra Road, Lucas Heights NSW 2234 |

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ By checking this box, I, **Michael Baker of AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION**, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

## Completed Person proposing to take the action's declaration

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

| | |
|---|---|
| ABN/ACN | 47956969590 |
| Organisation name | AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION |
| Organisation address | New Illawarra Road, Lucas Heights NSW 2234 |

| | |
|---|---|
| Representative's name | Jakob Vujcic |
| Representative's job title | General Manager, Regulatory and Governance |
| Phone | 02 9717 3844 |
| Email | vujcicj@ansto.gov.au |
| Address | New Illawarra Road, Lucas Heights NSW 2234 |

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ I, **Jakob Vujcic of AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION**, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

## ✔ Completed Proposed designated proponent's declaration

The Proposed designated proponent is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ I, **Jakob Vujcic of AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION**, the Proposed designated proponent, consent to the designation of myself as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

☐ I would like to receive notifications and track the referral progress through the EPBC portal. *