EPBC Referral Self-Assessment on Impacts to the Environment for the Nuclear Medicine Technology Demonstration (NMTD) Facility

This self-assessment informs the decision by ANSTO to whether a referral to the Minister for the Environment is required for the proposed action.

Contents

1. Purpose and scope

1.1 Purpose

Under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* an action will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

In addition, under the EPBC Act,

1. any person who proposes to take an action which is either situated on Commonwealth land or which may impact on Commonwealth land, and/or
2. representatives of Commonwealth agencies who propose to take an action that may impact on the environment anywhere in the world,

will require approval from the minister if the action has, will have, or is likely to have, a significant impact.

1.2 What is an action?

'Action' is defined broadly in the EPBC Act and includes: a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things.

1.3 Matters of National Environmental Significance

Matters of National Environmental Significance Matters of national environmental significance are:

- listed threatened species and ecological communities
- migratory species protected under international agreements
- Ramsar wetlands of international importance
- the Commonwealth marine environment
- World Heritage properties
- National Heritage places
- the Great Barrier Reef Marine Park, and
- nuclear actions, and
- a water resource, in relation to coal seam gas development and large coal mining development.

1.4 What is a significant impact?

A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. You should consider all of these factors when determining whether an action is likely to have a significant impact on matters of national environmental significance.

1.5 When is a significant impact likely?

To be 'likely', it is not necessary for a significant impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility. If there is scientific uncertainty about the impacts of your action and potential impacts are serious or irreversible, the precautionary principle is applicable. Accordingly, a lack of scientific certainty about the potential impacts of an action will not itself justify a decision that the action is not likely to have a significant impact on the environment.

This self-assessment incorporates the referral thresholds as indicated in:

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

1.6 How to use this form

The completion of this form should be informed by the results of AF-1376 Project Environmental Planning Checklist

Project team

- Project team should complete **section 2** of this form and attach relevant project documents which can support how the proposed action will or will not have a significant impact on matters of national environmental significance.
- The information to be provided in this form will inform the responses required within the EPBC referral.

Regulatory and Governance in consultation with project team

- A search using the protected matters search tool must be conducted. This search will inform many of the inputs in **section 4**.
- Using the information provided by the project team, answer the questions in **section 4**.
- Questions in green and red must be answered.
    - Where any question in red is answered yes, a referral must be submitted.
- Where a question in green has been answered yes, information (informed by the protected matters search) in blue must be completed, subsequent questions in orange must be answered.
- All questions in yellow must be answered.
- **Where an inherent likelihood (consulting AG-2395) is rated 'likely' or above, information on 'Mitigation controls', 'Certainty of control effectiveness', and 'Significance assessment' must be completed.**

Results of self-assessment

- Where a proposed action is determined to require referral, this self-assessment should be provided as an attachment to the referral.
- Where a proposed action is determined not to require referral, this self-assessment should be saved in the appropriate project and Regulatory and Governance team information management systems.

2. Description of the Action (Project team to lead input)

2.1 Project description

Embed in this document.

- In Word, go to the 'Insert' tab on the ribbon above.
- Select 'Object' under the 'Text' section in the ribbon.
- In the dialogue box, click the tab 'Create from file'. Find the location of the PMST PDF you saved.
- Check the box 'Display as icon', then press 'Ok'.

Create link from Sharepoint

- After saving the file in Sharepoint / Onedrive – create a link to it, remembering to add staff who can view it, and paste below.

Provide a description of the proposed action, preferably as documented project plan
The proposed action is for the construction of a Nuclear Medicine Technology Demonstration (**NMTD**) Facility 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 the existing Building 22 managed by ANSTO at the LHSTC. The NMTD will operate under the existing Australian Radiation Protection and Nuclear Safety Agency (**ARPANSA**), facility licence F0262, issued for ANSTO Health Products operations. To facilitate this addition to this licence, a submission pursuant to section 63 of the Australian Radiation Protection and Nuclear Safety Regulations 2018. Currently, Building 22 consists of facilities to support the Centre for Accelerator Science (**CAS**) and National Deuteration Facility (**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 located next to the proposed siting of the NMTD. ARPANSA facility licence F0316 will not apply to the NMTD. The primary function of the NMTD is to provide the physical workspace and testing equipment to support ANSTO's Nuclear Medicine Manufacturing Program 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 mock-up hot cell containment areas and manufacturing line equipment, • Demonstrating safe operation and maintenance of the equipment. • 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 facility, effectively a building within a building. The facility will comprise of four main areas: radioactive working area; plant room; wet chemistry area (non-radioactive); and, gowning area. 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 tradewaste discharge (C-line); in-bound truck bay.

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 the 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. The primary radioisotopes intended to be used within this area are molybedenum-99/technetium-99m, iodine-131 and lutetium-177. Additional isotopes are proposed to be introduced at a later date.

Plant room area (~70 m2)

The plant room shall occupy the existing rooms 0024 and 0025 on the ground floor of Building 22 and contains all radioactive ventilation system and heating, ventilation and air conditioning equipment not included in the radioactive working area.

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 Lightwater (**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
- Regulatory approvals, commissioning and handover
- Procurement of a principal construction contractor
- Project management, safety and reliability assurance
- Procurement of key plant and equipment (including hot cells)
- **Construction of the NMTD**
- **Operation of the NMTD.**

The ultimate decommissioning of the NMTD is excluded from the scope of this referral.

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

2.2 Alternatives to undertaking the proposed action

Provide details of alternatives to undertaking the proposed action.
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 Nuclear Medicine Manufacturing Facility. 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, 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.

2.3 Timing duration and frequency of the activity and its impacts

Provide details of the intended duration, timing (including day/night and seasonal) and frequency of higher impact activities.
Estimated start date – 7 May 2025 Estimated end date – 8 February 2027

2.4 Context of the proposed action

Describe the location, geographical context, current uses of the land where the proposed action is proposed.
a. What is the location of the proposed action and proximity to significant infrastructure? b. Reasons behind the selection of the site for the proposed action. c. Is the action being conducted on Commonwealth land? d. What are the historic uses of the land? e. What are the current uses of the land? f. What are the current uses of land which may be indirectly impacted by the action? Consider land uses which may be impacted from: the altering of watercourses, increased traffic.
ANSTO's main campus is located along New Illawarra Road at Lucas Heights, about 35 km south-west of the Sydney CBD on the Woronora Plateau at an elevation of about 150 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 ANSTO Lucas Heights Campus was established in the 1950s, with many of its current buildings and much of its site infrastructure dating back to that era. The total campus comprises approximately 500 ha of which around 70 ha is developed while the remainder is a combination of landfill, brownfields and bushland (referred to as the bushland perimeter zone). At the time of initial development of the site, the whole of the70 ha development area was cleared to bedrock to allow construction of the site.

The 70 ha 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. The residential suburbs of Barden Ridge and Engadine are located in the north-east to south-east sectors adjacent to the ANSTO bushland perimeter zone boundary while the suburban area of Menai is located around 3 km further to the north-east.

The Building 22 was constructed in the 1960s to host the MOATA Research Reactor which was decommissioned in 2008..

There are no features in the project area that are vulnerable, rare or of otherwise important 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.

2.5 Sensitivity of the environment

Describe the environmental setting (native bushland, urbanised, revegetated), conditions and specific sensitivities or vulnerabilities.

The study area is located in 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 - Coastal Upland Swamp in the Sydney Basin Bioregion (PCT1803)

PCT 1803 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* (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) vegetation communities known to exist in the broader LHSTC include:

- PCT 1826: Dwarf Apple Banksia Tea tree - Hakea heath-woodland on the hinterland sandstone plateaus

- PCT 1803: Banksia Needlebush Tea-tree damp health swamps on coastal sandstone plateaus
- PCT 1787: Red Bloodwood Scribbly Gum Stringybark open forest on sandstone ridges
- Urban exotic/native vegetation.

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 and BC Acts. 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 (E-785 ANSTO Screening assessment of dose rates to Wildlife) 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 below standard benchmarks for all organisms and all pathways considered.

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

Soil characteristics

The Wollongong-Port Hacking 1:100,000 Geological Series Sheet 9029-9129 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. 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 indicates that 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.

Commonwealth Heritage

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. 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.

Indigenous Heritage

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.

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.

Hydrology

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 ANSTO Lucas Heights campus is far removed from a natural drainage channel in the adjacent terrain.

No watercourses occur within the project 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 Lucas Heights campus 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**.** 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 Lucas Heights 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 project area 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 monitoring at the OPAL reactor site to the west of the project site 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 betweenRL147.1mAHD to RL153.9mAHD, approximately 2.5 to 9m below ground level.

a long term, deeper groundwater level at RL~144.2mAHD to RL146.4mAHD, around 8 to 13m belowground 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. Likewise 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.

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 project site.

Flooding

Local council flood mapping for the Sutherland Shire indicates the project site (or the broader ANSTO campus) is not within an area that can be expected to be inundated by flooding.

2.6 Sources of information

(e.g. floral and faunal studies, heritage surveys – please embed or link as per the instructions provided in section 2.1)

Provide details of the sources of information obtained to inform the outcomes of this self-assessment.

3. Results of Protected Matters Search Tool (PMST)

Steps to generate a report out of the PMST.

- Go to: https://pmst.environment.gov.au/
  - The link above should default to the Lucas Heights campus.
- Expand 'draw' on the left sidebar and click 'draw a polygon'
- Draw as close as possible to likely project area. Multiple areas can be drawn if there are more than one project site.
- Expand 'Report' and check the checkbox 'Drawings'.
- A new dialogue box will appear asking you to select a buffer distance. Select 2 km, this will generally encompass all features within the ANSTO Buffer Zone. Click 'Explore'
- A new dialogue box will appear, click 'Generate PDF Report'.
- Select the file from your downloads and save it a folder location.

Insert or link PMST report here.

https://pmst.environment.gov.au/#/map/(m:mfi)?lng=150.98395407199862&lat=-34.05138604960808&zoom=18&baseLayers=Imagery,ImageryLabels

4. Significance assessment for MNES

4.1 Nuclear Actions

Nuclear Actions *EPBC Act s.21 Protection of the environment from nuclear actions*	
Will the action involve:	☒ Establishing or significantly modifying a nuclear installation. A nuclear installation being: a) a nuclear reactor for research or production of nuclear materials for industrial or medical use (including critical and sub-critical assemblies); b) a plant for preparing or storing fuel for use in a nuclear reactor as described in paragraph a); c) a nuclear waste storage or disposal facility with an activity that is greater than the activity level prescribed by regulations made for the purposes of this section; d) a facility for production of radioisotopes with an activity that is greater than the activity level prescribed by regulations made for the purposes of this section. ☐ Transporting spent nuclear fuel or radioactive waste products arising from reprocessing ☐ Establishing or significantly modifying a facility for storing radioactive waste products rising from reprocessing ☐ Mining or milling uranium ores ☐ Establishing or significantly modifying a large-scale disposal facility for radioactive waste ☐ Decommissioning or rehabilitating any facility or area in which one of the above has been undertaken ☐ Any other type of action set out in the EPBC Regulations. For the avoidance of doubt, proposed projects involving the recovery of sands or rare earths may constitute a 'nuclear action' if the proposed project falls within the above definition. A decision about whether a disposal facility is large scale will depend on factors including the activity of the radioactive materials to be disposed of (see regulation 2.02 of the *Environment Protection and Biodiversity Regulations 2000*).

Did you answer 'Referral required' to any of the questions in the Significance Assessment?	Yes ☒	No ☐	If yes, an EPBC referral is required.

4.2 Flora, Fauna and Ecological Communities

Are any listed threatened flora, fauna or migratory species, or ecological communities likely found within the project area?	Yes ☐	Provide relevant details of listings below and complete **s.4.2.1 - 4.2.5**	No ☒	**Only complete s.4.2.5 (section in yellow) below, then proceed to s.4.3**

Protected Matters Search – Listed threatened flora				
Common name	**Scientific name**	**EPBC listing**	**Prescence text**	**Relevant to action (provide reason)**
Error! Reference s ource not found.				

Protected Matters Search – Listed threatened fauna				
Common name	**Scientific name**	**EPBC listing**	**Prescence text**	**Relevant to action (provide reason)**

Protected Matters Search – Migratory				
Common name	**Scientific name**	**EPBC listing**	**Prescence text**	**Relevant to action (provide reason)**

Protected Matters Search – Listed threatened ecological communities			
Community name	**EPBC listing**	**Prescence text**	**Relevant to action (provide reason)**

Significance Assessment – Flora, Fauna and Ecological Communities
EPBC Act s.18 Listed threatened species and communities; s.20 Listed migratory species; s.26 Commonwealth land; s.28 Commonwealth agencies

Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
4.2.1 MNES – Extinct in the wild species	**4.2.1.a.** adversely affect a captive or propagated population or one recently introduced / reintroduced to the wild.		Choose an item		Choose an item.	Referral required? ☐

Significance Assessment – Flora, Fauna and Ecological Communities *EPBC Act s.18 Listed threatened species and communities; s.20 Listed migratory species; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
☐ Species identified in PMST - complete this section	**4.2.1.b.** interfere with the recovery of the species or its reintroduction into the wild.		Choose an item		Choose an item.	Referral required? ☐
4.2.2 MNES – Critically endangered, endangered, vulnerable species ☐ Species identified in PMST - complete this section	**4.2.2.a.** lead to a long-term decrease in the size of a population.		Choose an item		Choose an item.	Referral required? ☐
	4.2.2.b. reduce the area of occupancy of the species.		Choose an item		Choose an item.	Referral required? ☐
	4.2.2.c. fragment an existing population into two or more populations.		Choose an item		Choose an item.	Referral required? ☐
	4.2.2.d. adversely affect habitat critical to the survival of a species.		Choose an item		Choose an item.	Referral required? ☐
	4.2.2.e. disrupt the breeding cycle of a population.		Choose an item		Choose an item.	Referral required? ☐
	4.2.2.f. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.		Choose an item		Choose an item.	Referral required? ☐
	4.2.2.g. result in invasive species that are harmful to a critically endangered or endangered species becoming established in		Choose an item		Choose an item.	Referral required? ☐

Significance Assessment – Flora, Fauna and Ecological Communities *EPBC Act s.18 Listed threatened species and communities; s.20 Listed migratory species; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
	the endangered or critically endangered species' habitat.					
	4.2.2.h. introduce disease that may cause the species to decline.		Choose an item		Choose an item.	Referral required? ☐
	4.2.2.i. interfere with the recovery of the species.		Choose an item		Choose an item.	Referral required? ☐
4.2.3 MNES – Listed migratory species ☐ Species identified in PMST - complete this section	**4.2.3.a.** substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.		Choose an item		Choose an item.	Referral required? ☐
	4.2.3.b. result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.		Choose an item		Choose an item.	Referral required? ☐
	4.2.3.c. seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.		Choose an item		Choose an item.	Referral required? ☐
4.2.4 MNES – Critically endangered and endangered	**4.2.4.a.** reduce the extent of an ecological community.		Choose an item		Choose an item.	Referral required? ☐

Significance Assessment – Flora, Fauna and Ecological Communities *EPBC Act s.18 Listed threatened species and communities; s.20 Listed migratory species; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
ecological communities ☐ Species identified in PMST - complete this section	**4.2.4.b.** fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission line.		Choose an item		Choose an item.	Referral required? ☐
	4.2.4.c. adversely affect habitat critical to the survival of an ecological community.		Choose an item		Choose an item.	Referral required? ☐
	4.2.4.d. modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.		Choose an item		Choose an item.	Referral required? ☐
	4.2.4.e. cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.		Choose an item		Choose an item.	Referral required? ☐
	4.2.4.f. cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: – assisting invasive species, that are harmful to the listed ecological community, to become established, or – causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants		Choose an item		Choose an item.	Referral required? ☐

Significance Assessment – Flora, Fauna and Ecological Communities *EPBC Act s.18 Listed threatened species and communities; s.20 Listed migratory species; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
	into the ecological community which kill or inhibit the growth of species in the ecological community.					
	4.2.4.g. interfere with the recovery of an ecological community.		Choose an item		Choose an item.	Referral required? ☐
4.2.5 Commonwealth entity-specific matters This section must be completed.	**4.2.5.a.** involve medium or large-scale native vegetation clearance.	No clearance activities will be conducted.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.2.5.b. involve any clearance of any vegetation containing a listed threatened species which is likely to result in a long-term decline in a population or which threatens the viability of the species.	No clearance activities will be conducted.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.2.5.c. introduce potentially invasive species.	No live plant material is planned to be introduced through the construction or operation of the NMTD.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.2.5.d. involve the use of chemicals which substantially stunt the growth of native vegetation.	Emissions of radioactive contaminants to the environment are expected to be low, even in the absence of the controls being implemented. Impacts to vegetation is expected to be negligible.	Highly unlikely	Engineering controls will be implemented to reduce atmospheric emissions to as low as reasonably practicable using HEPA (High-Efficiency Particulate Air)	Choose an item.	Due to the engineering controls implemented, no releases of liquid radioactive contaminants to the environment have occurred at ANSTO from the storage of or transfer from radioisotope production facilities.

Significance Assessment – Flora, Fauna and Ecological Communities *EPBC Act s.18 Listed threatened species and communities; s.20 Listed migratory species; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
				filters and/or charcoal filters (Standard Iodine Adsorption Module – SIAM filters). Liquid ad solid wastes will be controlled using existing discharge and transfer systems at ANSTO.		The quantity of holdings and any emissions to the atmosphere or tradewaste will not significantly increase upon existing levels, previously determined for the LHSTC. ANSTO does not expect that the addition of the NMTD will significantly increase ANSTO's dose rate profile to reference organisms. Referral required? ☐
	4.2.5.e. involve large-scale controlled burning or any controlled burning in sensitive areas, including areas which contain listed threatened species.	No clearance activities will be conducted.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.2.5.f. cause a long-term decrease in, or threaten the viability of, a native animal population or populations, through death, injury or other harm to individuals.	Emissions of radioactive contaminants to the environment are expected to be low, even in the absence of the controls being implemented. Impacts to local faunal populations is expected to be negligible.	Highly unlikely	Engineering controls will be implemented to reduce atmospheric emissions to as low as reasonably practicable using SIAM and HEPA filtration. Liquid ad solid wastes will be	High	Due to the engineering controls implemented, no releases of liquid radioactive contaminants to the environment have occurred at ANSTO from the storage of or transfer from radioisotope production facilities.

Significance Assessment – Flora, Fauna and Ecological Communities *EPBC Act s.18 Listed threatened species and communities; s.20 Listed migratory species; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
				controlled using existing discharge and transfer systems at ANSTO.		The quantity of holdings and any emissions to the atmosphere or tradewaste will not significantly increase upon existing levels, previously determined for the LHSTC. ANSTO does not expect that the addition of the NMTD will significantly increase ANSTO's dose rate profile to reference organisms. Referral required? ☐
	4.2.5.g. displace or substantially limit the movement or dispersal of native animal populations.	The proposed action is being conducted within an existing building, in the securely fenced LHSTC brownfield site. No impacts to local fauna are expected from the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.2.5.h. substantially reduce or fragment available habitat for native species.	No clearance activities will be conducted.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.2.5.i. reduce or fragment available habitat for listed threatened species which is likely to displace a population, result in a long-term	No clearance activities will be conducted.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Significance Assessment – Flora, Fauna and Ecological Communities *EPBC Act s.18 Listed threatened species and communities; s.20 Listed migratory species; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
	decline in a population, or threaten the viability of the species.					
	4.2.5.j. introduce exotic species which will substantially reduce habitat or resources for native species.	No live plant or animal material is planned to be introduced through the construction or operation of the NMTD.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Did you answer 'Referral required' to any of the questions in the Significance Assessment?	Yes ☐	No ☒	If yes, an EPBC referral is required.

4.3 Cultural Heritage

Are any listed World Heritage Places found in or within 2km of the project area?	Yes ☐	Provide details of relevant listings below and complete **s.4.3.1 & s.4.3.3**	No ☒	**Only complete s.4.3.3 (section in yellow) below, then proceed to s.4.4**
Are any listed Commonwealth Heritage Places found in or within 2km of the project area?	Yes ☐	Provide details of relevant listings below and complete **s.4.3.2 & s.4.3.3**		

Protected Matters Search – Commonwealth Heritage Places			
Name	**State**	**Listing status**	**Relevant to action (provide reason)**

Significance Assessment – Cultural Heritage *EPBC Act s.12 World Heritage; s.15B National Heritage; s.26 Commonwealth land; s.27B Commonwealth Heritage Places Overseas, s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
4.3.1 MNES – World heritage properties ☐ Matter identified in PMST - complete this section	**4.3.1.a.** one or more of the World Heritage values to be lost.		Choose an item		Choose an item.	Referral required? ☐
	4.3.1.b. one or more of the World Heritage values to be degraded or damaged.		Choose an item		Choose an item.	Referral required? ☐
	4.3.1.c. one or more of the World Heritage values to be notably altered, modified, obscured or diminished.		Choose an item		Choose an item.	Referral required? ☐
4.3.2 MNES – National heritage places	**4.3.2.a.** one or more of the National Heritage values to be lost.		Choose an item		Choose an item.	Referral required? ☐

Significance Assessment – Cultural Heritage *EPBC Act s.12 World Heritage; s.15B National Heritage; s.26 Commonwealth land; s.27B Commonwealth Heritage Places Overseas, s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
☐ Matter identified in PMST - complete this section	**4.3.2.b.** one or more of the National Heritage values to be degraded or damaged.		Choose an item		Choose an item.	Referral required? ☐
	4.3.2.c. one or more of the National Heritage values to be notably altered, modified, obscured or diminished.		Choose an item		Choose an item.	Referral required? ☐
4.3.3 Commonwealth entity-specific matters This section must be completed	**4.3.3.a.** permanently destroy, remove or substantially alter the fabric of a heritage place.	No heritage places will be physically impacted by the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.3.3.b. involve extension, renovation, or substantial alteration of a heritage place in a manner which is inconsistent with the heritage values of the place.	No heritage places will be physically impacted by the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.3.3.c. involve the erection of buildings or other structures adjacent to, or within important site lines of, a heritage place which are inconsistent with the heritage values of the place.	No heritage places will be physically impacted by the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.3.3.d. substantially diminish the heritage value of a heritage place for a community or group for which it is significant.	There are no heritage places in the vicinity of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.3.3.e. substantially alter the setting of a heritage place in a manner which is inconsistent with the heritage values of the place.	There are no heritage places in the vicinity of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Significance Assessment – Cultural Heritage *EPBC Act s.12 World Heritage; s.15B National Heritage; s.26 Commonwealth land; s.27B Commonwealth Heritage Places Overseas, s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
	4.3.3.f. substantially restrict or inhibit the existing use of a heritage place as a cultural or ceremonial site.	There are no heritage places in the vicinity of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Did you answer 'Referral required' to any of the questions in the Significance Assessment?	Yes ☐	No ☒	If yes, an EPBC referral is required.

4.4 Landscape, soils, geology and geotechnical

Significance Assessment – Landscape, soils, geology and geotechnical *EPBC Act s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
4.4.1 Commonwealth entity-specific matters This section must be completed	**4.4.1.a.** substantially alter natural landscape features.	The proposed action is being conducted within the building envelope of the existing Building 22. No clearing or earthworks are being conducted as part of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.4.1.b. cause subsidence, instability or substantial erosion.	The proposed action is being conducted within the building envelope of the existing Building 22. No clearing or earthworks are being conducted as part of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Significance Assessment – Landscape, soils, geology and geotechnical *EPBC Act s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
	4.4.1.c. involve medium or large-scale excavation of soil or minerals.	The proposed action is being conducted within the building envelope of the existing Building 22. No clearing or earthworks are being conducted as part of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.4.1.d. alter coastal processes, including wave action, sediment movement or accretion, or water circulation patterns.	No impacts to coastal ecosystems expected as a result of the distance from and contained nature of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.4.1.e. permanently alter tidal patterns, water flows or water quality in estuaries.	No impacts to estuarine ecosystems expected as a result of the distance from and contained nature of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.4.1.f. reduce biological diversity or change species composition in estuaries.	No impacts to estuarine vecosystems expected as a result of the distance from and contained nature of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.4.1.g. extract large volumes of sand or substantially destabilise sand dunes.	No impacts to coastal dunal ecosystems expected as a result of the distance from and contained nature of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Did you answer 'Referral required' to any of the questions in the Significance Assessment?	Yes ☐	No ☒	If yes, an EPBC referral is required.

4.5 Water (including surface and groundwater and the marine environment)

Is the proposed action likely to occur in or near to the Great Barrier Reef?	Yes ☐	Complete **s.4.5.1** & **s.4.5.4**	No ☒	**Only complete s.4.5.4**
Is the proposed action likely to occur in or affect the quality of a RAMSAR listed wetland?	Yes ☐	Provide details of relevant listings below and complete **s.4.5.2** & **s.4.5.4**		
Is the proposed action likely to occur in or affect the quality of the Commonwealth marine area?	Yes ☐	Complete **s.4.5.3** & **s.4.5.4**		

Protected Matters Search – RAMSAR listed wetland			
Name	**State**	**Listing status**	**Relevant to action (provide reason)**

Significance Assessment – Water (including surface and groundwater and the marine environment) *EPBC Act s.16 Wetlands of international importance; s.23 Marine environment; s.24B Great Barrier Reef Marine Park; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
4.5.1 MNES – Great Barrier Marine Park ☐ Matter identified in PMST - complete this section	**4.5.1.a.** modify, destroy, fragment, isolate or disturb an important, substantial, sensitive or vulnerable area of habitat or ecosystem component such that an adverse impact on marine ecosystem health, functioning or integrity in the Great Barrier Reef Marine Park results.		Choose an item		Choose an item.	Referral required? ☐
	4.5.1.b. have a substantial adverse effect on a population of a species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.		Choose an item		Choose an item.	Referral required? ☐

Significance Assessment – Water (including surface and groundwater and the marine environment) *EPBC Act s.16 Wetlands of international importance; s.23 Marine environment; s.24B Great Barrier Reef Marine Park; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
	4.5.1.c. result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological health or integrity or social amenity or human health.		Choose an item		Choose an item.	Referral required? ☐
	4.5.1.d. result in a known or potential pest species being introduced or becoming established in the Great Barrier Reef Marine Park.		Choose an item		Choose an item.	Referral required? ☐
	4.5.1.e. result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, or social amenity or human health may be adversely affected.		Choose an item		Choose an item.	Referral required? ☐
	4.5.1.f. have a substantial adverse impact on heritage values of the Great Barrier Reef Marine Park, including damage or destruction of an historic shipwreck.		Choose an item		Choose an item.	Referral required? ☐
4.5.2 MNES – Wetlands of international importance (RAMSAR)	**4.5.2.a.** areas of the wetland being destroyed or substantially modified.		Choose an item		Choose an item.	Referral required? ☐
	4.5.2.b. a substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland.		Choose an item		Choose an item.	Referral required? ☐

Significance Assessment – Water (including surface and groundwater and the marine environment) *EPBC Act s.16 Wetlands of international importance; s.23 Marine environment; s.24B Great Barrier Reef Marine Park; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
☐ Matter identified in PMST - complete this section	**4.5.2.c.** the habitat or lifecycle of native species, including invertebrate fauna and fish species, dependant upon the wetland being seriously affected.		Choose an item		Choose an item.	Referral required? ☐
	4.5.2.d. a substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health.		Choose an item		Choose an item.	Referral required? ☐
	4.5.2.e. an invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland.		Choose an item		Choose an item.	Referral required? ☐
4.5.3 Commonwealth marine environment ☐ Matter identified in PMST - complete this section	**4.5.3.a.** result in a known or potential pest species becoming established in the Commonwealth marine area.		Choose an item		Choose an item.	Referral required? ☐
	4.5.3.b. modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results.		Choose an item		Choose an item.	Referral required? ☐
	4.5.3.c. have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.		Choose an item		Choose an item.	Referral required? ☐

Significance Assessment – Water (including surface and groundwater and the marine environment) *EPBC Act s.16 Wetlands of international importance; s.23 Marine environment; s.24B Great Barrier Reef Marine Park; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
	4.5.3.d. result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity; social amenity or human health.		Choose an item		Choose an item.	Referral required? ☐
	4.5.3.e. result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected.		Choose an item		Choose an item.	Referral required? ☐
	4.5.3.f. have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of an historic shipwreck.		Choose an item		Choose an item.	Referral required? ☐
4.5.4 Commonwealth entity-specific matters This section must be completed.	**4.5.4.a.** reduce biological diversity or change species composition on reefs, seamounts or in other sensitive marine environments;	No impacts to marine ecosystems expected as a result of the distance from and contained nature of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.5.4.b. alter water circulation patterns by modification of existing landforms or the addition of artificial reefs or other large structures.	No impacts to marine ecosystems expected as a result of the distance from and contained nature of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.5.4.c. substantially damage or modify large areas of the seafloor or ocean habitat, such as sea grass.	No impacts to marine ecosystems expected as a result of the distance from	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Significance Assessment – Water (including surface and groundwater and the marine environment) *EPBC Act s.16 Wetlands of international importance; s.23 Marine environment; s.24B Great Barrier Reef Marine Park; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
		and contained nature of the proposed action.				
	4.5.4.d. release oil, fuel or other toxic substances into the marine environment in sufficient quantity to kill larger marine animals or alter ecosystem processes.	Small quantities of liquid low and intermediate-level radioactive waste will be produced through the life of the production facility.	Highly unlikely	The discharge of small volumes of liquid radioactive wastes will be managed through in-facility delay and decay infrastructure, further delay infrastructure in WMS and dilution with other tradewaste produced at the LHSTC for eventual discharge will reduce any impact to marine biota to negligible levels.	High	The quantity of holdings and any emissions to the atmosphere or tradewaste will not significantly increase upon existing levels, previously determined for the LHSTC. ANSTO does not expect that the addition of the NMTD will significantly increase ANSTO's dose rate profile to reference organisms
	4.5.4.e. release large quantities of sewage or other waste into the marine environment.	See 4.5.4.d.	Highly unlikely	See 4.5.4.d.	High	No large releases of radioactive wastes into the marine environment are foreseeable. Referral required? ☐
	4.5.4.f. measurably reduce the quantity, quality or availability of surface or ground water.	Small quantities of liquid low level radioactive waste will be produced through	Highly unlikely	All liquid and solid wastes will be contained in	High	Due to the engineering controls implemented, no releases of liquid

Significance Assessment – Water (including surface and groundwater and the marine environment) *EPBC Act s.16 Wetlands of international importance; s.23 Marine environment; s.24B Great Barrier Reef Marine Park; s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
		the life of the production facility.		multiple defence-in-depth designed vessels and transferred using existing waste transfer systems at LHSTC.		radioactive contaminants to the environment have occurred at ANSTO from the storage of or transfer from radioisotope production facilities. Referral required? ☐
	4.5.4.g. channelise, divert or impound rivers or creeks or substantially alter drainage patterns.	No earthworks will be conducted as a result of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.5.4.h. measurably alter water table levels.	No earthworks or emplacement of new buildings which could disturb groundwater levels will be conducted as a result of the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Did you answer 'Referral required' to any of the questions in the Significance Assessment?	Yes ☐	No ☒	If yes, an EPBC referral is required.

4.6 Pollution

Significance Assessment – Pollution *EPBC Act s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
4.6.1 Commonwealth entity-specific matters This section must be completed	**4.6.1.a.** generate smoke, fumes, chemicals, nutrients, or other pollutants which will substantially reduce local air quality or water quality.	Small quantities of liquid low level radioactive waste and activity emissions to the atmosphere will be produced through the life of the production facility, which potentially have an impact no local reference organisms	Highly unlikely	All liquid and solid wastes will be contained in multiple defence-in-depth designed vessels and transferred using existing waste transfer systems at LHSTC. The discharge small volumes of liquid radioactive wastes will be managed through in-facility delay and decay infrastructure, further delay infrastructure in WMS and dilution with other tradewaste produced at the LHSTC for eventual discharge will reduce any impact to marine biota to negligible levels.	High	Due to the engineering controls implemented, no releases of liquid radioactive contaminants to the environment have occurred at ANSTO from the storage of or transfer from radioisotope production facilities. The quantity of holdings and any emissions to the atmosphere or tradewaste will not significantly increase upon existing levels, previously determined for the LHSTC. ANSTO does not expect that the addition of the NMTD will significantly increase ANSTO's dose rate profile to reference organisms. Referral required? ☐

Significance Assessment – Pollution *EPBC Act s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
				Airborne emissions will be filtered through a series of SIAM and HEPA filters prior to release to the atmosphere. Emissions will be continuously monitored.		
	4.6.1.b. result in the release, leakage, spillage, or explosion of flammable, explosive, toxic, radioactive, carcinogenic, or mutagenic substances, through use, storage, transport, or disposal.	Refer to 4.6.1.a.	Unlikely	Refer to 4.6.1.a.	High	Refer to 4.6.1.a. Referral required? ☒
	4.6.1.c. increase atmospheric concentrations of gases which will significantly contribute to the greenhouse effect or ozone damage.	No ozone depleting substances will be released to the atmosphere.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.6.1.d. substantially disturb contaminated or acid-sulphate soils.	No earthworks will be conducted for the proposed action.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Did you answer 'Referral required' to any of the questions in the Significance Assessment?	Yes ☐	No ☒	If yes, an EPBC referral is required.

4.7 People and communities

Significance Assessment – People and communities *EPBC Act s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
4.7.1 Commonwealth entity-specific matters This section must be completed	**4.7.1.a.** substantially increase demand for, or reduce the availability of, community services or infrastructure which have direct or indirect impacts on the environment, including water supply, power supply, roads, waste disposal, and housing.	During site preparation and construction, there will be a small increase in heavy vehicle ingress and egress to the LHSTC.	Very unlikely	During site preparation and construction, there will be an small increase in heavy vehicle ingress and egress to the LHSTC.	High	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. Referral required? ☒

Significance Assessment – People and communities *EPBC Act s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
	4.7.1.b. affect the health, safety, welfare or quality of life of the members of the community, through factors such as noise, odours, fumes, smoke, or other pollutants.	ANSTO routinely monitors atmospheric and liquid radioactive contaminants and ionising radiation at various locations within the LHSTC and surrounding community, including in the nearby suburb, Engadine. Doses to the public at Engadine receive less than 0.2% of the annual natural background radiation dose. Since the NMTD will be using radioisotopes one or two orders of magnitudes lower than existing facilities, it is expected the NMTD will not significantly or cumulatively to ANSTO's emissions profile.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.7.1.c. cause physical dislocation of individuals or communities.	The action will have any physical dislocation impacts on individuals or community.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.7.1.d. substantially change or diminish cultural identity, social organisation or community resources.	There will be no negative impact on social and community resources. The	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐

Significance Assessment – People and communities *EPBC Act s.26 Commonwealth land; s.28 Commonwealth agencies*						
Is there a real chance or possibility that the action will:		**Detail of potential direct or indirect impact**	**Likelihood** Use AG-2395	**Mitigation controls** (e.g. alternative locations and timing)	**Certainty of control effectiveness** (high, medium or low)	**Significance assessment**
		outcomes of the NMTD will benefit Australians through the development of supply of future radiopharmaceutical medicines.				

Did you answer 'Referral required' to any of the questions in the Significance Assessment?	Yes ☐	No ☒	If yes, an EPBC referral is required.