EPBC Referral Self-Assessment on Impacts to the Environment for the Nuclear Medicine Facility project.

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

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

2.1 Provide a description of the proposed action, preferably as documented project plan.

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.

The existing production facility at the Australian Nuclear Science and Technology Organisation's (ANSTO) Lucas Heights campus – known as Building 23 – was constructed during the 1950s and has since undergone five major refurbishments within the last 30 years, however is approaching the end of its lifespan. In order to ensure ANSTO can meet domestic demand, a new Nuclear Medicine Facility (NMF) is proposed to be constructed to replace Building 23.

The NMF would allow for efficient, compliant, and safe production of reactor-based radioisotopes in pharmaceutical applications including the generation of Technetium-99m (Tc-99m), a radioisotope used by hospitals and medical centres in nuclear medicine procedures to diagnose heart disease and other diseases.

ANSTO will be required to seek a licence for the siting, construction and operation of the NMF through the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

Built form

The proposed project area is approximately 1.09 hectares and the proposed project area is approximately 1.37 hectares. The proposed project area is approximately 1.07 hectares and and the proposed project area is approximately 1.49 hectares. The proposed NMF would comprise a generally two level building with a footprint of around 6,700 square metres.
The total square meterage of the building would be around 14,000 square metres. The structure would consist of a concrete floor system supported by concrete columns and walls. The current design of the NMF would provide a stone clad masonry finish to the lower ground façade; lightweight cladding to the ground floor façade; and sections of full height glazing. The design will meet government-mandated sustainable design requirements. This strategy will be reviewed periodically to ensure application of government requirements are implemented.

Source materials

The existing Open-pool Australian Lightwater (OPAL) nuclear reactor is located west of the proposed NMF and the existing Mo-99 processing facility (ANSTO Nuclear Medicine (ANM)) is located to the south west of the proposed NMF. These buildings are where all on-site source materials for the NMF will originate, with the existing connections to Building 23 rerouted to the new NMF.

NMF components and processing

The NMF would include both radiological processing areas and supporting offices. The NMF would enable greater automation in the production process, and consequently improve efficiency and safety. The new facility would also have the potential to increase the overall capacity of production in comparison to Building 23. To achieve this, the building would be separated into 'active' and 'non-active' areas. Active areas would include all spaces where radioactive materials or waste are handled (delivery areas, laboratories, preparation areas, generator facilities etc). Non-active areas would allow for radioactive materials (and include offices and publicly accessible areas). The transition between active and non-active portions of the building would take place through safety points (air locks) where employees, materials and equipment would be monitored for contamination.

Product development within the NMF would be consistent with the existing production portfolio of Building 23 and include manufacture of Tc-99m, Lutetium Lu-177, and Iodine I-131. The facility would also support the development and distribution of other niche products.

Materials would enter from a series of receiving docks on the lower level of the building and then progress into a manufacturing process corridor that provides access to the appropriate processing suite. Upon completion, the product (such as a vial, capsule, etc) would then exit the processing location in a shielded container for inspection, packaging and labelling. From there it would be stored in a shielded area until being loaded onto trucks for delivery to customers.

The proposed site for the NMF is currently occupied by a number of existing buildings, roads and utilities already planned for decommissioning, removal or relocation. To accommodate the NMF, seven (7) buildings would be removed prior to construction. The decommissioning of these buildings has been self-assessed as not having significant impact on matters of national environmental significance, including to Commonwealth land (s. 26 EPBC Act).

As part of the proposed NMF, the existing internal ANSTO road network would be upgraded around the new building perimeter including changes to Mendeleef Avenue and Aston Avenue. The proposed NMF will also include earthworks, surface grading, stormwater drainage design, services coordination (including relocation of some utilities) and pavement works.

After building commissioning, an Operating Licence will be sought from ARPANSA . Subject to this approval, the facility would begin to generate isotopes. The facility would be operated in accordance with established ANSTO procedures and ARPANSA regulations. Critical elements of these procedures include:

- *Radiation safety*: The requirements would be set to comply with ANSTO's procedures for handling and storage of radioactive materials.
- *Gaseous emissions*: The facility would be designed so that emissions of chemicals and radioactivity would be either zero or below the existing prescribed limits for Building 23. Monitoring devices would ensure compliance with regulatory requirements.
- *Personnel and materials access*: This would be controlled by ANSTO's security and material access procedures.

Following the construction and full commissioning of the NMF, the existing B23 facility will be decommissioned. The action to decommission the existing B23 facility will be referred at a later date, likely after 2031.

2.2 Alternatives to undertaking the proposed action

Provide details of alternatives to undertaking the proposed action.
The development of the NMF is required to provide important safety and capacity upgrades to support the ongoing development and supply of critical nuclear medicine and medical radioisotope in Australia including Technetium-99m, as well as provide for expected growth in use of Iodine-131 and Lutetium-177. The NMF will also support the development and distribution of niche products, ensuring Australia remains a leader in global nuclear medicine advancements. Within the Reactor Zone of the Lucas Heights campus there is an existing pneumatic transfer system that connects the OPAL reactor to the existing Building 23 (where the nuclear medicine products are currently manufactured). Based on the functional requirements for the NMF, the only alternative considered feasible was the option to replace Building 23 with the proposed NMF. The current location proposed for the NMF was considered to be the only feasible option as it would be located close to the existing OPAL reactor building, in order minimise the distance needed to transport materials between the existing OPAL building and the NMF. **Not taking the action** A possible alternative to the proposed NMF is not taking the action, however this would forego the important benefits of the new facility including ensuring production capacity for Australia with respect to nuclear medicine requirements, noting that the Australian Government fulfils approximately 75-80 per cent of Australia's nuclear medicine requirements The existing Building 23 facility is over 60 years old and cannot in the medium term provide a secure and sustainable supply of nuclear medicines. Prolonged delay in replacing this facility will increase the risks to ANSTO staff safety, product quality, supply reliability and patient care outcomes.

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.
Site preparation is proposed to commence in late 2024, with project completion by the end of 2031.

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 (AHD). 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 the 70 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, centred 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 NMF will be located within the Reactor Zone Precinct on the western side of the site. It is preferential that this facility be in the vicinity of the OPAL reactor (building 80) and the fission product separation plant (ANM, Mo99, building 88) due to their interactive use. The project site footprint would be around 130 metres (m) (north-south) by around 140 m (east-west) comprising an area of around 1.6 ha. The site would be generally bounded by Mendeleeff Avenue (west), Bragg Avenue (north), Meitner Street (east), and Buildings 89 and 15 (south). The project site footprint currently consists of:

- open grassed areas
- car parks and roadways
- a series of existing campus buildings, including support buildings for the HIFAR building to the east of the project site.

A number of existing buildings are currently located within the project site which have been identified in the ANSTO 2035 Lucas Heights Master Plan to be demolished prior to the construction of the NMF. These buildings are assumed, for the purpose of the project, to have been removed prior to the construction of the NMF building.

The risk of bushfire in the vicinity of the site increases during dry weather and peaks on days of high temperature, low humidity and strong winds. Notwithstanding, the project site area for the NMF does not fall within any of the bushfire attack level risks zones which have been identified for the broader Lucas Heights site .

Existing use

The ANSTO site is currently used for nuclear science and technology research and operations. This includes the production of radiopharmaceuticals or nuclear medicines that every Australian will, on average, need in their lifetime as well as the application of nuclear techniques with scientific and industrial applications in areas of key national and economic importance.

The current campus is divided into a range of functional precincts including the reactor zone, business park, research precinct, public area, education and waste storage. The existing production facility at Lucas Heights (Building 23) is located within the reactor zone.

Proposed use

There is no proposed change of use within the existing site as a result of the proposed NMF. The NMF would be entirely consistent with ANSTO's current operations, including the production of radiopharmaceuticals or nuclear medicines.

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 site, the whole of the 70 ha 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 30m 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 metres thick beneath the site and overlies interbedded sandstones and claystones of the Narrabeen Group and Permian Illawarra Coal Measures.

The Hawkesbury Sandstone generally consists of interbedded massive and current bedded layers with cross beds typically ranging from 1.5 to 3 metres thick and occasionally up to 15 metres 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.

Previous vegetation mapping an identified four vegetation communities within the broad Lucas Heights site being:

- 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.

Specifically, the project site footprint currently consists of:

- a series of existing campus buildings (which are proposed to have been removed prior to commencement of construction of the NMF).
- open grassed areas
- car parks and roadways
- a small number of exotic trees towards the north-east corner of the project site.

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 NMF.

The Lucas Heights facility is located on an elevated plateau area known as the Woronora Plateau at an elevation of around 155 m.

The existing topography of the site for the proposed NMF includes a significant change in elevation of around 6 metres (roughly sloping from RL 151 m at the northern end of the site to RL 156 m at the southern end of the site). This grade change is inconsistent and results in a multi-level plateau within the whole of the Reactor Zone. Just south of Bragg Avenue and an existing utility trench there is a steep change in grade of roughly 5 m that generally forms the edge of the Reactor Zone plateau. Just north of the HIFAR building (adjacent to the eastern side of the project site) is a second shift in elevation that roughly aligns with the floor elevation of the OPAL entrance (to the west of the project site).

Existing geotechnical reports, from recent projects in the Reactor Zone, indicate that the site likely consists of a relatively shallow depth (±1 metre) covering of soil underlaid by weathered sandstone.

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.

Vegetation mapping and plant communities

Four vegetation communities have been identified within the broader Lucas Heights campus area:

- 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 ecological communities

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 Lucas Heights campus near New Illawarra Road. It is not within the vicinity of the project site for the NMF.

Threatened species

A search for threatened species using the Protected Matters Search Tool within the EPBC Referral Portal identified a number of threatened flora species, threatened fauna species and migratory species. The review identified the potential for 72 threatened species and 16 migratory species, in addition to the potential for 5 threatened ecological communities.

BioNet records indicate that a threatened fauna species *Phascolarctos cinereus* (Koala), has been previously recorded within the broader Lucas Heights campus. 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 Lucas Heights campus. The immediate project site footprint within which the NMF would be developed currently consists of:

- open grassed areas (predominantly Kikuyu) and some landscaping (non-native trees)
- car parks and roadways
- a series of existing campus buildings, including the HIFAR to the east of the project site.

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 Lucas Heights campus. The vegetation within immediate project site footprint within which the NMF would be developed currently consists of:

- grassed areas – vegetation within the project area has been heavily disturbed over time and all grassland patches within the project area are considered to consist of exotic grassland
- amenity planting – one small patches of exotic trees occurs within the north east corner of the project site. A range of typically exotic plantings also occurs within the broader Lucas Heights campus.

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 site.

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 500 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 the Hi-flux Australian Reactor (HIFAR), located adjacent to the south-east of the project area, 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 Values

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 in 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.

2.6 Sources of information

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

Provide details of the sources of information obtained to inform the outcomes of this self-assessment.
Aboriginal Heritage Information Management System (AHIMS) search undertaken in 8 September 2022.

3. Results of Protected Matters Search Tool (PMST)

Steps to generate a report out of the PMST.

- Go to: https://pmst.awe.gov.au/#/map?lng=150.98515033721927&lat=-34.05016599484229&zoom=17&baseLayers=Imagery,ImageryLabels
    - 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.

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)**

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 the endangered or critically endangered species' habitat.		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**
	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 ecological communities	**4.2.4.a.** reduce the extent of an ecological community.		Choose an item		Choose an item.	Referral required? ☐
	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? ☐

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	**4.2.4.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 into the ecological community which kill or inhibit the growth of species in the ecological community.		Choose an item		Choose an item.	Referral required? ☐
	4.2.4.g. interfere with the recovery of an ecological community.		Choose an item		Choose an item.	

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**
						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 native vegetation will be cleared.	Extremely unlikely	N/A - 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 native vegetation will be cleared.	Extremely unlikely	N/A - No further assessment	Choose an item.	Referral required? ☐
	4.2.5.c. introduce potentially invasive species.	New exotic floral species may be introduced to the urban landscape through the importation of fill or landscaping material, or the through the establishment of garden beds or other landscaped areas.	Unlikely	Implementation of project environmental management plan and landscaping plan by Principal Contractor	High	A landscaping plan will be prepared which will only select plants endemic to the region. Construction environmental management plan will implement controls to minimise erosion and introduction of contaminated fill. Given the highly urbanised nature of the proposed site, the inherent risk of impacts to flora / fauna from introduced specie is likely to be very low.

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**
						Referral required? ☐
	4.2.5.d. involve the use of chemicals which substantially stunt the growth of native vegetation.	Construction environmental management plan will be prepared with the principal contractor to identify, control and monitor potential pollution sources during construction. The Environmental Protection Plan to be developed to support the ARPANSA licence applications will detail how radiological contaminants will be controlled and minimised throughout the operational stage.	Very unlikely	Implementation of landscaping plan and CEMP controls and ongoing monitoring.	High	Given the highly urbanised nature of the proposed site, the inherent risk of impacts to flora / fauna are likely to be very low. 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 controlled burning to 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.	Since no native vegetation will be cleared, there aren't anticipated to be any impacts to native fauna throughout the construction phase. Impacts from radiological emissions are likely to be negligible and below ARPANSA	Highly 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**
		screening levels, as is currently the case for the entire Lucas Heights site.				
	4.2.5.g. displace or substantially limit the movement or dispersal of native animal populations.	No native vegetation will be cleared, therefore no additional pressures will be placed on faunal movements.	Extremely unlikely	N/A - No further assessment	Choose an item.	Referral required? ☐
	4.2.5.h. substantially reduce or fragment available habitat for native species.	No native vegetation will be cleared, therefore no additional pressures will be placed on faunal movements.	Extremely unlikely	N/A - 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 decline in a population, or threaten the viability of the species.	No native vegetation will be cleared, therefore no additional pressures will be placed on faunal movements.	Extremely unlikely	N/A - No further assessment	Choose an item.	Referral required? ☐
	4.2.5.j. introduce exotic species which will substantially reduce habitat or resources for native species.	A landscaping plan will be prepared which will only select plants endemic to the region. Project environmental management plan will implement controls to minimise erosion and introduction of contaminated fill.	Unlikely	Implementation of landscaping plan abd project environmental management plan by Principal Contractor.	High	Given the highly urbanised nature of the proposed site, the inherent risk of impacts to flora / fauna from introduced specie is likely to be very low. 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? ☐
	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? ☐

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.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.	There will be no direct impact to heritage places as a result of the proposed action, 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 Royal National Park, located over 3 km to the east of the project site. The nearest Indigenous cultural site is situated over 300 metres to the south of the NMF, in a separate water catchment. No direct or indirect impacts are likely on this or other Indigenous cultural sites. The design of the proposed NMF facility is expected to meet (or improve upon) existing emissions releases from Lucas Heights. It is	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**
		therefore not expected that there would be any potential impacts to the Royal National Park or any other National heritage places.				
	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 physical alterations to heritage places will occur due to 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 structures will be erected in proximity to heritage places.	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.	The NMF will replace a similar facility which has been operating at the LHSTC for the past 50 years. The handling of radioactive isotopes in the NMF will be similar to the existing facility. The NMF will likely improve on emissions to the environment through improved waste management technology. Any changes to cultural heritage places, including Indigenous heritage places, as a result of the NMF is	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**
		expected to be extremely unlikely.				
	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.	As above.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.3.3.f. substantially restrict or inhibit the existing use of a heritage place as a cultural or ceremonial site.	The NMF will be established within the existing LHSTC, which has been used for scientific activities since the mid-1950's. Access to the NMF will be consistent with existing access to the LHSTC. Not further restrictions will occur.	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 impact to the existing landform will be minimal. The existing landform is a previously manipulated brownfield site, now primarily as grassed or bitumen covered. The prevailing landform/relief will be utilised as much as possible, to enable the two-storey appearance on the northern side of the building.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.4.1.b. cause subsidence, instability or substantial erosion.	Some erosion from the project site during construction is possible, due to the inherent nature of soils being exposed during construction. The amount of erosion potential will however be limited by the limited project area.	Likely	During construction, exposed soils will be managed in accordance with AP-5400 Project Environmental Protection Requirements, s.5 Land and Surface/Groundwater Contamination Minimisation.	High	The application of the required sediment controls are likely to be sufficient to contain the limited amount of sediment displacement from the project area. Referral required? ☐
	4.4.1.c. involve medium or large-scale excavation of soil or minerals.	During construction of the proposed NMF, there will be some limited direct impacts to existing vegetation (minor	Almost certain	Excavation will be minimised through utilising the existing topography.	High	The excavation will be on a scale that may be considered medium-scale, and therefore

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**
		potential tree and exotic shrubs) and landform to accommodate the new building works, new roadway/driveway alignment and utility relocation. There will be some degree of cut and fill excavation to smooth the existing topography and enable the two-storey appearance on the northern side of the building.				triggers the requirement for referral. However, it should be noted that the proposed site is a brownfield site within the established LHSTC. The area in the past has accommodated a number of maintenance workshops and support infrastructure. The project area is currently grassed or bitumen hardstand/carpark. Through attempting to interpret the language of the Significance Guidelines 1.2, i.e. does the proposed action involve medium or large-scale excavation of soil or minerals?", ANSTO believes this may trigger the requirement for referring the action. However due to the limited area being impacted by the project and the historical nature of the site, ANSTO does

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**
						not believe this activity to be significant and be a controlled action. Referral required? ☒
	4.4.1.d. alter coastal processes, including wave action, sediment movement or accretion, or water circulation patterns.	No direct or indirect impacts to coastal processes is expected from 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 direct or indirect impacts to estuarine processes is expected from 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 direct or indirect impacts to estuarine processes is expected from 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 direct or indirect impacts to sand dunes is expected from 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? ☐
	4.5.1.c. result in a substantial change in air quality or water quality (including temperature)		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**
	which may adversely impact on biodiversity, ecological health or integrity or social amenity or human health.					
	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) ☐ Matter identified in PMST - complete this section	**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? ☐
	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? ☐

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**
	4.5.2.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? ☐
	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? ☐

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.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 direct or indirect impacts are anticipated which would adversely impact marine ecosystems. The discharge of low levels of radionuclides in accordance with ANSTO's tradewaste discharge consent with Sydney Water, will be similar if not less than that of the current facility. Radiological screening dose assessments on marine biota in the vicinity of the ocean outfall from the Cronulla Waste Treatment Plant have shown negligible impacts to reference vertebrate and invertebrate marine species.	Very unlikely	Any waste from the NMF will be treated in the same manner as the existing facility and to the same standard prior to being release off site.	High	Based upon historical performance and the application of the appropriate controls, and the amount of radioactivity which can be discharged, it is extremely unlikely there will be any impact to marine biota. 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**
	4.5.4.b. alter water circulation patterns by modification of existing landforms or the addition of artificial reefs or other large structures.	The project will not alter any marine currents or tidal patterns.	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.	The project will not alter the seafloor or physically impact ocean habitats.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	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 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. This is demonstrated through the existing wildlife screening dose assessment for the LHSTC, which the NMF will replace an	High	Since the NMF will be a replacement of the existing facility, with similar operational outputs and similar (or lower) emissions to the environment, significant impacts to reference organisms is foreseeable, as has been assessed in previously ecological dose screening assessments. 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**
				existing, largely like-for-like.		
	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 is foreseeable. Referral required? ☐
	4.5.4.f. measurably reduce the quantity, quality or availability of surface or ground water.	Since the NMF will erect a new building, with stormwater containment systems, there will be a small amount of overland stormwater flow which will be retained for harvesting purposes. Stormwater not harvested will be re-introduced into the same accepting catchment.	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.5.4.g. channelise, divert or impound rivers or creeks or substantially alter drainage patterns.	See 4.5.4.f	Extremely unlikely	No further assessment.	Choose an item.	Referral required? ☐
	4.5.4.h. measurably alter water table levels.	Due to the impermeable footprint of the building, there will be a very small amount of localised water-table alteration. However on a landscape-level, the impact will be negligible.	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.	Low levels of radioactive contaminants will be generated through the preparation of radiopharmaceuticals in the NMF. For liquid waste, refer to 4.5.4.d.	Almost certain	Radioactive gases will be managed within the facility using delay-and-decay tanks, carbon and HEPA filtration banks, and emissions to the environment monitored using in-line active stack discharge monitoring systems. Very levels of radioactive gas emissions are likely to be discharged to the environment after controls, however similarly to the existing B23 facility, these emissions are not likely to have a substantial impact to reference organisms.	High	As demonstrated through the performance of the existing B23 facility, and the similar controls to be implemented for the NMF, it is unlikely that radioactive air emissions will substantially reduce local air quality. Referral required? ☐
	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.	See 4.6.1.a	Almost certain	See 4.6.1.a	High	See 4.6.1.a 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**
	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.	The area where the NMF will be sited is a brownfield site within the LHSTC. The area has previously been characterised for contamination, and further detailed characterisation will be conducted prior to preparation of the site.	Highly 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 an small increase in heavy vehicle ingress and egress to the LHSTC.	Unlikely	A traffic management plan will be required to be implemented by the PC to minimise traffic demand, particularly at peak traffic times.	Medium	While the timing and utilisation will be determined by the Principal Contractor (PC) in consultation with ANSTO, it is anticipated the additional demand on local roads (primarily New Illawarra Road and Heathcote Road) will be ~2 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 minimal. Referral required? ☐
	4.7.1.b. affect the health, safety, welfare or quality of life of the members of the	ANSTO routinely monitors atmospheric and water radioactive contaminants	Extremely unlikely	No further assessment	Choose an item.	

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**
	community, through factors such as noise, odours, fumes, smoke, or other pollutants.	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 NMF will replace the existing facility, largely like-for-like, it is expected the NMF will contribute anymore to this dose.				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 outcomes of the NMF will benefit Australians through the ongoing supply of critical radiopharmaceutical medicines.	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.