

Legacy Mineral Sands Remediation and Disposal

Application Number: 01332

Commencement Date: 20/07/2022

Status: Locked

1. About the project

1.1 Project details

1.1.1 Project title *

Legacy Mineral Sands Remediation and Disposal

1.1.2 Project industry type *

Commonwealth

1.1.3 Project industry sub-type

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1.1.4 Estimated start date *

14/12/2022

1.1.4 Estimated end date *

31/03/2023

1.2 Proposed Action details

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

Proposed Action

ANSTO is proposing to remediate, through the excavation and disposal of contaminated soils to licenced waste facilities, a parcel of contaminated land within the confines of the Lucas Heights Science and Technology Centre (LHSTC), at Lucas Heights NSW. The source of soil contamination is as a result of the historical use of the area since the establishment the LHSTC in c1955. ANSTO intends to remediate the land-parcel with the long-term objective to utilise the land-parcel for future industrial, commercial or research purposes.

ANSTO has conducted a comprehensive characterisation of the land-parcel. Soil contamination is confined to discrete areas within the land-parcel, including contamination with asbestos containing material (ACM), imported mineral sands ore (containing naturally occurring radioactive material - NORM, as uranium and thorium and their radiological progeny isotopes), and heavy metals. ANSTO contracted GETEX to develop a Remedial Action Plan for the affected area (Att A-Site Remedial Action Plan).

ANSTO will be engaging a Principal contractor who will be appropriately experienced and licenced to excavate and transport contaminated soils within approved transportation vehicles to the above waste disposal facilities. Excavation of contaminated soil will be conducted under strict environmental management and human health monitoring arrangements to ensure dust production, sediment displacement or other contaminant migration is minimised. Specific measures will be detailed in a completed Environmental Management Plan (Att B-AF-5947 Project - Construction Environmental Management Plan) which will be developed in consultation with the Principal Contractor in line with industry best practice for managing contaminated sites and ANSTO's environmental protection requirements (Att C-AP-5400 Project Environmental Protection Requirements). Contaminated soil will be transferred to sealed containers and loaded onto trucks which meet the transporting requirements for transporting special waste - asbestos and hazardous wastes.

Controls which will be required include:

- dust suppression methods, such as water sprays, covering stockpiles.
- sediment capture mechanisms, such as sediment fences , erection of retaining walls, cattle grates and vehicle wash-down facility with sediment traps
- surface water re-direction around excavation site
- de-watering of excavated areas
- active dust monitoring for asbestos fibres and radioactive airborne contaminants
- surface water monitoring for contaminants of interest
- further site characterisation post-excavation to assess for any residual contamination (and subsequent removal).

The excavated area will be back-filled with virgin excavated natural material (VENM), similar to native soils found in the vicinity of the project site, and either concreting or re-turfing area following removal of contaminated soils. The total area of the project site is approximately 3,700 m2.

The NORM characterised soil (expected excavated volume of ~362m3) are proposed to be disposed at the Cleanaway Kemps Creek Waste Recovery Park in Western Sydney. The low-level lead contaminated soil (expected excavated volume of ~10m3) is proposed to be disposed at the Cleanaway St Mary's Resource Recovery Park, and the asbestos contaminated soil (expected excavated volume of ~12 m3) and low-level heavy metal contaminated soil (expected excavated volume of ~3000 m3) is proposed to be disposed at the Cleanaway Lucas Resource Recovery Park. Each disposal facility is licenced by the NSW Environment Protection Authority to accept the waste type specified, concentration and volume of soil proposed to be disposed.

The transporting company engaged will be licenced by the NSW EPA to transport the types of waste specified. The estimated truck-loads to each waste disposal facility are:

- 1 truck to Cleanaway St Mary's (58 km away)
- 12-15 trucks to Cleanaway Kemps Creek (44 km away)
- 100-125 to Cleanaway Lucas Heights (2 km away)

Contaminated soils will be transported from the LHSTC in sealed bulk bags and loaded into semi-trailers which themselves will be covered to ensure loose soils are not blown into the environment during transportation. The transportation route will likely include a mix of private roads, state main roads and motorways. The majority (>90%) of material to be disposed will be transported the shortest distance to Cleanaway Lucas Heights (2 km away from the LHSTC).

The transportation route within the LHSTC has considered the possible impacts to staff, tenants and members of the public which visit the publicly accessible area of the LHSTC. In conjunction with other proposed activities for the LHSTC, the perimeter road is being realigned, which will route vehicles about 100 m further away from the cafe, motel and childcare facility situated in within the public accessible area of the LHSTC. This will reduce the noise and vibration aspect of the heavy vehicle movements to the public areas.

Associated activity not within scope of Proposed Action

There is one associated activity to the Proposed Action which ANSTO considers not within the scope of the Proposed Action. This activity is in relation to a small area of vegetation clearing to allow for the realignment of a 100 m section of private road at ANSTO, which has been determined necessary to support the transportation of material from the site and to support future activities at the LHSTC.

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

Yes

1.2.3 Is the proposed action the first stage of a staged development (or a larger project)?

No

1.2.4 Related referral(s)

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1.2.5 Provide information about the staged development (or relevant larger project).

A small area of vegetation clearing was identified as being required, to allow for the movement of the heavy vehicles around the perimeter of the LHSTC, which will also support the Proposed Action as well future activities at the LHSTC. This activity involves the clearing of a small number of trees (8), none of which are threatened species, from land which has been historically disturbed and is not an endangered ecological community (Att D-Ecological report-supporting road realign).

The area has been characterised as a Dry Sclerophyll Forest (Shrubby sub-formation, PCT 3590), which is not listed as a threatened ecological community (Att D-Ecological report-supporting road realign, page 17). The understorey at this location is primarily grasses, exotic species, isolated shrub species with less than 10% cover (*Melaleuca linariifolia* and *Acacia suaveolens*) and some exposed soil which are currently maintained by mowing the area. In total eight mature to semi mature trees (*Eucalyptus capitellata* and *Corymbia gummifera* - Att D-Ecological report-supporting road realign, page 16) on previously disturbed land on the periphery of the LHSTC will be removed to provide for a new 100 metre section of new pavement. This area has been previously partially cleared for the creation of an unformed track.

The vegetation clearing will provide for vehicles which access the perimeter of the broader LHSTC to travel further away from the publicly accessible child care centre, motel and cafe situated in the periphery of the LHSTC. An ecological assessment has been conducted (provided as Att D-Ecological report-supporting road realign) with no significant impacts likely to matters of national environmental significance. This activity is not considered to be within the scope of this referral, as it is being included in broader site improvements.

ANSTO has self-assessed this activity as not requiring an EPBC referral as it is not expected to have a significant impact on matters of national environmental significance or a significant impact on the environment as a whole.

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

The contaminated soil has been characterised in accordance with:

- Ref 1-Contaminated sites: Sampling Design Guidelines (NSW EPA)
- Ref 2-National Environment Protection (Assessment of Site Contamination) (NEPC)
- Ref 3-Safety Guide for the Management of Naturally Occurring Radioactive Material (NORM) (ARPANSA)
- Ref 4-Waste Classification Guidelines Part 1: Classifying waste (NSW EPA)
- Ref 5-Waste Classification Guidelines Part 3: Waste containing radioactive material (NSW EPA)

These references have been used to characterise the extent and type of contamination with the land-parcel. The sampling guidelines have informed the acceptable sampling regime required to the extent practicable, to accurately identify the type and extent of contaminants, the preferred remedial action plan, and the scope of works for this proposed action.

The waste proposed to be disposed at the Cleanaway Kemps Creek, St Mary's and Lucas Heights Resource Recovery Parks are licenced to accept the respective contaminated soils. Similarly, the transporting company to be engaged will have the required transporting and handling licences to transport the specified wastes.

On 7 April 2021, ARPANSA provided a Declaration of Exemption in relation to ANSTO's intention to excavate and appropriately dispose of the NORM containing soil.

As this activity involves the medium to large scale excavation of contaminated soils on Commonwealth land and by a Commonwealth agency (ANSTO), this activity has been self-assessed as requiring referral to the Minister for the Environment, pursuant to section 28 of the Environment Protection and Biodiversity Conservation Act 1999.

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

The proposed transportation route of material from the site will occur close to a number of tenanted areas within the LHSTC. The project team have consulted with these entities about the potential impacts, primarily noise and vibration. Consequently and in conjunction with other proposed projects for the LHSTC, the unsealed perimeter road is being moved approximately 100 metres further away from some of these tenanted areas, such as a cafe, motel and child care centre, to reduce the noise and vibration from the heavy vehicles accessing this unsealed perimeter road. Consultation with ANSTO staff and LHSTC tenants will continue throughout out the project phase.

No consultation with Indigenous stakeholders has been conducted for this activity. The Project Area is situated wholly within a significantly disturbed, brownfield site. In c.1955, the Lucas Heights Science and Technology Centre was cleared, generally to bedrock or close thereto for the placement of the HIFAR nuclear reactor and supporting facilities and infrastructure. The Project Area is situated within this historically cleared area. The soil within the Project Area has predominantly been imported, and contamination has occurred due to the storage of ore samples and the disposal of asbestos containing material in the past. There are no sites of Indigenous importance with the Project Area or in the surrounding area.

1.3.1 Identity: Referring party

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Confirm that you have read and understand this Privacy Notice *

1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

ABN/ACN	47956969590
Organisation name	Australian Nuclear Science and Technology Organisation
Organisation address	New Illawarra Road, Lucas Heights NSW 2234

Referring party details

Name	Michael Baker
Job title	Environmental Management Leader
Phone	0297179467
Email	mhb@ansto.gov.au
Address	New Illawarra Road, Lucas Heights NSW 2234

1.3.2 Identity: Person proposing to take the action

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

No

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

Yes

Person proposing to take the action organisation details	
ABN/ACN	47956969590
Organisation name	Australian Nuclear Science and Technology Organisation
Organisation address	New Illawarra Road, Lucas Heights NSW 2234
Person proposing to take the action details	
Name	Dave Filipetto
Job title	General Manager Engineering Delivery & Special Projects
Phone	02 9717 7916
Email	filipetd@ansto.gov.au
Address	New Illawarra Road, Lucas Heights NSW 2234

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

No

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

No

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

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

ANSTO is subject to strict ongoing radiological environmental regulation by ARPANSA. To comply with the ARPANS Act, ANSTO is required to obtain approval from ARPANSA of Plans and Arrangements, including Environmental Protection Plans, for controlled facilities. Such plans are periodically reviewed and updated by ANSTO. ANSTO's commitment to the environment is also demonstrated through its certification to the International Environmental Management Standard, ISO 14001. Part of this commitment is through an Environmental Monitoring Group that provides regular ongoing monitoring of waterways, groundwater, air and ocean biota. In addition, ANSTO has demonstrated its ability to work with government departments to ensure environmental safety outcomes are met. For example: ANSTO has ensured full compliance with the 29 conditions applied following the approval of the construction of the OPAL reactor in 1999 by the then Minister for the Environment and Heritage.

ANSTO's Environmental Sustainability Strategy outlines our high-level environmental goals and targets. This Strategy includes long-term, ambitious objectives which seek to significantly reduce ANSTO's greenhouse gas emissions, water consumption and waste production. The Strategy also includes objectives to improve ecological outcomes within ANSTO's Bushland Perimeter.

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

Previous EPBC referrals submitted are provided below:

- 2021/9025 - Intermediate Level Solid Waste Storage Facility
- 2021/8998 - Return of Australian Intermediate Level Radioactive Waste from the UK

- 2016/7841 - Transport of OPAL Spent Fuel to France in 2018 and 2025
- 2016/7733 - Extension and upgrade waste management facilities, Lucas Heights
- 2015/7437 - Transport of intermediate level radioactive waste to Lucas Heights
- 2012/6697 - Synroc Waste Treatment Facility
- 2012/6598 - ANSTO Nuclear Medicine Mo99 Facility
- 2012/6564 - Interim Waste Storage Facility
- 2010/5645 - Decommissioning of NMC and Camperdown Facility
- 2008/4615 - Decommissioning of Moata Research Reactor
- 2008/4459 - Construction of Nuclear Materials Store
- 2007/3672 - Shipment of Spent Nuclear Fuel to USA
- 2006/2740 - Upgrade Of Nuclear Production Equipment
- 2003/1114 - Extension to Lucas Heights production building
- 2001/405 - Placement of fill excavated from the site for the Replacement Research Reactor
- 2001/342 - Waste Treatment and Packaging Building

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

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

1.3.3 Identity: Proposed designated proponent

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

Yes

Proposed designated proponent organisation details

ABN/ACN	47956969590
Organisation name	Australian Nuclear Science and Technology Organisation
Organisation address	New Illawarra Road, Lucas Heights NSW 2234

Proposed designated proponent details

Name	Dave Filipetto
Job title	General Manager Engineering Delivery & Special Projects
Phone	02 9717 7916
Email	filipetd@ansto.gov.au
Address	New Illawarra Road, Lucas Heights NSW 2234

1.3.4 Identity: Summary of allocation

Confirmed Referring party's identity

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

ABN/ACN	47956969590
Organisation name	Australian Nuclear Science and Technology Organisation
Organisation address	New Illawarra Road, Lucas Heights NSW 2234
Representative's name	Michael Baker
Representative's job title	Environmental Management Leader
Phone	0297179467
Email	mhb@ansto.gov.au
Address	New Illawarra Road, Lucas Heights NSW 2234

Confirmed Person proposing to take the action's identity

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

ABN/ACN	47956969590
Organisation name	Australian Nuclear Science and Technology Organisation
Organisation address	New Illawarra Road, Lucas Heights NSW 2234
Representative's name	Dave Filipetto
Representative's job title	General Manager Engineering Delivery & Special Projects
Phone	02 9717 7916
Email	filipetd@ansto.gov.au
Address	New Illawarra Road, Lucas Heights NSW 2234

Confirmed Proposed designated proponent's identity

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

Same as Person proposing to take the action information.

1.4 Payment details: Payment exemption and fee waiver

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

No

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

No

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

No

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

No

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

No

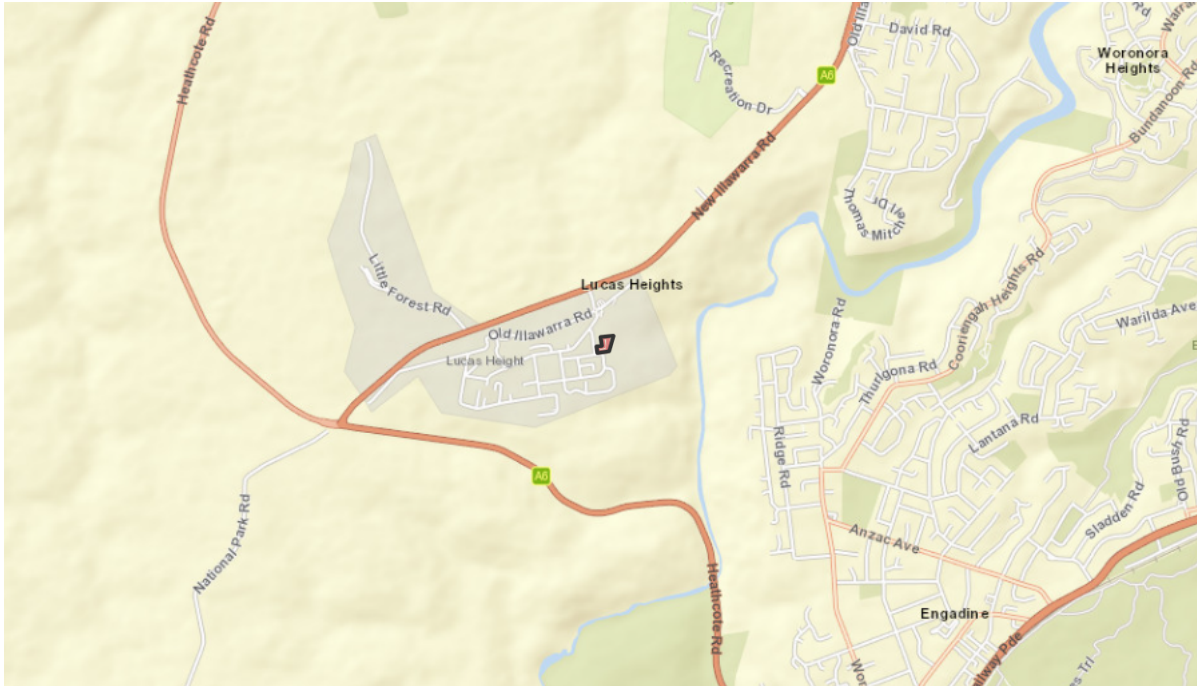
1.4 Payment details: Payment allocation

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

Referring party

2. Location

2.1 Project footprint



2.2 Footprint details

2.2.1 What is the address of the proposed action? *

Australian Nuclear Science and Technology Organisation, New Illawarra Road, Lucas Heights NSW

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

New South Wales

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

No

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

The land where the proposed action is to take place is Commonwealth-owned land, managed by ANSTO.

3. Existing environment

3.1 Physical description

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

The project area is situated within the Lucas Heights Science and Technology Centre (LHSTC), Lucas Heights NSW. The project area is of a highly disturbed nature, as a result of the establishment of the LHSTC in the mid-1950's. The LHSTC is situated on Commonwealth land and is not subject to NSW State environmental legislation (refer section 7A *Australian Nuclear Science and Technology Organisation Act 1987*) and local planning provisions. The current condition of the project area is a combination of unconsolidated soil with sporadic grass and exotic vegetation coverage and asphalt (Att A-Site Remedial Action Plan, p.16). There are currently no activities undertaken on in the Project Area. Some areas of exposed soil is present, however erosion from these areas is minimal due to previous compaction of the soil and gentle slope of the area. The area has been characterised through a series soil characterisation studies, and has been found to be contaminated with low-level concentrations of naturally occurring radioactive material (NORM - primarily mineral sands ore containing primarily thorium and its daughter isotopes in secular equilibrium), asbestos containing material, and low-level concentrations of heavy metals (lead, zinc, copper and nickel). These studies are provided in:

- Att A-Site Remedial Action Plan
- Att H-Site Characterisation Report
- Att I-Soil Sample Report

Excavated soil will be transported offsite by NSW Environment Protection Authority (EPA) licenced waste transporters. The proposed transportation route is likely to be the most direct appropriate heavy vehicle route between the LHSTC and the three waste disposal facilities at Kemps Creek (for minerals sands classified as restricted waste), St Mary's (for low-level lead contaminated soil classified as hazardous waste) and Lucas Heights (for asbestos containing material and other low-level heavy metal contaminated soils, classified as general solid waste). The roads likely to be utilised for the transportation of contaminated soil are a combination of LHSTC site roads, main (state) roads and motorways, which transect native and disturbed bushlands, residential and light industrial used lands. The final disposal locations are NSW EPA licenced waste acceptance facilities for the waste types which have been characterised.

The existing private ANSTO perimeter road which is immediately adjacent to the east of the project area will be used for vehicles for the excavation and removal of the contaminated soils. The existing private ANSTO perimeter road is maintained as a gravel road. Vehicles will access this perimeter road 70 m south-west of the from northern extent of Old Illawarra Road (private ANSTO road) at Lucas Heights. From this intersection, vehicles will travel Old Illawarra Road to the intersection with Rutherford Avenue (private ANSTO road), continue north along Rutherford Avenue to the intersection of New Illawarra Road (State Road A8). From this intersection, the transporting company in consultation with ANSTO on the days of transporting material, will determine the most suitable transport route, depending on the traffic conditions.

As mentioned in 1.2.1 and 1.2.5 of this referral, a 100 m section of the ANSTO perimeter road will be re-aligned. ANSTO has determined this activity as not included within the scope of the Proposed Action and has self-assessed the road re-alignment activity as not likely to have a significant impact on matters of national environmental significance nor have a significant impact on the environment as a whole.

Old Illawarra Road and Rutherford Avenue are both sealed roads.

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

The current land use for the project area is considered light industrial, situated within the LHSTC. Public access is restricted to the project area. In addition, the project area is currently further restricted from general ANSTO staff due to the soil contaminants present.

The asphalt area is currently used to temporarily store equipment for ANSTO.

No items are currently situated on the non-asphalt area.

The site has been previously used as a general temporary storage area for material and equipment for the LHSTC.

Over the short term (5 to 10 years), the site is anticipated to continue to function as an above ground gas cylinder storage and filling station (depot) and as a general storage area for large equipment. In the medium term (10 to 20 years), the future use of the site is currently planned as a publicly accessible open space as part of the proposed ANSTO Innovation Precinct (Att A-Site Remedial Action Plan, p.20).

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

There are no outstanding natural, unique or otherwise important features within the project area or which are likely to be directly or indirectly impacted by the proposed action.

The residual Lucas Heights soil landscape is characterized by gently undulating crests and ridges on plateau surfaces of the Mittagong formation (alternating bands of shale and finegrained 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 area is associated with the Hawkesbury Sandstone Unit consisting of medium to coarse-grained quartz sandstone, very minor shale and laminite lenses (Att H-Site Characterisation Report p. 24-25).

There are no natural drainage lines or water reservoirs within the area, however shallow natural drain leads to the east of the area, which ultimately discharge into the Woronora River.

A bitumen hardstand predominantly covers the southern and western sections of the area while the northern and eastern sections of the area are predominantly covered by maintained grasses and exotic weed species.

Based on the available geological and hydro-geological information it is anticipated that groundwater may be encountered at the soil-rock interface as a result of subsurface water movement during and following wet weather and is expected to flow towards the east due to the topography of the Site and surrounding area towards Woronora River. The permanent groundwater table is anticipated to occur within the underlying bedrock, within zones of relatively higher permeability or associated with inconsistencies in the bedrock (faults, joints, weathered zones, etc.).

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

The gradient of the project area is at most 1:10.

3.2 Flora and fauna

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

No native flora is present within the project area. Thinned grasses and exotic weed species occupy this area (Att H-Site Characterisation Report, pages 18-19), managed under an active maintenance regime to prevent the propagation of weed seed beyond the site boundary. Native fauna is generally restricted to the transient common ringtail and brushtail possums, and common urban bird species, such as Australian raven, Australian magpie, magpie-lark, noisy miner, masked lapwing, sulfur-crested cockatoo, and red wattlebird. No formal ecological studies have been conducted for the proposed Project Area due to the highly disturbed nature of the Project Area, the absence of native flora and the transient nature of non-threatened faunal species.

The project area is situated within an industrial site on highly disturbed land. As mentioned above, the area is under an active maintenance program through mowing of grasses and spraying of weeds. There are no trees present within the project area and therefore no possibility for nests to be established. There are no floral or faunal values contained within the project area.

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

No native flora is present within this area. Grasses and managed exotic weed species occupy this area (Att H-Site Characterisation Report, pages 18-19).

Topsoil (0-0.3m below surface) consists of brown loam with high organic matter, which has likely been introduced to the area as cover for the underlying stratum. Fill material beneath the topsoil (0.3-1.5m below surface) consists of gravelly clay, sandy clay and fine grained sands (Att H-Site Characterisation Report, p. 24). This fill layer consists the target material for excavation, which is contaminated with naturally occurring radioactive material (NORM - as thorium and uranium bearing mineral sands), asbestos-containing material, and heavy metals (lead, zinc, nickel and copper).

3.3 Heritage

3.3.1 Describe any Commonwealth heritage places overseas or other places recognised as having heritage values that apply to the project area.

There are no Commonwealth heritage places in proximity to the Project Area.

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

There are no sites of Indigenous heritage value in proximity to the Project Area.

3.4 Hydrology

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

Detail on the hydrogeology of the Project Area is provided in Att H-Site Characterisation Report, p.24-25.

In summary, the gentle gradient toward the east promotes sheet surface water flow across the Project Area before being diverted through to an artificial dish drain, discharging approximately 100 m to the north-north east of the Project Area in a small creek. This creek ultimately discharges to the Woronora River approximately 550 m to the east of the Project Area.

Groundwater is generally present at the soil-rock interface during times of high rainfall or groundwater ingress. Groundwater flows are understood to flow toward the east. The permanent groundwater table is anticipated to occur within the underlying bedrock, within zones of relatively higher permeability or associated with inconsistencies in the bedrock such as faults, joints and weathered zones.

The ANSTO Lucas Heights site contains a network of 29 groundwater bores used for routine Environmental monitoring. An additional 5 groundwater bores were drilled in 2018 surrounding the underground petrol storage tanks for the purpose of a tank integrity investigation. Groundwater standing water levels in the nearby groundwater monitoring wells are typically between 1-5 m below surface. A pair of shallow and deep sampling groundwater monitoring well sampling points are situated approximately 100 m to the north-north east of the Project Area, in the general direction of any likely groundwater movement from the project area. No significant levels of heavy metal contaminants or radioactivity have been observed from samples taken from this well.

4. Impacts and mitigation

4.1 Impact details

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

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

4.1.1 World Heritage

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

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

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

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

No

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

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

4.1.2 National Heritage

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

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

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

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

No

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

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

4.1.3 Ramsar Wetland

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

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

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

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

No

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

A Protected Matters Search was conducted for the project area, there are no Ramsar listed wetlands identified within the vicinity of the project area. Towra Point Nature Reserve (a Ramsar listed wetland) is located approximately 14 km from the project site, within the broader Georges / Woronora River catchment. Waters from the project area do eventually flow into the Woronora River.

The project will be implementing dust suppression and sediment controls at the site to ensure contaminants cannot propagate beyond the project area. These controls include: watering down of material during excavation to prevent dust production; installation of temporary bunding around the project area boundary with additional sediment controls installed at stormwater drains leading away from the project area; installation of cattle grates, wash down facilities and water retention pits to minimise soil propagation on trucks transporting waste. Active monitoring of dusts at the project site will also be conducted to monitor for human health hazards to project workers. At A-Site Remedial Action Plan, sections 15.3-4, pages 62-65, provides further information of the minimum sediment and dust control measures. Following awarding of the earthworks contract, ANSTO will work with the Principal Contractor to prepare an Environmental Management Plan which meets the objectives of the project and ANSTO's minimum environmental protection requirements.

All contaminated soil to be disposed off site will be transported in sealed containers by NSW EPA licensed transporters for the specified waste type. The soil will be disposed at a licenced waste facility for the waste types.

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

4.1.4 Threatened Species and Ecological Communities

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

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

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

Threatened species

Direct impact	Indirect impact	Species
No	No	Acacia bynoeana
No	No	Acacia bynoeana
No	No	Acacia pubescens
No	No	Acacia pubescens
No	No	Acacia terminalis subsp. terminalis MS
No	No	Acacia terminalis subsp. terminalis MS
No	No	Allocasuarina glareicola

Direct impact	Indirect impact	Species
No	No	<i>Allocauarina glareicola</i>
No	No	<i>Anthochaera phrygia</i>
No	No	<i>Anthochaera phrygia</i>
No	No	<i>Botaurus poiciloptilus</i>
No	No	<i>Botaurus poiciloptilus</i>
No	No	<i>Caladenia tessellata</i>
No	No	<i>Caladenia tessellata</i>
No	No	<i>Calidris canutus</i>
No	No	<i>Calidris ferruginea</i>
No	No	<i>Calidris ferruginea</i>
No	No	<i>Callocephalon fimbriatum</i>
No	No	<i>Callocephalon fimbriatum</i>
No	No	<i>Calyptorhynchus lathami lathami</i>
No	No	<i>Chalinolobus dwyeri</i>
No	No	<i>Chalinolobus dwyeri</i>
No	No	<i>Charadrius leschenaultii</i>
No	No	<i>Charadrius leschenaultii</i>
No	No	<i>Cryptostylis hunteriana</i>
No	No	<i>Cryptostylis hunteriana</i>
No	No	<i>Cynanchum elegans</i>
No	No	<i>Cynanchum elegans</i>
No	No	<i>Dasyornis brachypterus</i>
No	No	<i>Dasyornis brachypterus</i>
No	No	<i>Dasyurus maculatus maculatus</i> (SE mainland population)
No	No	<i>Dasyurus maculatus maculatus</i> (SE mainland population)
No	No	<i>Erythrorhynchus radiatus</i>
No	No	<i>Erythrorhynchus radiatus</i>
No	No	<i>Eucalyptus camfieldii</i>
No	No	<i>Eucalyptus camfieldii</i>
No	No	<i>Falco hypoleucos</i>
No	No	<i>Falco hypoleucos</i>
No	No	<i>Genoplesium baueri</i>
No	No	<i>Genoplesium baueri</i>
No	No	<i>Grantiella picta</i>
No	No	<i>Grantiella picta</i>
No	No	<i>Heleioporus australiacus</i>
No	No	<i>Heleioporus australiacus</i>
No	No	<i>Hirundapus caudacutus</i>
No	No	<i>Hirundapus caudacutus</i>
No	No	<i>Hoplocephalus bungaroides</i>
No	No	<i>Hoplocephalus bungaroides</i>

Direct impact	Indirect impact	Species
No	No	Isoodon obesulus obesulus
No	No	Isoodon obesulus obesulus
No	No	Lathamus discolor
No	No	Lathamus discolor
No	No	Leucopogon exolasius
No	No	Litoria aurea
No	No	Litoria aurea
No	No	Litoria littlejohni
No	No	Litoria littlejohni
No	No	Macquaria australasica
No	No	Macquaria australasica
No	No	Melaleuca biconvexa
No	No	Melaleuca biconvexa
No	No	Melaleuca deanei
No	No	Melaleuca deanei
No	No	Mixophyes balbus
No	No	Mixophyes balbus
No	No	Notamacropus parma
No	No	Numenius madagascariensis
No	No	Numenius madagascariensis
No	No	Persicaria elatior
No	No	Persicaria elatior
No	No	Persoonia hirsuta
No	No	Persoonia hirsuta
No	No	Persoonia nutans
No	No	Persoonia nutans
No	No	Petauroides volans
No	No	Petauroides volans
No	No	Petaurus australis australis
No	No	Petaurus australis australis
No	No	Petrogale penicillata
No	No	Petrogale penicillata
No	No	Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)
No	No	Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)
No	No	Pimelea curviflora var. curviflora
No	No	Pimelea curviflora var. curviflora
No	No	Pomaderris brunnea
No	No	Pomaderris brunnea
No	No	Prostanthera densa
No	No	Pseudomys novaehollandiae
No	No	Pseudomys novaehollandiae

Direct impact	Indirect impact	Species
No	No	Pteropus poliocephalus
No	No	Pteropus poliocephalus
No	No	Pterostylis saxicola
No	No	Pterostylis saxicola
No	No	Pycnoptilus floccosus
No	No	Pycnoptilus floccosus
No	No	Rhizanthella slateri
No	No	Rhizanthella slateri
No	No	Rhodamnia rubescens
No	No	Rhodamnia rubescens
No	No	Rhodomyrtus psidioides
No	No	Rhodomyrtus psidioides
No	No	Rostratula australis
No	No	Rostratula australis
No	No	Syzygium paniculatum
No	No	Syzygium paniculatum
No	No	Thelymitra kangaloonica
No	No	Thelymitra kangaloonica
No	No	Thesium australe
No	No	Thesium australe

Ecological communities

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

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

No

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

The remediation activities will be confined to the Lucas Heights Science and Technology Centre (LHSTC). The LHSTC was significantly disturbed from broadscale land clearance activities which were conducted circa 1955 for the establishment of the HIFAR research nuclear reactor. The remediation site has primarily been used for the storage of equipment and waste material. The remediation site is highly disturbed with only grasses and exotic plant species present. There are no proposed activities which will result in the removal of native vegetation to be undertaken as part of the remediation works, therefore it is unlikely that there will be any direct impact on listed threatened species or ecological communities.

The remediation activities will involve the excavation of approximately 3,400 m³ of contaminated soil (asbestos, naturally occurring radioactive material - NORM as mineral sands, heavy metals - copper, nickel, zinc, lead) and other soil which has been characterised as general solid waste. The primary environmental risks are from sediment or dust displacement of contaminated soil from the site, and solubilisation of contaminants into surface or ground waters. Att A-Site Remedial Action Plan, sections 15.3-4, pages 62-65, provides information of the minimum sediment and dust control measures. Following awarding of the earthworks contract, the Principal contractor will be required to complete and implement a decommissioning environmental management plan (Att B-AF-5947 Project - Construction Environmental Management Plan), meeting ANSTO's minimum requirements for protection of the environment (Att C-AP-5400 Project Environmental Protection Requirements). The controls being employed are standard industry practice for the remediation of contaminated sites. Controls which will be required in the DEMP, include:

- dust suppression methods, such as water sprays, covering stockpiles.
- sediment capture mechanisms, such as sediment fences, erection of retaining walls, cattle grates and vehicle wash-down facility with sediment trap
- surface water re-direction around excavation site

- de-watering of excavated areas
- active dust monitoring for asbestos fibres and radioactive airborne contaminants
- surface water monitoring for contaminants of interest
- further site characterisation post-excavation to assess for any residual contamination (and subsequent removal)
- back-filling with virgin excavated natural material and either concreting or re-turfing area following removal of contaminated soils.

4.1.5 Migratory Species

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

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

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

Direct impact	Indirect impact	Species
No	No	Actitis hypoleucos
No	No	Apus pacificus
No	No	Calidris acuminata
No	No	Calidris ferruginea
No	No	Calidris melanotos
No	No	Charadrius leschenaultii
No	No	Cuculus optatus
No	No	Gallinago hardwickii
No	No	Hirundapus caudacutus
No	No	Monarcha melanopsis
No	No	Motacilla flava
No	No	Myiagra cyanoleuca
No	No	Numenius madagascariensis
No	No	Rhipidura rufifrons
No	No	Symposiachrus trivirgatus
No	No	Tringa nebularia

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

No

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

Similarly to the response provided in 4.1.3.1 of this Referral on why the action is unlikely to have a direct or indirect impact on listed fauna species, this action is not likely to have a significant direct or indirect impact on migratory species.

The remediation activities will be confined to the Lucas Heights Science and Technology Centre (LHSTC). The LHSTC was significantly disturbed from broadscale land clearance activities which were conducted circa 1955 for the establishment of the HIFAR research nuclear reactor. The remediation site has primarily been used for the storage of equipment and waste material. The remediation site is highly disturbed with only grasses and exotic plant species present. There are no proposed activities which will result in the removal of native vegetation to be undertaken as part of the remediation works, therefore it is unlikely that there will be any direct impact on listed threatened species or ecological communities.

The remediation activities will involve the excavation of approximately 3,400 m³ of contaminated soil (asbestos, naturally occurring radioactive material - NORM as mineral sands, heavy metals - copper, nickel, zinc, lead) and other soil which has been characterised as general solid waste. The primary environmental risks are from sediment or dust displacement of contaminated soil from the site, and solubilisation of contaminants into surface or ground waters. Att A-Site Remedial Action Plan, sections 15.3-4, pages 62-65, provides information of the minimum sediment and dust control measures. Following awarding of the earthworks contract, the Principal contractor will be required to complete and implement a decommissioning environmental management plan (Att B-AF-5947 Project - Construction Environmental Management Plan), meeting ANSTO's minimum requirements for protection of the environment (Att C-AP-5400 Project Environmental Protection Requirements). The controls being employed are standard industry practice for the remediation of contaminated sites. Controls which will be required in the DEMP, include:

- dust suppression methods, such as water sprays, covering stockpiles.
- sediment capture mechanisms, such as sediment fences, erection of retaining walls, cattle gates and vehicle wash-down facility with sediment trap
- surface water re-direction around excavation site
- de-watering of excavated areas
- active dust monitoring for asbestos fibres and radioactive airborne contaminants
- surface water monitoring for contaminants of interest
- further site characterisation post-excavation to assess for any residual contamination (and subsequent removal)
- back-filling with virgin excavated natural material and either concreting or re-turfing area following removal of contaminated soils.

4.1.6 Nuclear

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

Yes

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

This action will involve the excavation, transportation and final disposal of naturally occurring radioactive material (NORM) as thorium and uranium containing mineral sands. Considering subsection 22(1) of the EPBC Act, ANSTO has determined this action intersects with:

- Subsection (e): establishing or significantly modifying a large-scale disposal facility for radioactive waste;
 - Subsection 22(2) states: **large-scale disposal facility** for radioactive waste means, if regulations are made for the purposes of this definition, a facility prescribed by the regulations.
 - Regulation 2.03 of the EPBC Regulations states: For the definition of **large-scale disposal facility** in subsection 22(2) of the Act, a facility used for the disposal of radioactive materials at or above the activity level mentioned in regulation 2.02 is prescribed.
- Subsection (f): de-commissioning or rehabilitating any facility or area in which an activity described in paragraph (e) has been undertaken;
- Subsection (g): any other action prescribed by the regulations.
 - Regulation 2.01 of the EPBC Regulations states: For paragraph (g) of the definition of **nuclear action** in subsection 22(1) of the Act, a nuclear action includes establishing, significantly modifying, decommissioning or rehabilitating a facility where radioactive materials at or above the activity level mentioned in regulation 2.02 are, were, or are proposed to be used or stored.

The total area to be remediated has been characterised from a radiological contamination perspective as three areas based upon concentration of radiological contaminants present (Att I-Soil Sample Report, pp.49-54). These areas are broadly summarised as:

- Material 1 - Site Soils Contaminated with Mineral Sands, Area - 166 m², Volume - 56.7 m³, Mass - 90.7 tonne, uranium (U)-238 (head of chain) specific activity concentration (SAC) = 0.62 becquerels / gram (Bq/g), thorium (Th)-232 (head of chain) SAC = 4.23 Bq/g.
- Material 2 - Site Soils Contaminated with Mineral Sands, Area - 922 m², Volume 296.2 m³, Mass - 474 tonne, U-238 SAC = 0.17 Bq/g, Th-232 SAC = 0.63 Bq/g.
- Material 3 - Site Soils Surrounding Materials 1 and 2, Area - 5962 m², Volume 8943 m³, Mass - 14,309 tonne, U-238 SAC = 0.12 Bq/g, Th-232 SAC = 0.06 Bq/g.

Total material - Area - 7,050 m², Volume 9295.9 m³, Mass - 14,873 kg.

The excavation of material will have a direct impact on this MNES, however as will be detailed in 4.1.6.6 of this Referral, ANSTO has determined that this action does not exceed the trigger values for the action to be deemed excessive as prescribed by Regulation 2.02(2) of the EPBC Regulations.

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

No

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

ANSTO applied to the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) to consider the handling of the radioactive material as a 'low-risk' dealing on 7 January 2021. Consequently, the ARPANSA CEO provided a 'Declaration of Exemption' under subsection 44(5) of the Australian Radiation Protection and Nuclear Safety Regulations 2018 (Att I-Soil Sample Report, p.60).

As previously mentioned in 4.1.2 of this Referral, ANSTO considers this action has a direct impact on the MNES of a nuclear action as the proposed action will involve the decommissioning of a large-scale disposal facility. To determine whether this action will be significant and thereby considered a controlled action, testing to whether the mixture of nuclides being handled exceeds the 'excessive' threshold, the thresholds stated in Regulation 2.02(2) need to be assessed in conjunction with the activity concentration values and activity values prescribed in Part 1 of Schedule 1 to the Australian Radiation Protection and Nuclear Safety Regulations 2018 (ARPANS Regulations). Further consideration is required to determine if the progeny nuclides present are in secular equilibrium with the parent nuclide, and if so what nuclides are included within the calculation to whether the mixture of nuclides is excessive. In determining whether to consider the head-of-chain nuclide or the combination of progeny nuclides, Regulation 5 of the ARPANS Regulations provides definition on determining the parent nuclide activity. Regulation 5 of the ARPANS Regulations states:

1. For the purposes of this instrument, in determining the activity of a parent nuclide mentioned in an item of Part 2 of Schedule 1, include the activity of any progeny nuclide mentioned in that item that is included in secular equilibrium with the parent nuclide.
2. Except for the purposes of determining under subsection (1) the activity of a parent nuclide mentioned in an item of Part 2 of Schedule 1, the activity of a progeny nuclide mentioned in an item of that Part is taken to be nil when included in secular equilibrium with a parent nuclide mentioned in that item.

ANSTO assessed the material as being natural uranium (U-nat) and thorium (Th-nat) in secular equilibrium with each respective nuclide progeny chain, and determined the activity and activity concentration values for both U-nat and Th-nat. This means that Regulation 5(2) of the ARPANS Regulations is taken as the guiding definition meaning the progeny nuclides activities are considered nil in lieu of using the parent nuclide activities for U-nat and Th-nat. This determination results in the activity concentration value and activity for each U-nat and Th-nat as being 1 Bq/g and 1,000 Bq respectively.

As the action involves the handling of unsealed sources, Regulation 2.02(2)(b) of the EPBC Regulations is taken to be the relevant provision, which states that a mixture is excessive if:

- the unsealed source activity value is greater than 10⁶ **and** the unsealed source activity concentration value is greater than 1.

This imposes a two-part test to determine if the mixture is considered excessive. ANSTO has used this two-part test to determine whether the mixture is considered excessive.

The specific activity concentration (SAC) for each material has been determined (see 4.1.6.2 of this Referral) as:

- Material 1: U-238 = 0.62 Bq/g, Th-232 = 4.23 Bq/g, sum = 4.85 Bq/g (greater than activity concentration value of 1)
- Material 2: U-238 = 0.17 Bq/g, Th-232 = 0.63 Bq/g, sum = 0.80 Bq/g (less than activity concentration value of 1)
- Material 3: U-238 = 0.12 Bq/g, Th-232 = 0.06 Bq/g, sum = 0.18 Bq/g (less than activity concentration value of 1)
- Total material: U-238 = 0.10 Bq/g, Th-232 = 0.12 Bq/g, sum = 0.23 Bq/g (less than activity concentration value of 1)

The second part to the two-part test requires to determine if the activity value is 1,000,000 times greater than the activity value given in Part 1 of Schedule 1 for each parent nuclide, which is 1000 for each U-nat and Th-nat. Giving an activity value limit of 1,000,000,000 Bq. This activity value limit has been used in this evaluation for both the individual nuclides and conservatively for the combined sum of the nuclides.

To calculate the activity for each material, the SAC's for U-238 and Th-232 is multiplied by the mass of each material, giving:

- Material 1:
 - U-238: $0.62 \text{ Bq/g} \times 90,700,000 \text{ g} = 56,246,000 \text{ Bq}$ (less than the activity value limit of 1,000,000,000 Bq)
 - Th-232: $4.23 \text{ Bq/g} \times 90,700,000 \text{ g} = 383,745,600 \text{ Bq}$ (less than the activity value limit of 1,000,000,000 Bq)
 - Sum = 439,992,000 Bq (less than activity value limit of 1,000,000,000 Bq)
- Material 2:
 - U-238: $0.17 \text{ Bq/g} \times 473,920,000 \text{ g} / 1,000,000 = 80,566,000 \text{ Bq}$ (less than the activity value limit of 1,000,000,000 Bq)
 - Th-232: $0.63 \text{ Bq/g} \times 473,920,000 \text{ g} = 298,569,600 \text{ Bq}$ (less than the activity value limit of 1,000,000,000 Bq)
 - Sum = 379,136,000 Bq (less than activity value limit of 1,000,000,000 Bq)
- Material 3:
 - U-238: $0.12 \text{ Bq/g} \times 14,308,800,000 \text{ g} / 1,000,000 = 1,717,056,000 \text{ Bq}$ (greater than the activity value limit of 1,000,000,000 Bq)
 - Th-232: $0.06 \text{ Bq/g} \times 14,308,800,000 \text{ g} = 858,528,000 \text{ Bq}$ (less than the activity value limit of 1,000,000,000 Bq)
 - Sum = 2,575,584,000 Bq (greater than the activity value limit of 1,000,000,000 Bq)
- Total material:
 - 3,394,712,000 Bq (sum of the above) (greater than the activity value limit of 1,000,000,000 Bq)

Summarising the two-part test results for each material and the combined total material gives, noting **both** the unsealed source activity concentration **and** the unsealed source activity value must be exceeded:

- Material 1:
 - Unsealed source activity concentration = 4.85 Bq/g - **greater** than activity concentration value of 1
 - Unsealed source activity value = 439,992,000 Bq - **less** than activity value limit of 1,000,000,000 Bq
 - Determined as **not excessive** using the two-part test
- Material 2:
 - Unsealed source activity concentration = 0.80 Bq/g - **less** than activity concentration value of 1
 - Unsealed source activity value = 379,136,000 Bq - **less** than activity value limit of 1,000,000,000 Bq
 - Determined as **not excessive** using the two-part test
- Material 3:
 - Unsealed source activity concentration = 0.18 Bq/g - **less** than activity concentration value of 1
 - Unsealed source activity value = 2,575,584,000 Bq - **greater** than activity value limit of 1,000,000,000 Bq
 - Determined as **not excessive** using the two-part test
- Total material:
 - Unsealed source activity concentration 0.23 Bq/g - **less** than activity concentration value of 1
 - Unsealed source activity value = 3,394,712,000 Bq - **greater** than activity value limit of 1,000,000,000 Bq
 - Determined as **not excessive** using the two-part test

As neither each individual material nor the overall total material exceeded both components of the two-part test for what is considered 'excessive' under Regulation 2.02 of the EPBC Regulations, this action is considered not a significant impact on this matter of MNES and therefore is not considered a nuclear action under s.22 of the EPBC Act.

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

No

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

The two part-test as prescribed by Regulation 2.02(2)(b) of the EPBC Regulations to be applied to determine whether the Proposed Action is a nuclear action results that **both** the unsealed source activity concentration **and** the unsealed source activity value for each identified material or the overall material has exceeded the respective values prescribed by Regulation 2.02(2)(b) of the EPBC Regulations (read in conjunction with Regulation 5(2) of the ARPANS Regulations). Therefore the Proposed Action is not considered 'excessive' under Regulation 2.02 of the EPBC Regulations, therefore is not considered a significant impact on the matter of national environmental significance - nuclear action, and should not be considered a controlled action in respect to a nuclear action.

Further to support this outcome, the 'Declaration of Exemption' provided by the CEO of ARPANSA under subsection 44(5) of the ARPANS Regulations 2018 (Att I-Soil Sample Report, p.60), demonstrates that the risks posed to the environment by the Proposed Action are considered as 'low risk' and do not require further controls or conditions imposed by ARPANSA.

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

As noted previously, the excavation activity will incorporate mitigation measures to prevent dusts or sediment being displaced away from the activity area. Following awarding of the earthworks contract, the Principal contractor will be required to implement a decommissioning environmental management plan (Att B-AF-5947 Project - Construction Environmental Management Plan), meeting ANSTO's minimum requirements for protection of the environment (Att C-AP-5400 Project Environmental Protection Requirements). The controls being employed are standard industry practice for the remediation of contaminated sites. Controls which will be required in the DEMP, include:

- dust suppression methods, such as water sprays, covering stockpiles.
- sediment capture mechanisms, such as sediment fences , erection of retaining walls, cattle grates and vehicle wash-down facility with sediment trap
- surface water re-direction around excavation site
- de-watering of excavated areas

- active dust monitoring for asbestos fibres and radioactive airborne contaminants
- surface water monitoring for contaminants of interest
- further site characterisation post-excavation to assess for any residual contamination (and subsequent removal)
- back-filling with virgin excavated natural material and either concreting or re-turfing area following removal of contaminated soils.

The likelihood that these measures will be effective is high. The measures being proposed to be implemented are standard industry measures for the remediation of contaminated sites and these requirements are being included in the tender specification as a requirement. The primary possible vectors of contaminants propagating from the site are: airborne (dusts blown from the site), surface waters, groundwater and material attached to the vehicles transporting soil away from the site. Airborne dust propagation will be mitigated by ensuring soils are kept moist and covered when exposed or in transport. Active dust monitoring will be used throughout the Project Area, primarily to protect workers from potential hazards, but secondarily to assess whether contaminated dusts are at risk of being blown into the surrounding environment. Surface water contamination will be controlled through the redirection of surface waters from upstream around the project area, installation of multiple sediment traps and monitoring of surface waters collected on the site prior to discharge to the environment. Groundwater contamination risks are largely due to the solubilisation of contaminants following exposure to the air. Importantly, the soil matrix is not considered as acid-sulfate soil potential (Att I-Soil Sample Report, page 4), and therefore oxidation and solubilisation is considered a low likelihood. The excavation and removal of contaminated soil will be conducted as quickly as possible and any ponding which occurs within partially excavated areas will be de-watered, tested and treated if required. Material that potentially becomes attached to vehicles transporting soil away from the site (i.e. in tyre treads), will pass over cattle grates and be washed down for any residue - all waters will be retained on site and tested (and treated if required) prior to discharge to the environment.

While ARPANSA have determined this activity an exempt dealing, ANSTO will apply the relevant radiation safety and environmental protection measures and standards which would otherwise be regulated by ARPANSA throughout this activity. More broadly, ANSTO is subject to strict radiological environmental regulation by ARPANSA, and will inform ARPANSA in the event of any unexpected significant release of radiologically contaminated material from the Project Area. Note: Any such events will be captured, categorised and investigated as part of ANSTO's standard internal reporting and investigation processes.

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

No offsets are proposed for this action.

4.1.7 Commonwealth Marine Area

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

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

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

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

No

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

A Protected Matters Search was conducted for the project area, there are no Commonwealth marine areas identified within the vicinity of the project area. Similarly to the assessment on possible impacts on Ramsar listed wetlands, the risk of contaminants propagating into the Woronora River catchment is assessed as very low, and therefore the risk to contaminants entering Commonwealth marine areas is also considered as very low.

4.1.8 Great Barrier Reef

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

No

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

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

4.1.9 Water resource in relation to large coal mining development or coal seam gas**4.1.9.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? ***

No

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

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

4.1.10 Commonwealth Land

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

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

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

—

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

Yes

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

The EPBC Act Significant impact guidelines 1.2 provides guidance to Commonwealth agencies on activities which are likely to have an impact to the 'whole of environment'. A self-assessment was conducted that concluded that this project triggers the requirement for referral as there is a real chance or possibility that the action will:

- involve medium or large-scale excavation of soil or minerals
- substantially disturb contaminated or acid-sulphate soils

The activity will involve the excavation, transport and ultimate disposal at licenced waste acceptance facilities, of legacy contaminated soil from a brownfield site. The contaminants identified are naturally occurring radioactive material (NORM - as mineral sands containing uranium and thorium, expected excavation volume ~360 m³), asbestos containing material (expected excavation volume ~12m³), moderate level concentrations of lead (expected excavation volume ~10m³), and low-level concentrations of copper, nickel and zinc (expected excavation volume ~3000m³). The total footprint area of the project site, which is confined within the Lucas Heights Science and Technology Centre is approximately 3,700 m². Locations of heavy metal contamination hotspots within the project area are summarised in Att D-Site Characterisation Report, p.88.

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

No

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

The extent of contamination of NORM is relatively small, and the activity concentration and total contained activity is low, which has been recognised by the Australian Radiation Protection and Nuclear Safety Agency as an exempt dealing under the ARPANS Regulations. ANSTO has assessed this activity as not triggering the nuclear action threshold as prescribed by s.22 of the EPBC Act. There are however three distinct areas of varying degrees of NORM contamination, which have been characterised to meet the requirements of the NSW EPA waste classification guidelines. Approximately 360 m3 of soil has been characterised as exceeding the general solid waste classification, and therefore is being disposed as restricted solid waste (Att I-Soil Sample Report, p.2).

Regarding the heavy metal contaminated soil, sampling from 29 boreholes, showed no exceedances of the health investigation levels (HIL) for public open space land use (Ref 2-National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1). However, samples from six boreholes returned levels of heavy metal contaminants which exceeded the ecological investigation levels (EIL) for open public space (Att H-Site Characterisation Report, pp.126-127), which are summarised in 4.1.10.9 of this referral:

The soils contaminated with heavy metals (excluding lead, see below) were characterised to the EPA waste classification guidelines [Ref 4-Waste Classification Guidelines Part 1: Classifying waste] as general solid waste (Att I-Soil Sample Report, pp.41-43).

While the concentration of lead did not exceed any HILs or EILs prescribed in the NEPM ASC (Att H-Site Characterisation Report, pp.126-127), the concentration of lead in the area to the south-east of the project area does exceed the NSW EPA waste classification threshold for restricted waste, and therefore is being disposed as hazardous waste (Att I-Soil Sample Report, p.45).

Asbestos containing material was found close to the existing building structure in 2 of 21 test pits sampled, likely as the result of historical roof renovations to this building. The area (resulting in approximately 12 m3 of soil) around the positive identification of asbestos has been subsequently characterised per the NSW EPA Waste Classification Guidelines as asbestos--special waste (Att I-Soil Sample Report, pp.4-5).

The excavation activity will employ industry-standard practices to minimise the production of dusts and the propagation of sediment away from the site. The mobilisation of contaminants into surface waters and groundwater will be controlled through the diversion of surface waters around the project site, covering of stockpile and de-watering excavated areas. The risk will be further mitigated by the short time frame between the proposed excavation and back-filling with virgin excavated natural material.

The transportation component will involve the movement of approximately 140 semi-trailer loads of material to the respective approved waste acceptance facility, with about 125 semi-trailer loads being transported to the Lucas Heights Waste Management Facility (2km from project site), 15 semi-trailer loads being transported to the Kemps Creek (44km from project site) and one semi-trailer loads being transported to the St Mary's Waste Management Facility (60km from project site). Assuming there will be eight truck movements per day, there additional traffic load on community roads will be about 1 per hour. Considering the impact on this traffic flow on residential/commercial areas, a traffic study performed for the Moorebank Intermodal Company in 2014 [Ref 6- Moorebank Intermodal Company Moorebank Intermodal Terminal – Traffic and Transport Impact Assessment, p.111] identified a heavy vehicle traffic peak hour intensity at the intersection of Heathcote Road and Nuwarra Road (which is on the likely route to Kemps Creek) of about 60 heavy vehicles per hour travelling in the north-western direction. The additional 15 semi-trailer loads is expected to have a negligible impact on community roads for the expected transporting route. The 125 semi-trailer loads being transported to the Lucas Heights Waste Management Facility will also have negligible impact on community roads given the very short distance to be travelled.

The transportation route within the LHSTC has considered the possible impacts to staff, tenants and members of the public which visit the publicly accessible area of the LHSTC. In conjunction with other proposed activities for the LHSTC, the perimeter road is being realigned, which will route vehicles about 100 m further away from the cafe, motel and childcare facility situated in within the public accessible area of the LHSTC. This will reduce the noise and vibration aspect of the heavy vehicle movements to the public areas.

ANSTO has assessed the impact to the whole-of-the-environment as being likely, but not significant, given the confined nature of the project area to an already heavily disturbed site, the low-level concentration of contaminants, and the use of industry standards for the excavation and transportation of contaminated soils.

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

No

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

The excavation activity will be confined within the site boundary of the Lucas Heights Science and Technology Centre. The project site is significantly disturbed and has no native vegetation present. Fauna are highly restricted to the site, with only urbanised avian species generally present. The primary risk to the environment is from the propagation of dusts and sediment away from the project area, however ANSTO has assessed the risk as not significant, considering the confined nature of the project area, the low-level concentration of contaminants, and the use of industry standards for the excavation and transportation of contaminated soils.

The activity will involve the medium-scale excavation of contaminated soil, however the contaminants in the soil have been characterised as low-level. The soil contaminated with naturally occurring radioactive material has been declared by the Australian Radiation Protection and Nuclear Safety Agency as an exempt dealing, and is considered as part of this referral as not triggering the nuclear action threshold. The level of heavy metal contaminants did not exceed any health investigation limits for open spaces as prescribed by the National Environmental Protection Measure - Assessment of Contaminated Sites (Ref 2-National Environment Protection (Assessment of Site Contamination)). As part of the soil characterisation, there were some exceedances identified of ecological investigation limits for open spaces for copper, nickel and zinc, however these were limited to a small number of boreholes samples. These are summarised as (Att H-Site Characterisation Report, pp.126-127):

- Copper (NEPM EIL Open Space 60 mg/kg), BH14 shallow (Sh)- 85 mg/kg, BH19 Sh- 4600 mg/kg, BH28 Sh- 260 mg/kg
- Nickel (NEPM EIL Open Space 10 mg/kg), BH2 Sh- 75 mg/kg, BH14 Sh- 18 mg/kg, BH19 Sh- 190 mg/kg, BH25 Sh- 11 mg/kg, BH26 Sh- 4600 mg/kg deep (Dp), 38 mg/kg, BH28 Sh- 36 mg/kg
- Zinc (NEPM EIL Open Space 210 mg/kg), BH14 Dp- 870 mg/kg, BH19 Sh- 2100 mg/kg, BH28 Sh- 4000 mg/kg, BH28 Dp- 520 mg/kg

There was also one exceedance of the NEPM ASC ecological screening level for the total recoverable hydrocarbons (C16-C34 fraction) for coarse soils (300 mg/kg) for BH2 shallow - 390 mg/kg (Att H-Site Characterisation Report, p.128).

The excavation and transportation of contaminated soil will be performed to industry standards for dust and sediment propagation mitigation. dust suppression methods, such as water sprays, covering stockpiles. All contaminated soils will be transported in either sealed containers or bulk bags which will be tied closed. Each bag or container will be transported in semi-trailers with each being contained with side/tail gates and canopies. These measures will be implemented to prevent dusts being blown from the vehicle while in transit.

The transport of material to approved waste acceptance facilities for the classified waste types will have a negligible impact on typical traffic flows on the expected transporting routes.

As a result, ANSTO has assessed that this activity is not likely to have a significant impact on the whole-of-the-environment, and therefore does not consider this action to be a controlled action under Division 2 of the EPBC Act.

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

A decommissioning environmental management plan (Att B-AF-5947 Project - Construction Environmental Management Plan) will be required to be completed and implemented by the Principal contractor, meeting ANSTOs minimum environmental protection requirements (Att C-AP-5400 Project Environmental Protection Requirements). Controls will include:

- dust suppression methods, such as water sprays, covering stockpiles.
- sediment capture mechanisms, such as sediment fences , erection of retaining walls, cattle grates and vehicle wash-down facility with sediment trap
- surface water re-direction around excavation site
- de-watering of excavated areas
- active dust monitoring for asbestos fibres and radioactive airborne contaminants
- surface water monitoring for contaminants of interest
- further site characterisation post-excavation to assess for any residual contamination (and subsequent removal)
- back-filling with virgin excavated natural material and either concreting or re-turfing area following removal of contaminated soils.

While the primary objective of the DEMP will be to minimise dust and sediment displacement away from the site, the following impacts will also be required to be controlled and documented in the Principal contractor's DEMP:

- incidental interactions with fauna
- noise and vibration
- odour management
- traffic management
- fuels, oils and grease leaks from plant and equipment
- consultation with internal and community stakeholders on detailed activities

The timing of the excavation and transportation of contaminated soil will need to align with the opening hours of the waste disposal facilities where the contaminated soil is being disposed and the availability of the transporters vehicles.

All works that involve the disturbance of asbestos impacted material is to be conducted by a Class A asbestos Licenced Contractor. Additionally, all works that involve the disturbance of asbestos impacted material must be performed in accordance with the NSW Work, Health and Safety Regulation 2017; and Ref 7-Safe Work Australia Code of Practice (How to Safely Remove Asbestos).

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

No offsets are being proposed for this action as the impacts to any vegetation is anticipated to be negligible.

4.1.11 Commonwealth heritage places overseas

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

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

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

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

No

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

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

4.1.12 Commonwealth or Commonwealth Agency

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

Yes

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

The EPBC Act Significant impact guidelines 1.2 provides guidance to Commonwealth agencies on activities which are likely to have an impact to the 'whole of environment'. A self-assessment was conducted that concluded that this project triggers the requirement for referral as there is a real chance or possibility that the action will:

- involve medium or large-scale excavation of soil or minerals
- substantially disturb contaminated or acid-sulphate soils

The activity will involve the excavation, transport and ultimate disposal at licenced waste acceptance facilities, of legacy contaminated soil from a brownfield site. The contaminants identified are naturally occurring radioactive material (NORM - as mineral sands containing uranium and thorium, expected excavation volume ~360m³), asbestos containing material (expected excavation volume ~12m³), moderate level concentrations of lead (expected excavation volume ~10m³), and low-level concentrations of copper, nickel and zinc (expected excavation volume ~3000m³). The total footprint area of the project site, which is confined within the Lucas Heights Science and Technology Centre is approximately 3,700 m². Locations of heavy metal contamination hotspots within the project area are summarised in Att H-Site Characterisation Report, p.88.

The extent of contamination of NORM is relatively small, and the activity concentration and total contained activity is low, which has been recognised by the Australian Radiation Protection and Nuclear Safety Agency as an exempt dealing under the ARPANS Regulations. ANSTO has assessed this activity as not triggering the nuclear action threshold as prescribed by s.22 of the EPBC Act. There are however three distinct areas of varying degrees of NORM contamination, which have been characterised to meet the requirements of the NSW EPA waste classification guidelines. Approximately 360 m³ of soil has been characterised as exceeding the general solid waste classification, and therefore is being disposed as restricted solid waste (Att I-Soil Sample Report, p.2).

Regarding the heavy metal contaminated soil, sampling from 29 boreholes, showed no exceedances of the health investigation levels (HIL) for public open space land use (Ref 2-National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1). However, samples from six boreholes returned levels of heavy metal contaminants which exceeded the ecological investigation levels (EIL) for open public space (Att H-Site Characterisation Report, pp.126-127), which are summarised in 4.1.10.9 of this referral:

The soils contaminated with heavy metals (excluding lead, see below) were characterised to the EPA waste classification guidelines (Ref 4-Waste Classification Guidelines Part 1: Classifying waste) as general solid waste (Att I-Soil Sample Report, pp.41-43).

While the concentration of lead did not exceed any HILs or EILs prescribed in the NEPM ASC (Att H-Site Characterisation Report, pp.126-127), the concentration of lead in the area to the south-east of the project area does exceed the NSW EPA waste classification threshold for restricted waste, and therefore is being disposed as hazardous waste (Att I-Soil Sample Report, p.45).

Asbestos containing material was found close to the existing building structure in 2 of 21 test pits sampled, likely as the result of historical roof renovations to this building. The area (resulting in approximately 12 m³ of soil) around the positive identification of asbestos has been subsequently characterised per the NSW EPA Waste Classification Guidelines as asbestos--special waste (Att I-Soil Sample Report, pp.4-5).

The excavation activity will employ industry-standard practices to minimise the production of dusts and the propagation of sediment away from the site. The mobilisation of contaminants into surface waters and groundwater will be controlled through the diversion of surface waters around the project site, covering of stockpile and de-watering excavated areas. The risk will be further mitigated by the short time frame between the proposed excavation and back-filling with virgin excavated natural material.

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The transportation route within the LHSTC has considered the possible impacts to staff, tenants and members of the public which visit the publicly accessible area of the LHSTC. In conjunction with other proposed activities for the LHSTC, the perimeter road is being realigned, which will route vehicles about 100 m further away from the cafe, motel and childcare facility situated in within the public accessible area of the LHSTC. This will reduce the noise and vibration aspect of the heavy vehicle movements to the public areas.

ANSTO has assessed the impact to the whole-of-the-environment as being likely, but not significant, given the confined nature of the project area to an already heavily disturbed site, the low-level concentration of contaminants, and the use of industry standards for the excavation and transportation of contaminated soils.

4.2 Impact summary

Conclusion on the likelihood of significant impacts

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

None

Conclusion on the likelihood of unlikely significant impacts

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

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

4.3 Alternatives

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

No

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

The land being proposed to be remediated is on Commonwealth land, within the secured Lucas Heights Science and Technology Centre.

The Remedial Action Plan (RAP - Att A-Site Remedial Action Plan, section 12) developed for this area considered a range of alternatives for the different contaminated areas identified. The options included:

- Isolation of the soil by emplacement of a capping material.
- Excavation and on-site storage of the impacted material
- Excavation and off-site disposal of the impacted material
- Remain in-situ and implemented appropriate management controls.

Each option was evaluated and ranked for each contaminated area based upon how each option addressed environmental, social and economic factors. Within the RAP, the excavation and off-site disposal of NORM and asbestos contaminated soils was identified as the preferred option, however for the heavy metal contaminated soil, the preferred outcome was to remain in-situ and implement appropriate management controls. ANSTO has subsequently re-evaluated the treatment option for the heavy metal contaminated soil considering the future purposes of the site which may include the development of the site into an innovation precinct which will may allow for greater access to members of the public. Consequently, the removal of the heavy metal contaminated soil was determined to be the preferred option to meet the objectives of the future land use.

ANSTO has assessed the risks (human health and ecologically) posed by maintaining the current state of the site as not acceptable and thereby requires an alternative solution to mitigate (eliminate) these risks. In order to do so, ANSTO has determined the most suitable outcome is to dispose of the contaminated soils to the appropriate approved waste acceptance facilities.

5. Lodgement

5.1 Attachments

1.2.1 Overview of the proposed action

#1.	Att A-Site Remedial Action Plan	Document	Remedial action plan prepared by GETEX that has informed the proposed excavation and removal of contaminated soils.
#2.	Att B-AF-5947 Project - Construction Environmental Management Plan	Document	Planning tool to identify, risk assess and control potential environmental impacts relating to construction, decommissioning or other projects at ANSTO.
#3.	Att C-AP-5400 Project Environmental Protection Requirements	Document	This document provides the overarching planning framework and requirements for the protection of the environment from project, decommissioning and maintenance activities at ANSTO.

1.2.5 Information about the staged development

#1.	Att D-Ecological report-supporting road realign	Document	Ecological constraints report for the small scale vegetation clearing associated but not included within the referral action scope.
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1.2.6 Commonwealth or state legislation, planning frameworks or policy documents that are relevant to the proposed action

#1.	Ref 1-Contaminated sites: Sampling Design Guidelines	Link (Webpage)	https://www.environment.nsw.gov.au/resources/clm/95059sampgdline.pdf
#2.	Ref 2-National Environment Protection (Assessment of Site Contamination)	Link (Webpage)	http://www.nepc.gov.au/nepms/assessment-site-contamination
#3.	Ref 3-Safety Guide for the Management of Naturally Occurring Radioactive Material (NORM)	Link (Webpage)	https://www.arpansa.gov.au/regulation-and-licensing/regulatory-publications
#4.	Ref 4-Waste Classification Guidelines Part 1: Classifying waste (NSW EPA)	Link (Webpage)	https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines
#5.	Ref 5-Waste Classification Guidelines Part 3: Waste containing radioactive material	Link (Webpage)	https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines

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

#1.	Att E-Health Safety Community and Environment Policy	Document	Contains ANSTO's environmental policy statements
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1.3.2.18 (Person proposing to take the action) If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

#1.	Att B-AF-5947 Project - Construction Environmental Management Plan	Document	This form is completed for all major projects conducted at ANSTO which may have an impact on the environment. This form may be complemented by a Principal Contractor's own environmental management plan.
#2.	Att C-AP-5400 Project Environmental Protection Requirements	Document	This document provides the overarching planning framework and requirements for the protection of the environment from project, decommissioning and maintenance activities at ANSTO.
#3.	Att E-Health Safety Community and Environment Policy	Document	Contains ANSTO's environmental policy statements
#4.	Att F-AF-1376 Project Environmental Planning Checklist	Document	This checklist informs project planners to understand the environmental regulatory approvals requirement and internal planning requirements for any project conducted at ANSTO.
#5.	Att G-AF-2315 Safe Work Method and Environmental Statement (SWMES)	Document	This form assists any staff member of ANSTO (or contractors) to identify, mitigate, and risk assess safety and environmental hazards for high risk or non-routine activities.

3.1.1 Current condition of the project area's environment

#1.	Att A-Site Remedial Action Plan	Document	Remedial action plan prepared by GETEX that has informed the proposed excavation and removal of contaminated soils.
#2.	Att H-Site Characterisation Report	Document	Provides the background site information and soil characterisation summary, including radiological, and waste classification outcomes
#3.	Att I-Soil Sample Report	Document	Provides the final soil classification and NSW EPA waste disposal classification outcomes for each soil type.

3.1.2 Existing or proposed uses for the project area

#1.	Att A-Site Remedial Action Plan	Document	Remedial action plan prepared by GETEX that has informed the proposed excavation and removal of contaminated soils.
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3.1.3 Natural features, important or unique values that applies to the project area

#1.	Att H-Site Characterisation Report	Document	Provides the background site information and soil characterisation summary, including radiological, and waste classification outcomes
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3.2.1 Flora and fauna within the affected area

#1.	Att H-Site Characterisation Report	Document	Provides the background site information and soil characterisation summary, including radiological, and waste classification outcomes
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3.2.2 Vegetation within the project area

#1.	Att H-Site Characterisation Report	Document	Provides the background site information and soil characterisation summary, including radiological, and waste classification outcomes
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3.4.1 Hydrology characteristics that apply to the project area

#1.	Att H-Site Characterisation Report	Document	Provides the background site information and soil characterisation summary, including radiological, and waste classification outcomes
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4.1.3.3 (Ramsar Wetland) Why your action is unlikely to have a direct and/or indirect impact

#1.	Att A-Site Remedial Action Plan	Document	Remedial action plan prepared by GETEX that has informed the proposed excavation and removal of contaminated soils.
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4.1.4.3 (Threatened Species and Ecological Communities) Why your action is unlikely to have a direct and/or indirect impact

#1.	Att A-Site Remedial Action Plan	Document	Remedial action plan prepared by GETEX that has informed the proposed excavation and removal of contaminated soils.
#2.	Att B-AF-5947 Project - Construction Environmental Management Plan	Document	This form is completed for all major projects conducted at ANSTO which may have an impact on the environment. This form may be complemented by a Principal Contractor's own environmental management plan.
#3.	Att C-AP-5400 Project Environmental Protection Requirements	Document	This document provides the overarching planning framework and requirements for the protection of the environment from project, decommissioning and maintenance activities at ANSTO.

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

#1.	Att A-Site Remedial Action Plan	Document	Remedial action plan prepared by GETEX that has informed the proposed excavation and removal of contaminated soils.
#2.	Att B-AF-5947 Project - Construction Environmental Management Plan	Document	This form is completed for all major projects conducted at ANSTO which may have an impact on the environment. This form may be complemented by a Principal Contractor's own environmental management plan.
#3.	Att C-AP-5400 Project Environmental Protection Requirements	Document	This document provides the overarching planning framework and requirements for the protection of the environment from project, decommissioning and maintenance activities at ANSTO.

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

#1.	Att I-Soil Sample Report	Document	Provides the final soil classification and NSW EPA waste disposal classification outcomes for each soil type.
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4.1.6.6 (Nuclear) Why you do not consider the direct and/or indirect impact to be a Significant Impact

#1.	Att I-Soil Sample Report	Document	Provides the final soil classification and NSW EPA waste disposal classification outcomes for each soil type.
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4.1.6.9 (Nuclear) Why you do not think your proposed action is a controlled action

#1.	Att I-Soil Sample Report	Document	Provides the final soil classification and NSW EPA waste disposal classification outcomes for each soil type.
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4.1.6.10 (Nuclear) Avoidance or mitigation measures proposed for this action

#1.	Att B-AF-5947 Project - Construction Environmental Management Plan	Document	This form is completed for all major projects conducted at ANSTO which may have an impact on the environment. This form may be complemented by a Principal Contractor's own environmental management plan.
#2.	Att C-AP-5400 Project Environmental Protection	Document	This document provides the overarching planning framework and requirements for the protection of the environment from project, decommissioning and maintenance activities at ANSTO.

Requirements			
#3.	Att I-Soil Sample Report	Document	Provides the final soil classification and NSW EPA waste disposal classification outcomes for each soil type.

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

#1.	Att H-Site Characterisation Report	Document	Provides the background site information and soil characterisation summary, including radiological, and waste classification outcomes
#2.	Att I-Soil Sample Report	Document	Provides the final soil classification and NSW EPA waste disposal classification outcomes for each soil type.
#3.	Moorebank Intermodal Company Moorebank Intermodal Terminal – Traffic and Transport Impact Ass	Link (Webpage)	https://static1.squarespace.com/static/57721a5af7e0ab564bcfc84d/t/57a6a93c
#4.	National Environment Protection (Assessment of Site Contamination) Measure	Link (Webpage)	http://www.nepc.gov.au/nepms/assessment-site-contamination
#5.	Waste Classification Guidelines Part 1: Classifying waste	Link (Webpage)	https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines

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

#1.	Att H-Site Characterisation Report	Document	Provides the background site information and soil characterisation summary, including radiological, and waste classification outcomes
#2.	National Environment Protection (Assessment of Site Contamination) Measure	Link (Webpage)	http://www.nepc.gov.au/nepms/assessment-site-contamination

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

#1.	Att B-AF-5947 Project - Construction Environmental Management Plan	Document	This form is completed for all major projects conducted at ANSTO which may have an impact on the environment. This form may be complemented by a Principal Contractor's own environmental management plan.
#2.	Att C-AP-5400 Project Environmental Protection Requirements	Document	This document provides the overarching planning framework and requirements for the protection of the environment from project, decommissioning and maintenance activities at ANSTO.
#3.	Ref 7-Safe Work Australia Code of Practice (How to Safely Remove Asbestos)	Link (Webpage)	https://www.safeworkaustralia.gov.au/doc/model-code-practice-how-safely-remove-asbestos

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

#1.	Att H-Site Characterisation Report	Document	Provides the background site information and soil characterisation summary, including radiological, and waste classification outcomes
#2.	Att I-Soil Sample Report	Document	Provides the final soil classification and NSW EPA waste disposal classification outcomes for each soil type.
#3.	Moorebank Intermodal Company Moorebank Intermodal Terminal – Traffic and Transport Impact Assessment	Link (Webpage)	https://static1.squarespace.com/static/57721a5af7e0ab564bcfc84d/t/57a6a93c
#4.	National Environment Protection (Assessment of Site Contamination) Measure	Link (Webpage)	http://www.nepc.gov.au/nepms/assessment-site-contamination
#5.	Waste Classification Guidelines Part 1: Classifying waste	Link (Webpage)	https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines

4.3.8 Why alternatives for your proposed action were not possible

#1. Att A-Site Remedial Action Plan Document

Remedial action plan prepared by GETEX that has informed the proposed excavation and removal of contaminated soils.

5.2 Declarations

Completed Referring party's declaration

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

ABN/ACN	47956969590
Organisation name	Australian Nuclear Science and Technology Organisation
Organisation address	New Illawarra Road, Lucas Heights NSW 2234
Representative's name	Michael Baker
Representative's job title	Environmental Management Leader
Phone	0297179467
Email	mhb@ansto.gov.au
Address	New Illawarra Road, Lucas Heights NSW 2234

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

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

By checking this box, I, **Michael Baker of Australian Nuclear Science and Technology Organisation**, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. *

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

Completed Person proposing to take the action's declaration

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

ABN/ACN	47956969590
Organisation name	Australian Nuclear Science and Technology Organisation
Organisation address	New Illawarra Road, Lucas Heights NSW 2234
Representative's name	Dave Filippetto
Representative's job title	General Manager Engineering Delivery & Special Projects
Phone	02 9717 7916
Email	filipetd@ansto.gov.au
Address	New Illawarra Road, Lucas Heights NSW 2234

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

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

I, **Dave Filippetto of Australian Nuclear Science and Technology Organisation**, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity. *

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

✔ Completed Proposed designated proponent's declaration

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

Same as Person proposing to take the action information.

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

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

I, **Dave Filippetto of Australian Nuclear Science and Technology Organisation**, the Proposed designated proponent, consent to the designation of myself as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

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