AUSTRALIAN NAVAL INFRASTRUCTURE

Site Licence Application Summary Overview

Preparing a site for a Naval Nuclear Power Facility within the Nuclear-Powered Submarine Construction Yard in Osborne, South Australia

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List of Acronyms

Acronym	Definition
ALARA	As Low As Reasonably Achievable
ANI	Australian Naval Infrastructure
ANNPSR	Australian Naval Nuclear Power Safety Regulator
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ARWA	Australian Radioactive Waste Agency
ASA	Australian Submarine Agency
ASNO	Australian Safeguards and Non-proliferation Office
AUKUS	Australia-United Kingdom-United States
CAE	Claim Argument Evidence
DBT	Design Basis Threat
DCCEEW	Department of Climate Change, Energy, the Environment, and Water
DoD	Department of Defence
EMS	Environment Management System
EPA SA	Environmental Protection Agency South Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act
EPP	Environmental Protection Plan
EPZ	Emergency Planning Zone
ERICA	Environmental Risks from Ionising Contaminants: Assessment and Management Tool
ERL	Environmental Reference Level
HEPA	High Efficiency Particulate Air
HAZID	Hazard Identification
HAZOP	HAZID and Hazard Operability Studies
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ISO	International Organization for Standardization
ITNS	Important To Nuclear Safety
KPI	Key Performance Indicator
LLLW	Low Level Liquid Waste
LLW	Low Level Waste
NNP	Naval Nuclear Propulsion
NPS	Nuclear-Powered Submarine
NPSCY	Nuclear-Powered Submarine Construction Yard

Acronym	Definition
NPS-SMS	Nuclear-Powered Submarine Safety Management System
OLC	Operating Limits and Conditions
OPCON	Operational Control
ONS	Osborne Naval Shipyard
PDI Act	Planning, Development and Infrastructure Act
PRT	Power Range Testing
PU	Power Unit
PMST	Protected Matters Search Tool
QMP	Quality Management Plan
QMS	Quality Management System
RMS	Risk Management System
RPP	Radiation Protection Plan
RSC	Radiation Safety Committee
RSO	Radiation Safety Officer
RWMF	Radioactive Waste Management Facility
SA	South Australia
SAMP	Strategic Asset Management Plan
SAR	Safety Analysis Report
SEB	Significant Environment Benefit
SLA	Site Licence Application
SMP	Safety Management Plan
SMS	Safety Management System
SSC	Structure, Systems and Components
SSER	Siting and Site Evaluation Report
SSN	Submersible Ship Nuclear
SSN-A	SSN-AUKUS
SWMS	Safe Work Method Statement
WOSR	Waste Operations Service Request
WHS	Work Health and Safety
WHSC	Work Health and Safety Committee

Executive Summary

Background

The Nuclear-Powered Submarine Construction Yard (NPSCY) is required to support Australia's future defence needs, in particular the acquisition of conventionally armed nuclear-powered submarines (NPS) which will be built in Adelaide under the Australia, United Kingdom, and United States (AUKUS) trilateral security partnership.

The Osborne Naval Shipyard in Adelaide, South Australia is Australia's most advanced and modern shipbuilding hub and contains an area that has been identified as the preferred site for the NPSCY. This is where Australia will build, test and commission its fleet of nuclear-powered submarines, known as SSN-AUKUS.

The Australian Submarine Agency (ASA) has partnered with Australian Naval Infrastructure (ANI), a Commonwealth Government Business Enterprise, supporting the Commonwealth's continuous naval shipbuilding program, to design and construct the NPSCY.

There are multiple legislative and regulatory approval requirements needed to build and operate the NPSCY, which include obtaining relevant licences under the Australian Naval Nuclear Power Safety Act 2024 (Cth.) (ANNPS Act).

ANI will apply to the newly established Australian Naval Nuclear Power Safety Regulator (ANNPSR) for a licence to '*prepare a site for a Naval Nuclear Propulsion (NNP) facility in a designated zone*' (referred to in this document as a Site Licence Application) under the ANNPS Act.

As the proposed licence holder, ANI must demonstrate to ANNPSR that the preferred site is suitable for the planned regulated facility activities to be undertaken at the NPSCY, and to ensure nuclear safety in relation to those facility activities. As part of the regulatory obligations under the ANNPS Act, ANI must also undertake consultation with the public on these matters.

This overview document provides a summary of the Site Licence Application soon to be submitted by ANI to ANNPSR and is provided to enhance public understanding of the process and application content.

Suitability of the NPSCY Location

The preferred site for the NPSCY is located 19 km north of Adelaide on the north-eastern side of the Lefevre Peninsula in Osborne, South Australia. The Lefevre Peninsula currently hosts a significant defence shipbuilding capability and submarine sustainment industry. The NPSCY will add several thousand skilled white collar and blue collar jobs to operate and service the NPSCY.

Early in 2023, ANI, in close collaboration with the ASA (and the ASA's predecessor, the Nuclear-Powered Submarine Taskforce (NPSTF)), commenced developing a comprehensive Siting and Site Evaluation Report (SSER) that documents the characterisation and environmental assessment of the preferred site to inform the Site Licence Application. The purpose of this work was:

- to identify the natural and human induced external hazards that could be prevalent at the preferred site and potential controls to mitigate the identified hazards,
- to identify the potential environmental impacts associated with site preparation, construction, future operations and the subsequent decommissioning,
- to demonstrate, through a body of technical evidence, the suitability of the preferred site to build, test and commission Australia's SSN-AUKUS fleet, and
- to inform the site layout and infrastructure design requirements and decisions, and their supporting site safety case justifications.

The SSER developed by ANI utilised international best practice safety standards developed by the International Atomic Energy Agency (IAEA). Due to the wide range of subjects covered by the IAEA suite of safety standards and guidance, and the breadth of technical disciplines involved, 21 technical studies (see Section 3.7) were commissioned to provide the evidence to support the conclusions in the SSER.

The SSER has presented that all 29 criteria required by the IAEA safety standards have been met for the preferred site, and any 'exclusionary' and 'discretionary' criteria that are present can be mitigated, where required.

Some of these technical studies address the radiological aspects for the NPSCY, with the majority addressing the non-radiological aspects, all of which are key parts of the planning and environmental approvals at State and Commonwealth level. The information contained within the State and Commonwealth planning and environmental approvals has also informed the findings of the assessment contained within the Site Licence Application.

Some of the findings related to IAEA safety standards for site suitability include:

- **IAEA SSR-1 Requirement 1: Safety Objective in site evaluation for nuclear installations:** The SSER provides a body of evidence characterising the natural and human induced events that might affect the safety of the nuclear installation, providing adequate input to demonstrate protection of people and the environment from the harmful effects of ionising radiation. Through demonstrating that the site is suitable, the safety objective in site evaluation has been achieved.
- **IAEA 2019 SSR-1 Requirement 4: Site Suitability:** The SSER and its technical studies have assessed the effects of natural and human induced external hazards, characterised the preferred site and its environment, assessed the potential radiological impacts to people and the environment, assessed the population density, distribution and other characteristics of the population and the effect on the feasibility of planning an effective emergency response. The assessments have concluded that the preferred site is suitable for a nuclear installation and hazards are either not present at the site, or where they are present, can be managed and mitigated by site protection measures.
- **IAEA 2015 SSG-35 Site Survey and Site Selection for Nuclear Installations – Siting criteria for site selection:** The SSER and associated technical studies have assessed the exclusionary and discretionary safety-related and non-safety-related siting criteria. The assessment has found that the exclusionary and discretionary criteria/hazards present for the site can be mitigated by site protection measures.

NPSCY Activities

To support SSN-AUKUS build, test and commissioning activities at the NPSCY a range of shipbuilding infrastructure will need to be developed spreading across three areas within the NPSCY including general fabrication and outfitting buildings, a consolidation hall, a launch and retrieval facility, an in-water test and commissioning berth and a commissioning facility.

The commissioning facility in Area 3 of the NPSCY will contain radiological and non-radiological laboratories for the management and temporary storage of low-level radioactive waste generated during the test and commissioning operations. The LLW will be stored temporarily in the commissioning facility at the NPSCY before being transported to an approved disposal facility within Australia.

Emergency Management and Response Plans

For the site preparation and construction period of the NPSCY, the hazards and associated emergency plans will be the same or similar to those at other construction sites and/or shipyards. Radioactive sources such as those used for radiography for non-destructive testing purposes or other radiation generating instrumentation will only be used at the NPSCY when the relevant naval nuclear propulsion facilities become licensed for operations and production activities. The naval nuclear propulsion system will be activated at the end of the build and commissioning stages of the SSN-AUKUS.

In planning for future NPSCY lifecycle phases, ANI will continue to collaborate closely with the ASA, the future Sovereign Submarine build partner (Shipbuilder) and all relevant emergency services and regulatory authorities. This will ensure that all appropriate arrangements are in place for the operator to prevent, respond to and manage any potential non-radiological and radiological incidents that could occur in or around the NPSCY site.

To support future development plans and site design considerations, an Urgent Protective action planning Zone (UPZ) has been proposed for the preferred site. The term UPZ is defined in IAEA safety standards and is used in safety management planning to describe an area that may require urgent actions to reduce the potential for radiation exposure during an incident. The proposed UPZ considers activities planned for the NPSCY which are comparable to a partner nation site. This assists a more accurate estimate of the potential radiological consequences of an incident and scale the associated emergency capability required.

The Emergency Management and Response Plans and their capability will be demonstrated to ANNPSR well before the introduction of radiological hazards.

1 Introduction

Australia's Nuclear-Powered Submarine Program

1.1 In 2021 Australia, the United Kingdom (UK) and the United States (US) announced AUKUS, a trilateral security partnership committed to supporting a stable, secure and prosperous Indo-Pacific region. The first major initiative of the AUKUS partnership is the delivery of a conventionally armed, nuclear-powered submarine (NPS) capability for Australia.

1.2 AUKUS partners intend to take a phased approach (the Optimal Pathway) to deliver Australia's NPS capability as follows:

- Phase 1 - includes increased port visits to Australia by US and UK nuclear-powered submarines. From as early as 2027, US and UK nuclear-powered submarines will establish a rotational presence at HMAS Stirling, Western Australia (WA), known as Submarine Rotational Force - West (SRF-West).
- Phase 2 - involves the transfer of at least three, and up to five, Virginia class submarines from the US to Australia beginning in the early 2030s.
- Phase 3 - involves the delivery of the next generation of conventionally armed, NPS, known as SSN-AUKUS, with the first Australian SSN-AUKUS to be built and commissioned in South Australia and delivered in the early 2040s.

1.3 A key enabler of Phase 3 of the AUKUS Optimal Pathway to achieving a NPS fleet is the development of a NPSCY capable of building, testing, and commissioning NPSs.

1.4 To deliver the necessary infrastructure for Phase 3 of the Optimal Pathway, the ASA has partnered with ANI. ANI is a Commonwealth Government Business Enterprise whose primary object is to support the Commonwealth's continuous naval shipbuilding program through acquiring, holding, managing, and developing the infrastructure and related facilities used in connection with the shipbuilding program.

1.5 ANI is responsible for the design and construction of the NPSCY. Once constructed, the NPSCY will be operated and submarines built by the Shipbuilder. At some point in the future the NPSCY will be decommissioned and the requirements and responsibilities around this phase of the NPSCY lifecycle are discussed in Section 11.

NPS Enterprise

1.6 The NPS Enterprise consists of a number of current and future key stakeholders including the ASA, ANI, ASC, BAE and Rolls Royce: ASC and BAE Systems are the Government appointed Shipbuilder and Rolls Royce (the designer and constructer of the power unit).

The Nuclear-Powered Submarine Construction Yard

1.7 The general location for the NPSCY was determined by the Commonwealth early in the AUKUS project.

1.8 The NPSCY consists of several parcels of land owned by ANI at the northern end of the Lefevre Peninsula. The entire NPSCY site extends to an area of over 70 hectares divided into three (3) interrelated areas (see Figure 1.2).

Figure 1.2: Preferred NPSCY site footprint

1.9 The NPSCY will involve a range of facilities associated with the building, testing and commissioning of at least five SSN-AUKUS's as follows:

- General Fabrication and Support Facilities (Area 1): This area includes a variety of fabrication workshops and machinery to support the processing of raw steel material, fabrication of submarine sections and other components, consistent with other metal fabrication and shipbuilding sites, as well as other ancillary buildings.
- Outfitting facilities (Area 2): Buildings in this area will accommodate the outfitting of submarine sections fabricated in Area 1. It will also include a variety of administrative buildings supporting the site organisational and management requirements.
- Consolidation, launching and commissioning facilities (Area 3): This area will support the full consolidation of the submarine from the sections and components fabricated in Areas 1 and 2. Facilities in Area 3 will also support the launch, testing and commissioning of a consolidated submarine.

Licence Application to Prepare a Site for an NNP Facility Activity

1.10 Prior to commencing any site preparatory works in Area 3 of the NPSCY, ANI must first obtain a licence from ANNPSR for relevant NNP facility activities under the Australian Naval Nuclear Power Safety Regulations (Regulations).

1.11 The NPSCY is located adjacent to the existing Osborne Naval Shipyard which is already the

most advanced and modern shipbuilding hub in Australia. The infrastructure on the existing Osborne Naval Shipyard is owned and managed by ANI. This infrastructure has been integral to Australia's naval shipbuilding enterprise for the build of major naval surface combatants including the Hobart Class Air Warfare Destroyers, Offshore Patrol Vessels, and Hunter Class Frigates and the facilities supporting the full cycle dockings of the Collins Class conventional-powered submarines.

1.12 As the licence applicant, ANI must demonstrate to ANNPSR its suitability as licence holder and the suitability of the site, and submit information and documents in relation to the facility activities that it will undertake on site to satisfy ANNPSR that it can ensure nuclear safety. ANI is also required under the ANNPS Regulations to undertake consultation with the public on these matters.

1.13 The key intent of the Site Licence Application is to:

- Demonstrate site suitability: The applicant must show that the site is appropriate for the intended activities, considering all environmental, safety, and community considerations.
- Organisational capability: The applicant must provide evidence of their organisation's expertise, training and information, including technical authorities and standards addressing measures to ensure, so far as reasonably practicable, nuclear safety.

1.14 This document provides summaries for the following ANI information and documents to be submitted as part of the Site Licence Application to ANNPSR, and have been provided to enhance public understanding of the wider Site Licence Application content:

- Section 2 - Nuclear Facility Details
- Section 3 - Site Evaluation and Characterisation
- Section 4 - Safety Analysis
- Section 5 - Safety Management
- Section 6 - Environment Protection
- Section 7 - Effective Control Arrangements
- Section 8 - Emergency Management
- Section 9 - Radiation Protection
- Section 10 - Radioactive Waste Management
- Section 11 - Site Decommissioning

1.15 This document has sought to provide as much information to the community as possible, within the bounds of national security, and commercial considerations.

2 Nuclear Facility Details

Introduction

2.1 This section provides information regarding the following to inform planning:

- Overview of the site location and surrounding area.
- Description of facilities located in Areas 1, 2 and 3.
- Supporting facilities for submarine build activities.
- Site characteristics and site information to support facility activity licensing.

Site Location

2.2 The general location for the NPSCY siting options was determined by the Commonwealth early in the AUKUS project.

2.3 This location already hosts a significant defence shipbuilding capability and submarine sustainment industry at the Osborne Naval Shipyard. It is expected that several thousand skilled shipbuilding workers will be required to operate and service the NPSCY, in addition to the construction jobs needed to develop the NPSCY.

2.4 Using industry best practice guidance contained in the IAEA Safety Standards[1], SSN- AUKUS construction specific criteria, and location specific feasibility studies, a decision was taken by Government to concentrate site suitability efforts at the preferred site. The suitability claims relating to the NPSCY will be reviewed by ANNPSR as part of the licensing process.

2.5 The NPSCY is located within the Osborne designated zone under the ANNPS Act. Naval nuclear propulsion facility activities undertaken within the designated zone must be licensed through ANNPSR.

Surrounding Area

2.6 The area surrounding the NPSCY site has been evaluated and reported as part of the SSER. The evaluation considered the potential impacts from natural and human induced external events on the NPSCY and found that, while there are existing hazards that could impact the site, none of those hazards would compromise the suitability of the site. The existing hazards can be managed through a combination of applying appropriate site layout, facility and system designs and engineering and/or organisational controls.

2.7 In addition, the SSER describes and assesses the uses of land and water and the distribution of temporary and permanent human populations surrounding the NPSCY. The components of the SSER which assessed population distribution and public exposure, and uses of land and water in region found:

[1] International Atomic Energy Agency, Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No.SSR-1,IAEA, Vienna (2019)

- There is no residential population within 1.5 km of the site. The nearest residence is located approx.1.6 km to the southwest, and that it is considered likely that planning policies will restrict the development of residential properties within 1.5 km of the site.
- The population is forecast to grow 36% by 2041 within the 10 km radius of the site.
- There are uses of groundwater, marine and estuarine waters, and rainwater within the surrounding area. There are some limited restrictions on the use of groundwater and on recreational activities such as fishing in the Port River and the surrounding marine environment.

NPSCY Area Activities

Area 1 - General Fabrication and Support Facilities

2.8 There are two parcels of land associated with Area 1 that straddle the freight rail corridor which services the Outer Harbour container depot and port:

- The smaller parcel, situated to the west of the rail corridor, is 9.5Ha in size and will be used as a car parking precinct; and

2.9 The remainder of Area 1, positioned on the east side of the rail corridor, is 23.2Ha in size and will be used for submarine component fabrication and ancillary facilities. Most of the activities in this larger (remainder) area will host a variety of fabrication workshops and machinery to support the processing of raw steel material, fabrication of submarine sections and other components, consistent with other metal fabrication and shipbuilding sites, as well as other ancillary buildings.

2.10 The hazards present within Area 1 are consistent with other metal fabrication and shipbuilding sites. No nuclear or unique radiological hazards will be present within Area 1. The use of portable sealed radiography sources for the purposes of non-destructive testing of welded joints (which is typical practice) during the operational phase of the NPSCY will be managed in accordance with applicable state and federal legislation.

Area 2 - Outfitting

2.11 Area 2 extends over an area of 25.7Ha.

2.12 The intention is that Area 2 will encompass a car park and a number of buildings and workshops to support outfitting of the submarine sections fabricated in Area 1. It will also include various administrative buildings tending to site organisational and management requirements.

2.13 The hazards present within Area 2 are consistent with other heavy metal fabrication and shipbuilding sites. No nuclear or unique radiological hazards will be present within Area 2. The use of portable sealed radiography sources for the purposes of non-destructive testing of welded joints (which is typical practice) during the operational phase of the NPSCY will be managed in accordance with applicable state and federal legislation.

Area 3 - Consolidation, Launch and Commissioning

2.14 The Area 3 footprint extends over an area of 17.4Ha. Area 3 will encompass a number of buildings, including several facilities that are expected to fall within the definition of “naval nuclear propulsion facilities” per section 12 of the ANNPS Act, supporting the integration, consolidation, testing and commissioning of submarine systems and components that have been outfitted in Area 1 and Area 2.

2.15 The facilities within the site will be purpose-built for the requirements for the NPSCY accommodating the following key functional areas:

- A NPS Consolidation Hall.
- A shiplift or floating dock.
- In-water test and commissioning berth.
- A test and commissioning facility housing the following functions:
    - Radiological and non-radiological laboratories supporting propulsion system testing and commissioning; and
    - A management and temporary storage of low-level radioactive waste facility supporting the receipt, handling and processing of low-level radioactive waste.
- Areas required to support site operations and internal systems, including working accommodation, personnel control and monitoring and secure access.

3 Site Evaluation and Characterisation

Introduction

3.1 A key supporting requirement of the Site Licence Application is the presentation of a Site Evaluation, Characterisation and Environmental Assessment, the purposes of which are:

- to identify the natural and human induced hazards that could be prevalent at the site and potential controls to mitigate the identified hazards,
- to identify and the potential environmental impacts associated with site preparation, construction, future operations and the subsequent decommissioning,
- to demonstrate, through a body of technical evidence, the suitability of the preferred NPSCY site to build, test and commission Australia's NPS fleet, and
- to inform the site layout and infrastructure design requirements and decisions, and their supporting site safety case justifications.

Siting and Site Evaluation Report

3.2 Since early in 2023, ANI, in close collaboration with the NPSTF and subsequently with the ASA, has been engaged in a comprehensive site evaluation and characterisation assessment, culminating in the preparation of a Siting and Site Evaluation Report (SSER).

3.3 The site evaluation and characterisation assessment has used the regulatory guidance contained in the internationally recognised best practice safety standards developed by the IAEA that systematically address the following:

- IAEA 2019 SSR-1 Site Evaluation for Nuclear Installations Safety Standards (IAEA 2019 SSR-1) [2] 29 requirements have been adequately addressed and substantiated by an independently verified body of evidence.
- IAEA 2015 SSG-35 Site Survey and Site Selection for Nuclear Installations (IAEA 2015 SSG-35)[3] – Siting criteria for site selection, exclusionary and discretionary criteria.
    - 'Exclusionary' criteria are either not present at the site, or where they are present, suitable engineering solutions exist to protect against and mitigate those hazard(s).
    - 'Discretionary' criteria are not present at the site, or where they are present, the risks associated with those hazards can be controlled and mitigated through the application of adequate engineering solutions.

3.4 The site evaluation and characterisation for the NPSCY, which informs the Site Licence Application, is an extensive assessment project that has engaged over 200 nationally and internationally renowned subject matter experts and supporting resources.

[2] International Atomic Energy Agency (IAEA) SSR-1. Site Evaluation for Nuclear Installations
[3] IAEA SSG-35. Site Survey and Site Selection for Nuclear Installations

Technical Studies

3.5 The information contained in the SSER has been drawn from a range of technical studies and their supporting assessments developed for the NPSCY. Collectively, the technical studies contain the body of evidence used to develop the conclusions presented in the SSER that confirms that the site is a suitable location for the NPSCY.

3.6 Due to the wide range of subjects covered by the IAEA suite of safety standards and guidance, and the breadth of technical disciplines involved, 21 technical studies were commissioned. The technical content of each technical study was defined and agreed early in the assessment process through the development of a Technical Work Plan for each of the studies, directly derived from the IAEA safety standards and guidance.

3.7 The technical studies supporting the content and conclusions presented in the SSER are:

- Geophysics and Fault Characterisation
- Seismic Models and Hazard Assessment
- Volcanic Hazard Assessment
- Geotechnical and Geological Hazard Assessment
- Hydrogeological Investigations
- Liquefaction Analysis and Ground Improvements Options Assessment
- Meteorological Hazard Assessment
- Meteorological Monitoring
- Bushfire Hazard Assessment
- Flood and Geomorphological Assessment
- Tsunami Hazard Assessment
- Climate Change Considerations for Natural Hazards Assessment
- Human Induced Events Assessment
- Electro Magnetic Interference Assessment
- Aircraft Crash Hazard Assessment
- Emergency Response Implementation Feasibility Study
- Ultimate Heat Sink - Assessment of External Hazards and Conditions
- Ultimate Heat Sink – Assessment of Non Radiological Impacts
- Land and Water Use and Population Study
- Radiological Dispersion and Dose Response Modelling
- Radiological and Contamination Baseline

3.8 The content of each of the technical studies has undergone internal checking using both the subject matter experts internal processes and those of ANI and ASA. In addition, each technical study has completed formal Independent Peer Reviews using nationally and

internationally recognised subject matter experts relevant to each technical study subject.

Siting and Site Evaluation Report Findings

3.9 The technical studies contain a significant body of quality reviewed and verified evidence characterising the natural and human induced external events that might affect the safety of the site. This information informs the individual responses to the 29 requirements described in IAEA 2019 SSR-1, and the exclusionary and discretionary criteria from IAEA 2015 SSG-35.

3.10 The SSER document collates the key outputs of each of the technical study summaries into a series of Claim, Argument and Evidence (CAE) assessments. These assessments have been further developed into a series of overall conclusions contained within the Safety Analysis Report, collectively demonstrating the suitability of the preferred site for the NPSCY.

3.11 Key claims, arguments and evidence that the SSER found include:

- IAEA SSR-1 Requirement 1: Safety Objective in site evaluation for nuclear installations – The SSER provides a body of evidence characterising the natural and human induced events that might affect the safety of the nuclear installation, providing adequate input to demonstrate protection of people and the environment from the harmful effects of ionising radiation. Through demonstrating that the site is suitable, the safety objective in site evaluation has been achieved.
- IAEA 2019 SSR-1 Requirement 4: Site Suitability - the SSER and its technical studies have assessed the effects of natural and human induced hazards, characterised the preferred site and its environment, assessed the potential radiological impacts to people and the environment, assessed the population density, distribution and other characteristics of the population and the effect on the feasibility of planning an effective emergency response. The assessments have concluded that the preferred site is suitable for a nuclear installation and hazards are either not present at the site, or where they are present, can be managed and mitigated by site protection and engineering measures.
- IAEA 2015 SSG-35 Site Survey and Site Selection for Nuclear Installations – Siting criteria for site selection - The SSER and associated technical studies have assessed the exclusionary and discretionary safety-related and non-safety-related siting criteria. The assessment has found that the exclusionary and discretionary criteria/hazards present for the site can be mitigated by site protection and engineering measures.

Environmental and Planning Approvals

3.12 The potential impacts for the NPSCY associated with non-radiological aspects are assessed through key planning and environmental approvals at State and Commonwealth level.

Commonwealth Approvals - Strategic Impact Assessment

3.13 The Commonwealth Minister for the Environment and Water ('the Minister') and the ASA entered into a Strategic Assessment Agreement in November 2023 to undertake a strategic assessment for the NPSCY as defined under Part 10 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The strategic assessment considers and assesses the impacts of the construction and operation of the NPSCY, i.e. impacts associated with the building of the NPSCY and building, testing and commissioning of

Australia's conventionally armed, nuclear-powered submarines, on Matters of National Environmental Significance that are protected under the EPBC Act.

3.14 A Strategic Impact Assessment Report (SIAR) is required to be prepared as part of the Commonwealth strategic assessment approval process. The strategic assessment approval pathway allows for the endorsement and approval of 'Actions' and 'Classes of Actions' detailed within a Strategic Assessment Plan ('The Plan'). The strategic assessment provides an assessment of the potential impacts of undertaking the actions set out in the Strategic Assessment Plan to make sure that the Minister is satisfied that the potential impacts of those actions are acceptable and consistent with the objectives of the EPBC Act.

3.15 The information contained in the draft SIAR has been drawn from a range of technical studies and their supporting assessments. The technical studies supporting the content and conclusions presented in the draft SIAR included:

- Community and Stakeholder Engagement Report
- Biodiversity Values Report
- Significance of Impact Assessments
- Climate Review Report
- Heritage Summary Report
- Environmental Risk Assessment.

3.16 The draft SIAR was presented for public review and comment from 3 February 2025 until 17 March 2025. The South Australian Environmental Impact Statement (EIS) (discussed in Paragraphs 3.18 to 3.233) was also made available for public comment during this period, to support enhanced understanding given the common focuses of these processes.

3.17 Following the public exhibition of the draft SIAR, the ASA has reviewed and considered submissions received during the consultation period. Feedback from the public and stakeholders has informed any necessary updates to the draft SIAR to ensure it reflects a comprehensive understanding of the potential impacts and community expectations. The revised document, referred to as the Final SIAR, incorporates the feedback and has been formally submitted to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and the Minister for Ministerial consideration under Part 10 of the EPBC Act.

State Approvals – Impact Assessed Development

3.18 In February 2024, the South Australian Minister for Planning declared the NPSCY as an 'Impact Assessed' development under section 108 (1)(c) of the *Planning, Development and Infrastructure Act 2016* (SA) (PDI Act). The Impact Assessed process is the highest level of assessment under the PDI Act and enables the holistic consideration of projects that are of economic, social or environmental importance to South Australia.

3.19 An Environmental Impact Assessment (EIA) process is a systematic process that aims to prevent, reduce or offset the significant adverse effects of development proposals and enhance beneficial effects. It ensures that planning decisions are made considering the likely significant effects and with engagement from statutory agencies and other stakeholders including the public. The EIA process requires that an Environmental Impact Statement (EIS)

be prepared for the development.

3.20 As part of the EIS process, the State Planning Commission (Commission), who are an independent advisory body, is responsible for setting the assessment requirements for Impact Assessed development. The assessment requirements determine the level of detail required in the EIS, taking into account relevant legislation, policy, and stakeholder input. In August 2024, the Commission released the Assessment Requirements for the EIS, which can be found on the Plan SA website.

3.21 Based on the issued Assessment Requirements, ANI undertook the EIA process and prepared the EIS for the NPSCY in 2024 and made publicly available for 30 business days, in line with Regulation 71 of the Planning, Development and Infrastructure (General) Regulations 2017 (the PDI Regulations). The EIS identifies measures required to prevent, reduce or offset any adverse effects (known as 'mitigation measures'), together with any monitoring that may be appropriate, to help inform decision making. The EIS and draft SIAR were available for public review from 3 February 2025 to 17 March 2025 to ensure the community had an opportunity to provide feedback.

3.22 As with the SSER and SIAR, a range of technical studies and their supporting assessments were undertaken for the EIS. The technical studies supporting the assessment and conclusions presented in the EIS include:

- Air Quality Assessment
- Noise and Vibration Technical Report
- Transport and Traffic Technical Memorandum
- Visual Amenity
- Biosecurity Report
- Terrestrial and Marine Flora and Fauna Ecological Report
- Terrestrial Flora and Fauna Requirements Analysis
- Climate Review Report
- Greenhouse Gas Emissions
- Sustainable Use of Resources
- Waste Management (non-radiological only)
- Environmental Impact Statement - Economic Analysis
- Stormwater Management Plan
- Physical Environment
- Dangerous Substances
- Land Tenure, Protected Areas and Land Use
- Coastal and Marine
- Aboriginal Heritage Desktop Assessment
- Social Impact Assessment

- Heritage Places & Areas Report.

3.23 Following the public exhibition of the EIS by the South Australian Department for Housing and Urban Development, ANI has reviewed and considered all submissions received during the consultation period. ANI has prepared a formal response document addressing the issues raised during consultation. The EIS, along with the response document, has now been submitted to the Commission and the South Australian Minister for Planning for consideration under the Impact Assessed provisions of the PDI Act. The next step in the Impact Assessed process is the preparation of Assessment Report by the Commission, following which a recommendation to South Australian Minister for Planning to determine the outcome of the NPSCY will be made.

4 Safety Analysis

Introduction

4.1 This section provides general information on the safety analysis for the preferred site for the NPSCY to demonstrate it is capable of meeting the requisite design and safety requirements. The section also includes information to support the commencement of site preparatory works required to be completed prior to constructing the regulated Structures, Systems and Components[4] (SSCs) at the NPSCY.

4.2 This section demonstrates that the preferred site for the NPSCY is capable of meeting the requisite design and safety requirements and in doing so demonstrates that:

- The site is a suitable place at which to undertake NPS build, test and commissioning activities.
- The potential consequences of internal and external hazards, whether originating from natural or human induced events, are identified and understood for the site's planned facilities and associated activities.
- The potential impacts to people and the environment resulting from these hazards are known and the hierarchy of engineering control measures can be implemented to prevent, protect against or mitigate the consequences if any of the hazard scenarios materialise.

Hazard Identification and Accident Analysis

4.3 A preliminary hazard identification workshop has been conducted to identify the bounding nuclear safety and radiological exposure hazards for the site during the NPS build, test and commissioning activities, and the potential consequences associated with those hazards. It is an expectation of the IAEA General Safety Requirements to identify the full range of potential hazards, no matter how unlikely, to inform preventative controls and mitigation measures.

4.4 The workshop identified the most significant bounding nuclear safety and radiological exposure hazard to be an event that results in a loss of containment during a radiological event, resulting in a radiological release to the atmosphere with an off-site radiological consequence.

4.5 For the purposes of informing the bounding hazard assessment, the human and environmental impact/consequences of such an event have used the currently approved data from the ARPANSA 2000 Reference Accident model and assessment.

4.6 This is a conservative approach applied to visiting nuclear-powered vessels at authorised locations around Australia. The intent is that a site specific SSN-AUKUS model will be developed for the NPSCY using representative SSN-AUKUS data when this becomes available.

[4] A general term encompassing all of the elements (items) of a facility or activity that contribute to protection and safety, except human factors.

Safety Structures, Systems and Components

4.7 ANI has engaged design partners to support the design of the NPSCY facilities. ANI is currently working with NPS Enterprise stakeholders to investigate options for the development and adoption of a common safety framework, supporting a safety led design of the NPSCY up to and beyond concept design. The framework is intended to document and provide an overarching process for categorisation and classification, where appropriate, of structures, systems and components supporting the NPS construction activities.

Radiation Protection

4.8 Section 9 details the current intent regarding procedures and administrative controls for radiation protection on the site.

Radioactive Waste Management

4.9 Section 10 provides an overview of the intended management and operational aspects of radioactive waste management arrangements as they apply to the site.

NPSCY Site Decommissioning

4.10 Section 11 outlines how ANI will take account of end-of-life decommissioning of the site during the design and construction phases of the site lifecycle. Site decommissioning activities, and ultimately the release of the site from institutional control, will commence towards the end of the NPSCY operational life.

Emergency Management

4.11 Section 8 provides an overview of intended planning and operational aspects of emergency management as it applies to the NPSCY during the site preparation phase of the site lifecycle. It also outlines the considerations which are being applied as part of the site suitability assessment with respect to required protective action zones and site protective actions for future phases.

Management System

4.12 Management System arrangements can be found in Section 7, Effective Control Arrangements, which details the current and future intentions of the ANI Business Management System (BMS) framework, covering many of the key BMS elements such as compliance, commitment, accountabilities, resourcing and controls arrangements.

4.13 Additionally, Section 5, Safety Management, outlines how ANI will take account of safety management during the ‘preparing a site for an NNP facility’ and ‘constructing an NNP facility’ phases of the licensing lifecycle, as well as how it is preparing the ANI workforce to ensure the nuclear mindset will be implemented throughout all levels of the organisation.

5 Safety Management

Introduction

5.1 The purpose of this section is to outline how ANI will take account of safety management during the 'preparing a site for an NNP facility' and 'constructing an NNP facility' phases of the licensing lifecycle. There will be no radiological hazards present during either of phases as the nuclear propulsion system will not be present until the NPSCY is in its operational phase. The nuclear propulsion systems will be activated for a short period at the end of the build and commissioning stages of the submarine.

5.2 The Shipbuilder, as the intended licence holder for the operational phase of the NPSCY, has a responsibility to safely operate the site. This includes ensuring the safe storage of radioactive materials and radioactive waste, information and assets, and the safety of staff, contractors, the public and the environment. The Shipbuilder will continue to develop the Safety Management Plan (SMP) for construction and commissioning of the NPS in which the processes and procedures for managing all aspects of safety will be finalised.

5.3 This section summarises how ANI will establish an effective health and safety management system (SMS) during the site preparation and construction phases of the site. The SMS will also consider the safety implications of those systems, structures and components (SSCs) important for nuclear safety.

5.4 In addition, this section explains how this work for the SLA builds on the existing Work Health and SMS that ANI has in place for its existing operations at Osborne, such that it will meet its legal obligations under Work Health and Safety (WHS) legislation and the ANNPS Act and Regulations.

Safety Culture & Nuclear Mindset

5.5 ANI acknowledges that nuclear technology comes with great responsibility, with potential safety implications to people and the environment. ANI acknowledges its responsibility to the Australian public to ensure the site can be operated safely and effectively, with a focus on protecting people and the environment from the harmful effects of ionising radiation.

5.6 There is currently a well-established safety, quality and environment management system and culture within ANI, as part of ANI's commitment to protect workers, the public and the environment. This system (and culture) has several years of evidence to support it by way of external third party audits and internal surveys.

5.7 In recognition of the importance of culture (including safety, security and safeguards culture), ANI has adopted the ASA's ten nuclear mindset principles which apply to the entire NPS enterprise. They are as follows:

- Nuclear safety is paramount.
- Unyielding commitment to security and nuclear safeguards.
- The best people dedicated to excellence.

- Maximise reliability, availability and readiness.
- Accountability.
- Strive for improvement.
- Compliance with approved standards and procedures.
- Not living with deficiencies.
- Decisions are considered, well-informed and underpinned by strong technical evidence.
- Clear and effective communication.

5.8 ANI has developed a high-level strategy to ensure the nuclear mindset will be implemented through all levels of the organisation and will implement a training program developed from the future project requirements. A continuous monitoring program will also be implemented to assess the health of the nuclear mindset culture. ASA continues to work with ANI to deliver the nuclear mindset training across the organisation.

Safety Policies and Objectives

5.9 ANI believes and drives a culture whereby 'safety never gets time off', specifically:

- Health and safety are a shared responsibility.
- Safe working practices are to be adopted at all times in the workplace, and across all facets of our lives.
- All work related injuries, illnesses and incidents are preventable.

5.10 ANI's SMS, which is certified to ISO 45001, includes, amongst other elements, clearly defined responsibilities for personnel to identify their obligations regarding WHS management. ANI's WHS policy sets out ANI's WHS objectives, which are to:

- Minimise or, where possible, eliminate risks to people with a priority for the prevention of physical or psychosocial illness or injury.
- Sustain a culture whereby safety is at the forefront in all decision-making processes and business planning.
- Promote a strong and consistent "fair and just" safety culture across our operations.
- Continue to consult with our personnel to reinforce our safety culture and ensure continual improvement of our SMS.
- Ensure compliance with all relevant health and safety legislation, codes of practice and applicable standards.
- Establish, measure and review WHS targets to ensure we do what we say.

5.11 ANI will work closely with the Shipbuilder and the ASA to ensure that a jointly coherent and compatible risk management system (RMS) is established which incorporates consistent radiological and nuclear risk management principles.

Monitoring and Measurement

5.12 ANI's WHS Management Plan describes the process used to monitor and measure data related to health and safety incidents. This is an ongoing activity that records and is reported up to the leadership team. Key Performance Indicators (KPIs) are established as part of ANI's annual performance scorecard and corporate plan and monitored quarterly.

5.13 KPIs are reviewed annually to measure performance in achieving strategic/organisational/safety objectives at the annual management review. ANI current safety KPIs capture:

- Formal observations.
- Site inspections.
- Hazard alerts.
- Drills.
- Internal audits.
- Days since last incident.

5.14 These KPIs will be updated to capture nuclear safety considerations and will continue to be developed throughout all phases of the NPSCY lifecycle.

5.15 The ANI Incident Reporting & Investigation Procedure outlines the requirements for the reporting and investigation of incidents. All incidents occurring within an ANI worksite will be reported and investigated. The areas covered include:

- Hazard, near miss and incident reporting.
- WHS risk assessment.
- Project risk assessments.
- Audits and inspections.
- Management actions.
- Safe Work Method Statement (SWMS) generation.

5.16 Additionally, ANI management has implemented a Work Health and Safety Committee (WHSC) comprising representation from across the organisation. WHSC meetings are held bi-monthly allowing workers to:

- Raise and discuss WHS initiatives.
- Receive feedback and review statistics and/or lessons learned.
- Consult and provide operational input towards tooling or equipment acquisitions.
- Discuss opportunities for improvement.

5.17 Actions from the meetings are recorded in the meeting minutes. These actions may be transferred into the risk register and/or management actions and assigned to a responsible person to manage.

Risk Assessment and Mitigation

5.18 The objective of risk assessment is to identify and analyse potential risks to provide data to assist in the elimination of risks or their evaluation and treatment where elimination is not reasonably practicable. Risk analysis involves consideration of the sources of risks, their consequences and the likelihood that those consequences may occur.

5.19 ANI uses the AS/NZS ISO 31000:2009 risk management principles and guidelines, including the Hierarchy of Controls (HoC) to minimise risks to workers and other stakeholders. The HoC includes:

- Eliminate.
- Substitute.
- Isolation/Engineering Controls.
- Administrative Controls.
- Personal Protective Equipment (PPE).

5.20 Section 9 provides general detail on radiation protection planning and the intended arrangements for how doses will be kept as low as reasonably achievable (ALARA) for future phases of the NPSCY.

5.21 To prevent and minimise human errors and organisational failures, a robust monitoring and evaluation system will be developed, along with an internal assurance system to audit and ensure compliance. Investigations will provide recommendations for rectification, taking human and organisational factors into account.

Managing Change

5.22 ANI recognises that incidents may occur where change management is incorrectly or poorly implemented. ANI currently utilises a configuration management plan and appropriate risk register to make changes within its Quality Management System (QMS). This process includes such things as changes in the supply chain, inventory requirements, scheduling or project scope, design changes and upgrades to equipment or plant, and changes to process or documentation. Development on this process will continue to capture the change management requirements for nuclear safety and will also include appropriate change management governance.

Learning and Continuous Improvement

5.23 To maintain continuous improvement, and the suitability and effectiveness of the QMS, ANI management regularly reviews and evaluates the system and its implementation. This is done using internal reviews/audits, which are an effective means of determining if the QMS is being correctly implemented and maintained, and whether the organisation has met the performance objectives set within out in the WHS Management Plan. Outcomes of the management reviews are then communicated to all staff to ensure improvements are implemented.

Training and Education

5.24 The ANI Training Management Plan has been developed primarily to cover training and development requirements for ANI's operational staff but extends to other ANI work areas to ensure efficient management of training requirements. This management plan includes requirements of contractors such as induction training requirements for safe access to the workplace. ANI has also recruited a Learning and Development professional to assist in the uplift of ANI's approach to training and development.

5.25 For roles that are Important to Nuclear Safety (ITNS), a training needs analysis will be used to develop the ANI training and competency management system, which will initially be based on the relevant principles of IAEA guides and publications: IAEA Publication Competency Assessment for Nuclear Industry Personnel (PUB1236) and IAEA Recruitment, Qualification and Training of Personnel for Nuclear Power Plants (SSG-75).

6 Environment Protection

Introduction

6.1 This section relates to ANI's obligations under the ANNPS Act and Regulations to manage protection of the environment. This requirement is consistent with Principle 1 of the IAEA Fundamental Safety Principles SF-1, which states that "the prime responsibility for safety is with the person or organisation responsible for facilities and activities that give rise to radiation risks".

6.2 As such, the purpose of the section is to describe the arrangements proposed to demonstrate radiation protection of wildlife (defined as any wild animal or plant living within its natural environment) in their natural habitats consistent with international best practice. This section indicates the principles that ANI intends to follow regarding the radiation protection of wildlife at the NPSCY, building on the existing ANI Environmental Policy and Environmental Management Plan.

Assumptions

6.3 This section deals specifically with radiation protection of wildlife under routine operational and accident scenarios and focuses on environmental exposures to ionising radiation including:

- The standard environmental management measures associated with the management of potential impacts associated with non-radiological aspects, which are dealt with via the following two key environmental approvals:
    1. An Environmental Impact Statement per the 'Impact Assessed' process under s.108(1)(c) of the PDI Act[5]
    2. A strategic assessment under Part 10 EPBC Act[6]
- The mitigation and management measures to be developed via these environmental approvals which will be implemented through design, construction, operation and decommissioning environmental management plans, environmental management systems, tools and procedures. As such, these are excluded from the scope of this document.

6.4 There are a number of assumptions that underpin this section, including:

- The site will present no nuclear or radiological safety or management implications specific to a NPS until the site becomes operational (subject to licensing).
- There will be no radioactive waste arising or stored on site during the site preparation or construction stage of the NPSCY.
- A future licence holder (i.e. the Shipbuilder) will take responsibility of the NPSCY prior to the commencement of site operations and NPS construction.

[5] Nuclear-Powered Submarine Construction Yard Project, Environmental Impact Statement, PlanSA
[6] Osborne Submarine Construction Yard, Strategic Assessment, DCCEEW

- All licensed facilities and activities are expected to be conducted in Area 3.
- It is anticipated that the ASA Environmental Policy will be developed to address the potential hazards to the environment as a result of the NPS program. Following this update, ANI will review the policy in the context of the NPSCY and incorporate any updated requirements where appropriate.
- Populations and ecosystems are the overall objects of protection (rather than aiming to protect at the individual plant or animal level).

Protection of Wildlife

Framework for the Protection of Wildlife

6.5 The framework for radiation protection of wildlife in their natural habitats has been considered together with radiation protection of people. It is applicable to routine operational and accident scenarios.

6.6 ANI in designing the NPSCY, and the future licence holder (i.e. the Shipbuilder) in operating the NPSCY, will adhere to three parallel objectives for the management of radiological exposures: the protection of people (workers), the public, and wildlife. In protecting these groups, ANI will limit exposure to below regulatory limits and keep this risk as low as reasonably achievable (ALARA).

Wildlife and Environmental Context

6.7 The land uses on the Lefevre Peninsula surrounding the site are varied, however, they generally comprise residential development along the western and central portions, with Defence and industrial uses sited along the eastern side of the peninsula. The land uses adjacent to the site are varied and include:

- The Port River, adjacent to the north and north east of Area 3.
- Mutton Cove Conservation Park alongside the Port River, south of Area 3 and east of Area 2.
- Falie Reserve, South of Area 2 and North of Area 3.
- Snapper Point Power Station to the northwest, alongside the Port River.
- Pelican Point Power Station to the northwest.
- Bulk grain handling, fuel storage facilities and Outer Harbour container and passenger terminal to the west.
- Osborne Naval Shipyard (ONS) to the south.
- An established residential area to the southwest.

Figure 6.1: Location map including the preferred NPSCY site, submitted with the SIAR

Flora

6.8 Much of the terrestrial vegetation across the Lefevre Peninsula has been cleared and developed, with minimal remnant native vegetation present. Vegetation associations in the locality include low open shrub land including degraded samphire and chenopod shrub land and planted areas of vegetation. There are a number of sites of higher ecological value in the region which support terrestrial flora, including Mutton Cove, Torrens Island Conservation Park and the dunes along the western coastline of the Lefevre Peninsula.

6.9 Marine vegetation within the Port River is characterised by intertidal mud flats and mangroves, with intertidal and subtidal seagrass beds. Seagrass species (Zostera nigricaulis and Zostera muelleri) are sparsely distributed around the edges of the Port River channel. Within the Port River, Zostera distribution is most dense and consistent north towards Bird Island, whereas along the site and further upstream, the distribution becomes patchy. Zostera species are opportunistic, often resulting in temporal variations.

6.10 Mutton Cove is the last remaining area of remnant vegetation on the Lefevre Peninsula. It has been modified since European arrival with vegetation changing over time from being dominated by mangrove species to saltmarsh species depending on connection to the tidal regime and integrity of the levee bank. Torrens Island Conservation Park hosts a large area of intact native vegetation including mangroves, saltmarsh and coastal dunes as well as large mature trees including those meeting regulated and significant tree size criteria.

6.11 Threatened flora and ecological communities within the surrounding area include:

- One threatened ecological community is known to occur in areas surrounding the NPSCY area that include Mutton Cove Conservation Reserve and Torrens Island - subtropical and temperate coastal saltmarsh.
- Seven EPBC Act threatened flora species were identified as 'known' or 'likely' to occur by the Protected Matters Search Tool (PMST) within the 10 km search area.
- Six vegetation associations were recorded in the 10 km search area.
- Seagrass species (Zostera nigricaulis and Zostera muelleri) are sparsely distributed around the edges of the Port Adelaide River channel.
- Three flora species with local values (i.e. providing a habitat source for locally endemic species or have importance for their cultural value) were identified.

Fauna

6.12 Fauna populations near the NPSCY include terrestrial, river, estuarine, and marine species. Threatened fauna species within the surrounding area include:

- Fifty-six threatened fauna species were identified as potentially occurring within the 10 km search area. A search of the *National Parks and Wildlife Act 1972* (SA) database identified 43 SA State listed threatened species. These species mainly comprised of birds and marine species.
- Two threatened marine species were identified to have potential to occur within the 10 km search area.
- The EPBC Act Protected Matters Search Tool (PMST) report identified 55 migratory bird species and five migratory marine species as 'known' or 'likely' to occur within the 10 km search area.
- Important local fauna values relevant to the search include bottlenose dolphin (Tursiops sp.), bitter-bush blue butterfly (Theclinesthes lbocincta), yellow-sedge skipper butterfly (Hesperilla flavescens), mottled grass skipper (Anisynta cynone cynone), and painted dragons (Ctenophorus pictus). While these species are not listed under Commonwealth or SA State legislation, they are of value to the local community.

Radiological and Contamination Baseline

6.13 A systematic and comprehensive radiological and contamination baseline survey has been completed as a key aspect of the site characterisation and evaluation work reported in the SSER (See Section 3 for further details). The purpose of the baseline survey was to establish the radiological and contamination baseline of the site as it currently is to support the design and construction phases as well as provide the baseline readings for the future ongoing monitoring program.

6.14 This assessment covered existing radioisotopes and chemical contamination and included the collection of samples from terrestrial soil and sediment, marine waters and sediment, marine invertebrates and seagrasses sampling, and has concluded:

- The radiological conditions identified to date at the site do not indicate elevated natural background or ambient anthropogenic sources of radiation and none that would require radiation protection or mitigation for workers.

- The chemical contaminants within site soils and groundwater do not represent a hazard that requires design mitigation or operational controls to enable the safe operation of the NPSCY.
- The radiological and contamination baseline data that has been collected to date (and sampling to be collected in the future) will inform the development of an environmental monitoring program over the operational lifetime of the NPSCY and through decommissioning.

Potential Exposure Pathways

6.15 In the context of the site characteristics discussed above, ANI is also required to map out the potential, but unlikely, scenarios in which the radionuclides could be released during routine operational scenarios or an accident. Radiological Dispersion and Dose Assessment Modelling will consider how radionuclides may physically move through the environment.

6.16 The Radiological Dispersion and Dose Assessment Modelling has considered exposure pathways to wildlife, including:

- External exposure due to radioactive material in the atmosphere, water, soil and sediments.
- Internal exposure from radioactive material absorbed by plants or ingested or inhaled by animals.

6.17 Radiological Dispersion and Dose Assessment Modelling has identified the likely extent of dispersion in air and within the Port River as a result of the reference accident and routine operational scenarios and the resulting doses to humans and the dose rate to non-human biota (wildlife). These considerations inform how exposure scenarios may affect wildlife.

Environmental Management Systems, Tools and Procedures

Development of an Environmental Management System

6.18 ANI is committed to ensuring the health, safety, and welfare of personnel, the public and wildlife from the harmful effects of radiation. A key aspect of achieving this commitment is the establishment of a proactive Safety Management System (SMS) and Environment Management System (EMS).

6.19 ANI's current EMS contributes to the company's International Organisation for Standardisation (ISO) certification for ISO 45001:2018 Occupational Health and Safety, ISO 9001:2015 Quality Management Systems, and ISO 14001:2015 Environment Management Systems.

6.20 ANI's current EMS applies to the operation of existing facilities and ANI is currently broadening the scope of the EMS to cover the design and construction of the NPSCY.

Goals and Objectives

6.21 ANI's EMS for the NPSCY will include plans or actions to mitigate and manage impacts on wildlife, as relevant to site preparation, design and site construction. It is anticipated that the

future licence applicants EMS, or similar, will include and address the operation of the NPSCY, including submarine construction and commissioning.

6.22 The overarching goals of radioactive environmental management for the NPSCY are:

- Ensure no radiation exposure to the environment.
- Ensure all activities are undertaken in accordance with the relevant regulatory requirements.
- Implement the principles of the waste hierarchy: avoid or reduce, reuse, recycle, treat, and dispose.
- Ensure that radioactive waste is characterised, documented, treated, packaged, stored and recorded.
- Minimise the amount of radioactive waste created during operations.
- Ensure accurate, accessible and complete records of all radioactive waste activities are maintained for the lifetime of the NPSCY.

Environmental Protection Measures

6.23 The design of the facilities and equipment on the site will consider an array of measures to prevent the uncontrolled or unintentional release of radioactive materials or other conventional releases into the environment, such as the following:

- Security fencing, physical barriers and access controls to exclude both unauthorised personnel and wildlife.
- Separation of radioactive materials and their handling and storage areas from non-radioactive materials.
- Waste cataloguing and tracking controls, through all stages of acceptance, collection, processing, packaging and interim storage.
- Site and waste monitoring procedures and controls.
- Vermin exclusion controls.
- Impermeable liners and floor sealers.
- Spill and leak containment barriers.
- Runoff controls.
- Leak detection systems.
- Contingency and emergency response plans, procedures and equipment.

6.24 In addition, an environmental monitoring program will be established, including radiological, to provide assurance that all aspects of the environment will be monitored. Periodic reports featuring the results of this monitoring will be made available to the public.

7 Effective Control Arrangements

Introduction

7.1 ANI must be able to demonstrate that its plans and arrangements for managing the site and the regulated activities to be undertaken at that site can be done in a manner to ensure nuclear safety.

7.2 The purpose of this section is to:

- Specify the processes or systems that will allow relevant and applicable statutory and regulatory requirements to be met.
- Specify the statutory and regulatory compliance aspects that will be shared and communicated to relevant personnel.
- Specify how all operations and functions will follow the identified requirements.
- Specify how the licence holder will ensure it stays up to date with applicable regulatory requirements.

Assumptions

7.3 The present assumption is that ANI will be the licence applicant for preparing the site for, constructing, and possession and control of, relevant NNP facilities, and for the decommissioning of the site at the end of its operational life, and disposal of those facilities. The operations phase of the NNP facilities' lifecycle and licensing will be the responsibility of the future licence applicants.

Responsibility and Statutory and Regulatory Compliance

7.4 ANI is responsible for maintaining effective control and ensuring compliance with regulatory requirements for preparing a site for and construction of NNP facilities within the NPSCY. ANI is the owner and developer of the site and will be the licence applicant and future licence holder for those stages of the NPSCY.

7.5 The principal approach taken by ANI to support the identification and compliance with statutory and regulatory requirements generally is to ensure responsibility for supporting processes and systems sits with each business function. Each business function is responsible for identifying relevant statutory and regulatory requirements, including through review and adoption of quality standards (namely, ISO standards, i.e. ISO14001 Environmental, ISO9001/19443 Quality, ISO45001 Safety, ISO55000 Asset management).

7.6 ANI is establishing a technical assurance framework for all projects delivered in conjunction with the NPSCY. The purpose of this framework is to demonstrate compliance with relevant statutory and regulatory requirements and to provide appropriate technical assurance through identifying requirements and guiding development, delivery and construction teams.

7.7 To further support its effective delivery and management of the NPSCY, ANI has a strategy to move toward an Integrated Management System (IMS). Under this strategy, ANI is working

toward increasing the scope of the ISO9001 certification to satisfy the requirements of ISO19443.

Communication of Compliance Responsibilities

7.8 Effective foundational training of ANI employees is a key element of ANI's approach to sharing and communicating important statutory and compliance matters with relevant personnel. ANI's Training Management Plan provides guidelines on the processes to be used in conducting training activities for ANI employees.

7.9 Ongoing communication to employees on statutory and regulatory matters is achieved through event-driven and other regular communication channels. For major changes, notification is published via the ANI SharePoint intranet site which is available to all employees promoting changes to documents, or the publishing of new documents, statutory and regulatory matters.

7.10 ANI also holds quarterly all-staff briefings and monthly projects briefings, where relevant requirements are shared and communicated. Additionally, communication on statutory and regulatory compliance matters is also achieved through ANI leadership and ANI projects monthly forums.

Standard Operating Procedures

7.11 ANI applies a QMS and an audit process to ensure all operations and functions are in compliance with statutory and regulatory requirements. For activities where ISO accreditation is active, the ISO standards requirements are documented and implemented within ANI's management plans and procedures that are used to define the operating process for all ANI employees. The relevant scope of ANI's QMS is audited by external accredited third parties to validate that regulatory requirements have been implemented. ANI uses results of the internal audits and the external audits as feedback to ensure the QMS is compliant and to drive continuous improvement.

Management Commitment

7.12 ANI management is committed to the effective implementation of the QMS and also to continually improving its effectiveness. The QMS covers the policies, plans, procedures and arrangements that govern how ANI undertakes its activities. As part of ANI's annual management review, a review of the QMS is conducted to ensure the QMS is operating effectively. This is an important mechanism to support management accountability for the QMS and its underpinning plans and arrangements.

7.13 ANI recognises that the current QMS will need to be uplifted to include a focus on nuclear safety requirements. This process is underway with the development of a series of documents, such as portfolio, program and project management plans that will address these requirements.

7.14 ANI management also acknowledges that as the organisation matures its nuclear mindset, more resources will be involved in safety and security activities. This includes the establishment and expansion of an ANI technical authority, which will have a key role in

assurance and advisory on nuclear safety and security. Management commitment to this process is evidenced by its investment in training/knowledge transfer and travel for key ANI staff to BAE Systems' facilities in the UK.

7.15 ANI's management is fully committed to maintaining and upholding safety across the full spectrum of ANI activities, including the NPSCY. ANI's commitment to creating and maintaining a positive and proactive safety culture is regularly communicated throughout the organisation at all levels. This is achieved by a range of methods including, but not limited to, initial induction training, refresher training, and team meetings.

7.16 ANI's Work Health and Safety (WHS) Policy and associated plans clearly define ANI's commitment to achieving and maintaining the highest standards of health and safety in the workplace and minimising the impact of ANI operations on the health and wellbeing of personnel.

Accountabilities and Responsibilities

Overall Management of Policy Plans and Arrangements

7.17 The overall control of ANI Policies and Management Plans are described within ANI's Quality Management Plan (QMP) and associated procedures. Within this structure, each plan describes the key responsibilities in relation to the specific business functions.

7.18 Accountabilities and responsibilities for the management of plans and arrangements are aligned with the ANI organisational structure. The organisational structure provides a clear path of responsibility and, in concert with the content from each management plan, provides a list of accountabilities and responsibilities for key personnel. The roles in ANI's organisational charts correspond to defined roles and responsibilities in the policies and plans that form the ANI QMS.

Control of Facility, Safety and Security

7.19 ANI's Security Management Plan (SMP) defines the current roles and responsibilities. The security responsibilities for managing facilities which will eventually hold nuclear material will be defined in future iterations of the SMP prior to the submission of a construction licence. Once the NPSCY transitions into the operational phase, it is anticipated that the future licence applicants will be the licence holder and responsible for the SMP, security and control of nuclear materials.

7.20 Safety responsibilities are specified within ANI's WHS Management Plan. All ANI workers are responsible for compliance with WHS laws. ANI also collaborates within the Osborne Naval Shipyard Operations Forum (ONSOF). The ONSOF provides a forum for senior industry participant management, ANI and Defence's Naval Construction Branch (NCB), to discuss matters that relate to the precinct and includes standing agenda items for health, safety, environment and security, shared infrastructure usage and emergency response.

7.21 All ANI employees have roles and responsibilities for security as outlined in the Australian Government Protective Security Policy Framework and Defence Security Principles Framework. Specific responsibilities are detailed within the SMP.

Resources

7.22 ANI management conducts ongoing reviews of the resource requirements against the current and future needs of the organisation with these reviews captured as part of the ANI annual corporate planning process.

7.23 For physical assets, ANI ensures sound Asset Management (AM) principles are implemented and operated, following the ANI AM objectives set out in the Asset Management Policy and delivered through ANI's Strategic Asset Management Plan (SAMP). For control of financial resources, resources are monitored and managed by the Chief Financial Officer with oversight from the Audit and Risk Committee of the Board, which meets quarterly. Financial resource oversight is also provided by ANI's joint Shareholder Departments (the Department of Finance and Department of Defence).

7.24 For control of people, leaders have responsibility for management of their teams, with support from ANI's Human Resources function led by the Executive General Manager, Corporate Affairs and People.

7.25 Control of contractors and consultants to ANI is provided through contractual arrangements, implemented as part of the procurement process, and ongoing oversight by the relevant contract manager. Where applicable, contractors are required to provide supporting management plans to ANI for the work being performed under the contract.

Resources to Support Radiation Protection and Nuclear Safety

7.26 ANI is currently identifying and assessing the needs and requirements for the suitable allocation of resources, with a primary focus on assuring that radiation protection and nuclear safety fully informs the design process. ANI is engaging technical capability in nuclear safety and radiation protection from the outset of the NPSCY, both internally and through the requirement for radiation protection and nuclear safety resources to be embedded within the contracted design teams.

Monitoring and Management Systems

7.27 Physical resources are monitored and managed through a range of activities as described in the SAMP. Human resources are tracked and monitored through various platforms. Financial resources are tracked and monitored through ANI's finance management system. Project tracking and monitoring is currently provided through standard Microsoft based programs, with ANI currently investigating new tools to transition to specific project management software.

Process Implementation and Documentation

Systems

7.28 ANI ensures that there is a consistent approach for the introduction of new operations and projects by maintaining ongoing ISO certification. This supports best practices in the consideration and development of management plans and arrangements across the organisation, through its involvement of leadership and functional team leaders in annual

management review processes and in plan reviews. Additionally, ANI's QMS and training plans provide consistent control and coordination when rolling out new processes and operations.

7.29 ANI has an established information management and document control function, alongside an information governance function. The activities of these functions are formalised in an Information Management Plan which informs information management and governance procedures across ANI. The approval and roll-out of new processes, and review of existing ones, is managed in accordance with these documents, including through the provision of document numbering and use of digital review and approval workflows.

Document Control

7.30 ANI's QMS is documented, implemented and continually improved. The QMS identifies and documents, where appropriate, the processes needed for the QMS and their application throughout the organisation, including their interaction and methods needed to ensure that both the operation and control of these processes are effective. ANI holds ISO9001 certification for an identified scope and is audited on a yearly basis by an external organisation. Ongoing ISO9001 certification requires ANI to have a controlled document quality management system including document management.

8 Emergency Management

Introduction

8.1 This section describes the intended planning and operational aspects of emergency management as it applies to the NPSCY during the site preparation phase of the site lifecycle. It also outlines the considerations which are being applied as part of the site suitability assessment with respect to required protective action zones and site protective actions for future phases.

8.2 Although there will be no radiological hazards present during the site preparation phase, this section provides general detail on emergency management planning and intended arrangements for the future operational phase of the NPSCY. ANI will retain ownership of the NPSCY throughout the site lifecycle.

Emergency Management and Response Plans

8.3 For the period of NPSCY site preparation, there will be no radiological hazards on site and therefore detailed radiological emergency plans are not required at this point in the licensing lifecycle.

Hazard Assessment

Assessment Approach

8.4 ANI uses the AS/NZS ISO 31000:2009 risk management principles and guidelines, including the Hierarchy of Controls (HoC) to minimise risks to workers and other stakeholders. The process for assessing risks is detailed in the ANI Risk Management Plan, which outlines the methods employed to evaluate and control risks within ANI worksites and details the HoC to be used in controlling risks as follows:

- Identify hazards.
- Eliminate the hazards where reasonably practicable to do so, and where this is not practicable.
- Ensure the residual risks associated with the remaining hazards are minimised.

Site Preparation Scope for Assessment

8.5 Activities that are expected to be undertaken during the licence phase of preparing a site for an NNP facility include:

- Site preparation earthworks.
- Removal and treatment of unsuitable materials.
- Relocation of third party utility infrastructure (gas pipelines, 275kV overhead electricity lines).
- Replacement of removed unsuitable materials with suitable fill to required site levels.

- Preloading of site.
- Establishment of site levels.
- Temporary works to retain site levels.

Nuclear Hazard Assessment

8.6 The safety framework currently being developed by ANI involves the application of multiple methodologies to support the required hazard identification, analysis and assessment processes that will support the development of the NPSCY safety case and inform the site layout and design.

8.7 A preliminary HAZID workshop and review of the findings has been conducted in order for ANI to understand the key bounding nuclear safety and radiological exposure hazards that may be prevalent at the site during site operations to inform the site design and safety case development. More work will be required to consider all aspects of submarine construction, given the multiple facilities which make up the NPSCY site. Response Time Objectives (RTOs) for these types of events have not yet been set, but will be factored into later licence applications when closer to the time when they are required.

8.8 In addition, emergency response feasibility has been assessed as part of, and is reported in, the SSER. The findings of this report and other emergency response related attributes will be integrated into the site safety case and guide proactive measures to maximise emergency preparedness and response arrangements to inform future construction and operating licence applications.

Classifying the Emergency

8.9 Classifying an emergency in accordance with the IAEA emergency classification system is not applicable at this stage of site works since no radiological hazards will be present on the site during the site preparation or construction phases.

8.10 For future phases of the site, emergency classification will be undertaken using applicable regulatory guidelines and aligning with industry best practice.

8.11 During the site preparation phase, response to emergencies will be managed in accordance with ANI's Emergency Management Plan (EMP) and, when the site has been handed over to a construction contractor with operational control, emergency response will be in accordance with the Contractor's Emergency Management Plan.

8.12 Response actions will be prioritised by the management representative at the time. The EMP includes, in general terms, the type of emergencies that may arise as a result of, for example, fire, serious accident, explosion, marine casualty, pollution, and human induced or natural phenomena. In the event of an incident occurring, the principles specified in the EMP are followed and the essential details of the situation reported following the relevant EMP protocols.

Initial Response Actions

Initiating Response Actions during Siting and Construction Phases

8.13 Response actions, as defined by the IAEA, relate to emergency preparedness and response to nuclear and radiological incidents and emergencies. For the purpose of the site preparation phase, the term 'response actions' is used to describe responses to hazards that do not involve nuclear or radiological materials.

8.14 ANI has robust risk management and emergency management policies and procedures in place. Specific plans will be developed for the NPSCY that allows for the initiation of mitigation actions. This includes the immediate activation of fire protection systems (where applicable), the immediate communication to ANI security contractor staff, for example, taking both safety and security events into consideration, and, if necessary, external notification to local emergency services.

8.15 Emergency response arrangements will be developed, and design aspects such as emergency control centres and potential response capability requirements will be matured, during the design of the site.

Implementing Facility Protective Actions

8.16 For the site preparation phase, protective actions normally used for radiation incidents are not required since no radiological hazard will exist. Further consideration of required protective action zones and site protective actions will be developed as part of the ongoing site design work and will be included in plans for future phases of the NPSCY lifecycle.

Application to NPSCY Design

8.17 The term Urgent Protective action planning Zone (UPZ)[7] is defined in the IAEA Safety Standards and is used in safety management planning to describe an area that may require urgent actions to reduce the potential for radiation exposure during an incident.

8.18 To support considerations for the initial concept design for the site and to support the site licence application, an UPZ has been proposed for the purpose of site design and layout development.

8.19 The UPZ boundary is represented by two circles of a radius of 630m each from two locations within the site. The activities planned for the NPSCY are comparable to a partner nation site. This helps to more accurately estimate the potential consequences of any incident and scale the associated emergency capability.

[7] UPZ is a term used to describe an area within which protective actions are taken to mitigate the potential consequences or 'reduce the risk of stochastic effects' from exposure to one or more radionuclides. Actions inside the zone consists primarily of 'cessation of activities', 'shelter and wait', 'evacuation' and the issuing and ingestion of 'stable iodine tablets', if assessed and verified to be required. The combination of these measures will minimise the effects of such exposures to those in the UPZ.

Figure 8.1: Osborne NPSCY's established UPZ

8.20 The practical application of appropriate boundaries of zone perimeters and arrangements for implementing evacuation and sheltering requirements will be the subject of ongoing analysis and assessment, and will be developed in cohort with adjacent landowners, external stakeholders, and local authorities and governments in due course and well before the introduction of radiological hazards.

Emergency Operations and Training

Existing Arrangements

8.21 To provide a timely, well organised, and co-ordinated response to the emergency situations, ANI establishes an emergency control structure for each ANI operated facility. ANI has trained wardens and a command structure but does not operate an Emergency Response Team on its current sites but may request assistance from precinct occupants who have capable teams.

Training and Testing

8.22 All personnel will receive the appropriate level of training to enable them to appropriately respond to abnormal events and emergency situations. To ensure the effectiveness of the emergency response procedures regular drills/exercises and testing of emergency equipment will be conducted. ANI's current scheduling of drills/exercises ensures that, at a minimum, the following requirements are met:

- Site Evacuation – Bi-annually.

- Person in the water – annually.
- Spill Response – annually.

8.23 The type and regularity of exercises will be assessed, updated and reviewed for the NPSCY as the performance, readiness and complexity requirements dictate.

8.24 For future site lifecycle phases, it is expected that training and exercising requirements will be assessed and amended as the site evolves. Emergency response training will consider precinct occupants and, where appropriate, the public. Once the zones have been confirmed through representative modelling and analysis, a further assessment of the emergency response requirements will provide the basis for any such adjustments to training needs and requirements.

Environmental Monitoring

8.25 The site selection process for the NPSCY identified the need for an environmental baseline assessment to be undertaken. This assessment has been completed, and the results will be used to inform a continuous environmental monitoring program extending over the entire lifecycle of the NPSCY. During the lifecycle of the NPSCY, this monitoring will evolve to meet future needs.

8.26 ANI maintains an EMS that is documented, implemented and continually improved. The EMS identifies and documents, the processes needed for the EMS and their application throughout the organisation.

Public Information

8.27 ANI will develop a Communications Plan that coordinates public information regarding emergencies in the NPSCY (subject to subsequent licensing).

Overarching Framework

8.28 The ANI WHS Policy currently provides an overarching framework for health and safety in the workplace. ANI is committed to achieving and maintaining the highest standards of health and safety in the workplace and minimising the impact of operations on the health and wellbeing of all.

Roles and Responsibilities

Site Preparation Phase

8.29 ANI is responsible for providing an Emergency Preparedness and Response Organisation (EPRO) appropriate for the site preparation phase of the lifecycle.

Roles, Responsibilities and Stakeholders in Subsequent Stages of the NPSCY Lifecycle

8.30 In planning for future NPSCY lifecycle phases, an emergency management strategy to

support the future site lifecycle activities will need to be developed. This strategy will evolve and adapt to the specific requirements of these phases as they develop, ultimately reaching a position where it can prepare for, respond to and manage all reasonably foreseeably incidents, events or accidents that could occur in or around the NPSCY site.

8.31 To deliver this outcome, a specific project involving NPS enterprise partners, with key stakeholders, including local, state and federal governments, has been initiated. The project will deliver clear, robust inter-government and inter-organisational communications, training, and competency assessments. Iterative procedural development will be key to building trust across the various agencies, organisations and the public. Key outputs of the project will likely include:

- Emergency Management Strategy Plan – To describe how the strategy will be delivered,
- Emergency Preparedness and Response Policy document,
- Emergency Preparedness and Response Concept of Operation,
- Site specific plans and procedures including organisational preparedness and training, and
- Integrated Site and Local, State and Federal preparedness and response plans.

8.32 The project will be pivotal in ensuring the establishment of successful emergency preparedness planning and response arrangements at the NPSCY. These arrangements will largely align with existing, or updated, state and federal response plans, and their effectiveness demonstrated to ANNPSR.

Emergency Procedures during Site Preparation Activities

Emergency Procedures

8.33 The purpose of NPSCY emergency procedures is to ensure an appropriate, rapid response to all possible emergencies in order to minimise the risk to workers, the public and the environment during the site preparation and construction phases of the NPSCY. ANI's Emergency Response procedures are detailed in its Emergency Response Plan and Emergency Response Procedures (collectively referred to as the ERP), which apply across all ANI-operated facilities.

8.34 The objective of the ERP is to ensure ANI personnel, contractors, and third-party users of ANI sites are able to react swiftly and positively should an emergency occur.

8.35 The ERP outlines the responsibilities and actions required in the event of identified emergency scenarios.

8.36 For all site preparation activities, the relevant prime contractor, as the entity who will have operational control of the site during site preparation phase, will have responsibility for setting up an emergency management command structure (including any interfaces with ANI) ensuring that emergency plans are in place, and all personnel involved are trained in their roles.

8.37 Contractors are responsible for ensuring alignment to, and compliance with, the ANI

Emergency Management Plan.

Precinct Responses and Coordination

8.38 The precinct and its facilities are divided into multiple tenancies where various Defence-contracted Industry Participants (IP) work simultaneously on various ship and submarine projects.

8.39 In order to maintain precinct-wide consultation, cooperation and communication, the Osborne ONSOF was established. The ONSOF provides a forum for senior IP management, ANI and Defence's Naval Construction Branch (NCB), to discuss matters that relate to the precinct and includes standing agenda items for Health, Safety and Environment (HSE), security, shared infrastructure usage, and emergency response.

8.40 The Precinct Incident Response Framework (PIRF) sets out the precinct emergency management strategy and the collaboration, co-ordination and communication arrangements necessary where a collective response is required. The PIRF document may require future updates.

9 Radiation Protection

Introduction

9.1 This section provides an overview of the intended management and operational aspects of radiation protection as it applies to the activities anticipated to be conducted in the site that have the potential (planned or otherwise) to expose people and/or the environment to radiation.

9.2 The site is being developed for the construction of the NPS and will include shipbuilding infrastructure, a consolidation hall, a launch facility, an in-water test and commissioning berth, and a commissioning facility. The commissioning facility will contain radiological and non-radiological laboratories and management and temporary storage of radioactive waste arising from NPS build and commissioning operations, up to Low Level Waste (LLW).

9.3 This section provides general information on radiation protection planning and intended arrangements for future phases including construction, operation and decommissioning of the site.

Principles of Radiological Protection

Radiological Protection Principles - Justification

9.4 During the operational phase of the NPSCY, construction of the NPS will inevitably result in small amounts of LLW being generated. The NPSCY and supporting infrastructure will be designed to the principles of justification, optimisation (including ALARA) and limitation for planned exposure situations.

9.5 During the site preparation and construction phases of the NPSCY, ANI will not possess or control any ionising or non-ionising radiation sources. Where these types of sources are used by contractors during site preparation or facility construction activities, such as the non-destructive testing of welding or the use of lasers for construction surveying purposes, these activities will be carried out by suitably qualified and licensed subcontractors, in accordance with applicable state and federal legislation. Therefore, this section does not specifically address use of ionising or non-ionising radiation sources.

Radiological Protection Principles – Optimisation

9.6 An optimisation approach to prospective tasks that may result in a dose to workers will be implemented by the future licence applicant. These tasks will be subject to a task specific hazard assessment and approval process that ensures dose and exposure is minimised by time, distance and shielding considerations, in line with the ALARA principle with an emphasis on well planned procedures, with estimated doses considered up front and actual doses recorded. This process will be further refined by way of an improvement loop with actual doses and trends established to identify opportunities for improvement. This is the optimisation process.

9.7 The hazard assessment will determine the dose constraint(s) to be applied, and the post

activity doses recorded will be used to assess the adequacy of the dose mitigations applied. This type of post activity review will support the feedback mechanisms for future ALARA assessments.

9.8 Access controls, fencing/barriers and physical security of buildings will ensure that unauthorised personnel and stray wildlife do not inadvertently have access to controlled areas (see section 7 for classification of work areas), which includes facilities and areas within the site.

Radiological Protection Principles – Limitation

9.9 Individual doses received in planned exposure situations will be monitored and constrained to levels below the regulatory dose limits specified in Section 72 of the ANNPS Regulations (2025). These limits have been developed based on the IAEA's International Basic Safety Standards[8], and the International Commission on Radiation Protection's (ICRP's) Recommendations on Radiological Protection[9].

9.10 ANI understands that dose constraints intended to be applied for future operations of the site will be established by the future licence applicant. These will include detailed assessments undertaken as part of the optimisation process and will be based on an ALARA assessment of the work required.

Radiological Controls Principles

9.11 The ASA has developed a radiological protection policy which is to be applied across the NPS lifecycle including the build environment at the NPSCY. ANI will apply its own policy aligned to the ASA policy, and international best practice principles of radiation protection, and define the expected culture of its workers who may be required to access the site once operational. ASA's eight guiding radiological control principles are provided below:

- Control and monitor the doses of workers.
- Keep doses ALARA.
- Prevent contamination of ASA people and the work environment.
- Prevent internal exposure of ASA workers.
- Control radioactive material from cradle to grave.
- Protect the health and safety of the public.
- Prevent adverse impacts to the environment.
- Ensuring people have the training, supervision and resources necessary to execute their work to achieve the task.

[8] International Atomic Energy Agency, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, General Safety Requirements Part 3, IAEA, Vienna, 2014
[9] International Commission on Radiation Protection, "The 2007 Recommendations of the International Commission on Radiological Protection," ICRP Publication 103, ICRP, Stockholm, 2007

Radiological Controls Workforce

9.12 The radiological controls workforce requirements are currently under development. This will set out the headcount and identification of organisational responsibility for delivering this function. The positions described, and their associated role roles and responsibilities, within this document will be fulfilled by the relevant licensee when radioactive sources are present on site (i.e. the Shipbuilder) with the ability to cover the planned production shift schedules during normal NPSCY operation and appropriate 24-hour emergency coverage.

9.13 ANI is presently responsible for ensuring that the introduction of radioactive sources to the site is identified, notified to personnel on site and that necessary control responsibilities are delivered during stages for which it is the licence holder, but as stated above, there are not expected to be radioactive sources on site during the site preparation or construction phases.

Radiation Safety Officer (RSO)

9.14 The RSO will develop procedures and processes to be followed by occupationally exposed workers and the roles of radiological controls technicians for specific activities and tasks. The roles and responsibilities of a RSO include:

- Developing radiological work packages.
- Developing procedures for radiological work.
- Setting radiological supervision requirements.
- Conducting ALARA assessments.
- Determining dose constraints.

Radiation Protection Advisor (RPA)

9.15 RPAs are part of the local radiological controls team and provide scientific support to radiological controls (e.g. environmental monitoring, dosimetry[10], clearance of material, internal monitoring). The roles and responsibilities of an RPA include:

- Monitoring workers for external and internal doses.
- Conducting dose assessments.
- Conducting analysis of environmental and solid/liquid waste samples.
- Posting local area environmental dosimeters.
- Clearing decontaminated items for release and generating clearance certificates.
- Planning the environmental monitoring program.

Workforce Training

9.16 Whilst radiological training is not a mandatory requirement to commence site preparations, ANI will commence workforce training in accordance with the ANI training schedule. In

[10] The determination (by calculation or measurement) of energy absorption (or field strength) in matter and tissue resulting from exposure to a known amount of ionising or non-ionising radiation. Glossary

addition, ANI will commit to conducting a training needs analysis which will include radiation protection and is likely to include multiple levels of awareness courses for all ANI NPSCY site workers and contractors.

9.17 Training and competency will increase commensurate with the scope of work undertaken by the worker in the course of their normal duties and any designated emergency duty roles.

Radiation Safety Committee (RSC)

9.18 Whilst there will be no RSC during the site preparation or construction phase, it is expected that a committee will need to be stood up ahead of site operations such that the committee is functioning ahead of any ionising radiological hazard arriving on site. The primary role of the RSC will be the revision of the system of radiation protection by the organisation.

Planning and Design of the Workplace

9.19 The design and layout of the NPSCY will be based on a combination of the functional requirements of the facility and the radiological hazard considerations of the work that will be conducted. The design requirements management process will act as the database for all requirements including radiological protection design requirements.

9.20 ANI's System Engineering Management Plan (SEMP) is under development which will detail the approach to be taken with establishing requirements and, where appropriate, the verification process to ensure that they have been met.

9.21 The design will demonstrate that doses are managed to the established dose constraints, which take due cognisance of the regulatory dose limits. Adherence to dose constraints will be confirmed by a regular survey program.

9.22 Engineering controls will be identified through the safety case development and the design requirements captured within the SEMP. Considerations will be made cognisant of the hazard and design options identified such as shielding, active ventilation, and active drainage.

9.23 The future radiological controls manual will set requirement for dose rates in public accessible space, office spaces and for supervised and controlled areas such that dose limits and dose constraints can be maintained for the facility in accordance with the ALARA principle.

Classification of Work Areas

9.24 Whilst there will be no designated radiation areas associated with the site preparation phase of the site, designated areas will be identified during the design of the site along with a maturing safety case. Supervised and controlled areas are designated radiation areas and will be defined in the future radiological controls manual along with due cognisance specific ASA policy.

Personal Protective Equipment

9.25 The radiological principle of controlling radioactivity at the source will influence the type and quantity of personal protective equipment (PPE). Work carried out in radiological controlled

areas may require PPE to be worn, and this will protect the worker from the potential presence of radioactive contamination that may potentially be present.

9.26 Any protective clothing and gloves will take into account the chemical and radiological protection requirements as well as the requirements to manage human health (e.g. heat stress, and ergonomics). The responsibility for personal protective equipment will lie with the organisations operating the facilities when a radiological hazard is present.

Monitoring the Workplace

9.27 Once the site is operational, it is expected that the RSO will establish the monitoring techniques, frequency and methods to be used across the site. Whole of site monitoring plans will be detailed in site wide plans and specific facilities with radiological hazards will have tailored monitoring arrangements within individual facility plans and procedures approved by the RSO or delegate.

9.28 Monitoring equipment selection and the processes that will be used to implement the workplace radiation monitoring program will be determined as both the safety case and site design develops.

9.29 The monitoring equipment is likely to include both fixed and portable devices. Monitoring records will need to be maintained, and the findings of the workplace monitoring program made available to workers.

9.30 Radiological workplace monitoring surveys will not be conducted as part of the site preparation of the NPSCY as there will be no radiological hazards present. Once the site is operational, it is expected that internal and external surveys of facilities will be conducted at a set of consistent locations to enable risks and trends to be identified.

Monitoring of Individuals

9.31 Once the site is operational, the monitoring of occupationally exposed workers plays an important role in managing the health and risk to the workforce. It also provides an important feedback mechanism to the ALARA process and ensures that there is constant pressure to optimise doses.

Monitoring of the Environment

9.32 The baseline environmental surveys have included the collection of data that will support pathway analysis for all potential exposure pathways. The collected data and samples will also act as the reference baseline for future comparisons.

9.33 ANI will develop a site monitoring program, that will monitor various environmental media, such as air, water, soil, and biota for any changes to established environmental baseline levels.

10 Radioactive Waste Management

Introduction

10.1 This section provides an overview of the intended management and operational aspects of radiological waste management arrangements as it applies to the NPSCY. This section adopts the broad definitions of radioactive waste described by ARPANSA[11].

Assumptions and Exclusions

10.2 Radioactive waste is material that no longer has any foreseeable use and contains radioactive materials with activities or activity concentrations at levels that require ongoing management to ensure its safety. The Australian classification scheme for disposal of radioactive waste is based on the international scheme issued by the IAEA in their Disposal of Radioactive Waste, SSR-5[12].

10.3 A radioactive waste classification system for the site and the intended pathway for storage and disposal of Commonwealth Government waste is yet to be developed but is expected to be consistent with international best practice.

10.4 This section does not consider the following:

- The management of waste relating to the end-of-life of a NPS. The specific design of the NPSCY is to support the building, testing and commissioning of Australia's sovereign fleet of NPSs.
- Specific details on the conditioning processes to prepare LLW stored at NPSCY for disposal, as these details are being considered as part of the site design development.
- The transport of operational LLW on public roads from NPSCY for disposal.

Radioactive Waste Management

10.5 Waste is expected to fall into three main categories during NPS testing and commissioning and prior to the submarines departing Osborne:

- Solid waste up to LLW, both compressible (soft, e.g. PPE, filler material) and non-compressible (hard, e.g. a pipe or component).
- Solid mixed LLW (e.g. a valve with mechanical grease).
- Liquid Low Level Waste.

Minimisation

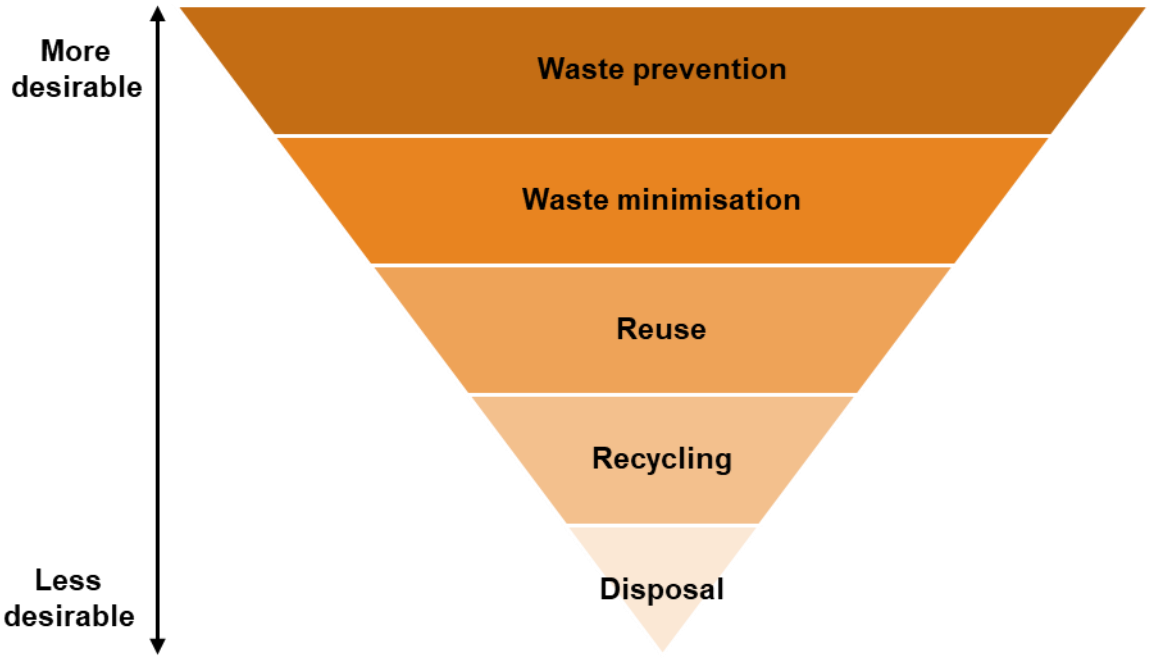
10.6 ANI will follow IAEA guidance and seek international best practice to minimise radioactive

[11] Guide for Classification of Radioactive Waste (2020) RPS-G-4 Radiation Protection Series G-4 | ARPANSA
[12] International Atomic Energy Agency, Disposal of Radioactive Waste, Specific Safety Standards Series No. SSR-5, IAEA, Vienna (2011), Disposal of Radioactive Waste | IAEA

waste generation as it relates to the design of the site, the activities undertaken at the site, and radioactive waste management responsibilities where relevant in relation to each stage of licensing of the NPSCY for which they are the licence applicant/holder.

10.7 Figure 10.1 shows IAEA's waste management hierarchy of controls which ranks strategies in order of preference from avoiding the creation of waste as the most desired outcome, and disposal as the least desired outcome.

Figure 10.1: Waste Management Hierarchy of Controls



Radioactive Waste Management Principles

10.8 The overarching principles for the site's radioactive waste management activities are:

- Ensure personnel have the training, supervision and resources necessary to execute their work safely and securely to achieve the mission.
- Ensure all activities are undertaken in accordance with the relevant regulatory requirements and international best practice.
- Implement the Waste Hierarchy (Figure 10.1).
- Ensure radioactive waste is characterised, documented, packaged, stored and recorded appropriately in line with the future licence applicant's radioactive waste management procedures until released from regulatory control or for ultimate disposal.
- Minimise the amount of radioactive waste created while balancing the need to provide protection to personnel through the appropriate use of PPE.

- Ensure accurate, accessible and complete records of all waste activities are maintained for the lifetime of the AUKUS program.
- Establish and maintain transparency and public engagement in matters of radioactive waste management activities.

Management of Radioactive Waste

10.9 The management, movement and processing of solid and liquid radioactive waste up to and including LLW during the testing and commissioning of a NPS are anticipated to be as follows:

- Characterising solid and liquid radioactive waste streams for the purposes of inventory control, records management and regulatory compliance.
- Conditioning and temporary storage of solid and liquid radioactive waste.
- Decontamination of materials and radioactive waste volume reduction capability.
- Treatment and removal of radionuclides from liquid waste streams to a level acceptable for release in line with federal, state and local regulatory guidelines.

Packaging and Containment of Radioactive Waste

10.10 The detailed processes and procedures are yet to be determined as the concept design for NPSCY is currently under development. Therefore, the narrative provided in this section is subject to change as these processes and procedures are developed.

Packages

10.11 A ‘package’ is made up of the container (i.e., an industry standard bag, bottle, Type A drum, etc.) and the contents. Appropriate industry standard waste packages will be used as required for storage and transport.

10.12 The labelling of radioactive waste packages, including their re-labelling with updated information, is a key component of waste management.

Containment Systems

10.13 ANI will design and implement containment systems and spill response plans for liquid radioactive waste management and processing and will address air quality control and ventilation systems to mitigate airborne contamination risks within the commissioning facility. This will include the development of procedures for environmental monitoring and reporting. ANI will provide further description of this in its documentation for the construction licence phase of the site.

10.14 Containers holding a radioactive liquid will be marked as such and must be kept in a suitably sized bunded[13] area. Protection of the environment in respect of spills of Liquid LLW will require design features that allow for the collection of these liquids and their management.

[13] Bund dimensions must be larger than the expected volumes of the containers that are stored within the boundaries of the bund such that should all containers fail then an over-spill event cannot occur.

10.15 The facility will be designed in such a way that there is no credible chance of spills reaching groundwater. Safety controls and mitigations will be in place to prevent and minimise these risks.

Temporary Storage of Radioactive Waste

10.16 The commissioning facility provides for the temporary storage of up to LLW prior to the LLW being permanently disposed of at a future disposal site.

10.17 While the commissioning facility is yet to be fully designed, the considerations for the temporary storage of radioactive waste during site operation are summarised within the remainder of this section.

Shielding and Ventilation

10.18 Due to the radiological hazards presented by radioactive wastes, some engineering controls will be necessary at the commissioning facility to protect workers, the public and the environment in line with the ALARA principles.

10.19 Areas where waste will be stored may require fixed or temporary shielding to be installed. This will be influenced by the occupation levels of the various parts of the facility and any dose rate limits set for areas inside and outside of the facility.

10.20 The need for dedicated ventilation systems in the commissioning facility, including high efficiency particulate air (HEPA) filters, charcoal filters, and negative pressure areas etc. will need to be considered. This will require further design and safety analysis to confirm specific requirements.

Monitoring

10.21 Radioactive waste within the commissioning facility will be both visually and radiologically monitored.

10.22 The selection of monitoring methods and techniques employed will be risk informed and based on the planned work activities occurring within any given part of the facility.

Documentation of Radioactive Waste

10.23 The management of records relating to radioactive waste is a key administrative control as it provides information on waste items inside sealed containers, without the need to open the container and/or expose personnel to radiation.

10.24 It also provides a means of assessment of compliance of a waste item against future criteria for offsite storage or disposal facilities, regulatory requirements, and potential requirements from the National Archives Act.

10.25 The records system for radioactive waste will likely involve both digital (soft) and paper (hard) copy records, however, the minimum requirements will be reviewed and validated prior to radioactive waste being created on the site.

Management of Treated Liquid Waste

10.26 Liquid LLW generated during the NPS build will be treated at the commissioning facility and the liquid may either be returned for reuse in the NPS or, if the liquid is no longer required, appropriately disposed of.

Ultimate Disposal or Transfer of Radioactive Waste

10.27 The current expectation is that low level radioactive waste generated at the site will remain temporarily on site until a future permanent disposal site has been established.

10.28 Temporary onsite storage is incorporated into the design to house low-level solid and solid mixed (hazardous) waste. It will then be transported to a permanent radioactive waste management facility, which is yet to be established

11 Site Decommissioning

Introduction

11.1 This section outlines how the licence holder for decommissioning will take account of end-of-life decommissioning of the NPSCY during all phases of the NPSCY lifecycle. Site decommissioning, and ultimately site delicensing activities commence towards the end of the NPSCY's operational life.

11.2 Decommissioning of the NPSCY is not anticipated at least until successful delivery of the final SSN-A to Navy. Future Defence shipbuilding strategy will inform any desired intention to extend the operational lifespan of the site, as a Defence related site.

11.3 It is a requirement that ANI leaves the site in a state such that human health and the environment continue to be protected. This section deals with the requirement to actively consider and plan for the management and disposal of radioactive waste generated as a result of planned decommissioning and site remediation activities.

11.4 The Decommissioning Plan (DP) for the NPSCY is considered to be a live document and will be updated throughout the NPSCY lifecycle. The DP will remain reflective of the national decommissioning strategy/policy being developed by Australian Radioactive Waste Agency (ARWA)[14].

Assumptions

11.5 The present assumption is that ANI will be the licence applicant/holder for preparing the site for, constructing and possession and hold of an NNP facility and at the end of its operational life, for the decommissioning and disposal.

11.6 The scope of this section is limited to the decommissioning of the site. Additional assumptions that underpin this section, include:

- Only authorised activities that are consistent with the licences, permits and approvals granted for the NPSCY, will be conducted at the site.
- ANI will retain ownership of the NPSCY site throughout the site lifecycle.
- During the operational life of the NPSCY, through life radiological monitoring will be in place.
- An appropriate record management system, such as an environmental incident record system and a radioactive waste inventory, that record all activities at the site, will be maintained by the relevant licence holder.

[14] The Australian Radioactive Waste Management Framework published by ARWA describes the institutional arrangements for the full cycle management of Australia's radioactive waste. The framework includes five main elements including strategic planning of radioactive waste management, which identifies the main sources of radioactive waste in Australia, including the decommissioning of facilities, and assists in the establishment of a common national inventory for radioactive waste. It should be noted that ARWA is expected to update this framework soon. The decommissioning policy will be in line with this updated framework.

Decommissioning Strategy

11.7 There are only a few facilities within the site where the scope of decommissioning would encompass the clean-up of potentially radioactive contamination or contaminated systems. Examples of the facilities that could include potential exposure to contaminated or radioactive infrastructure and/or waste are the Radioactive Waste Management Facility, chemistry laboratories, and the equipment used to support those activities.

11.8 As outlined within the Section 9 of this document, baseline surveys for the NPSCY have been undertaken as part of the site characterisation activities. Survey of the site to establish a radiological and contamination baseline provides a reference point for ongoing assessments throughout the life of the NPSCY and for decommissioning purposes.

11.9 A detailed decommissioning strategy will be developed for the NPSCY, with consideration given to the entire lifecycle of the NPSCY, in order to safely facilitate the decommissioning process in the future. This will ensure the highest standards of protection to workers, the general public, and the environment by following appropriate codes, standards and/or guides developed in Australia, which are based on international best practice and guidance from IAEA.

Decommissioning Management

Management System

11.10 It is expected that the management system for site decommissioning will be the same or similar to the control arrangements used for the operation of the site. The management system will specify the organisation structure, its policy, and the responsibilities and functions of the organisation's management.

Quality Management

11.11 ANI's current management system is certified to ISO9001. ANI is currently expanding this system to include the NPSCY, and this system is expected to be certified to ISO9001[15] and ISO19443[16].

Radioactive Waste Management Program

11.12 No radioactive waste is anticipated to be generated during the site preparation and construction phase. Radioactive waste management during site operations will be undertaken by the future licence applicants and will be controlled in accordance with appropriate radioactive waste management policies (see the Radioactive Waste Management Section 10 of this document for further details).

11.13 Radioactive waste management during decommissioning will be undertaken in accordance

[15] ISO9001:2015 Quality management systems - Requirements
[16] ISO19433:2018 Quality management systems – Specific requirements for the application of ISO 9001:2015 by organizations in the supply chain of nuclear energy sector supplying products and services important to nuclear safety (ITNS)

with the site decommissioning management system and control policies.

Environmental Impact Assessment

11.14 Prior to commencement of decommissioning of the NPSCY, an Environmental Impact Assessment may be required by the nuclear safety and federal and state environmental regulators. Regulatory interfaces and requirements will be considered in the decommissioning strategy.

Emergency Planning

11.15 The emergency plan for use during decommissioning will be the same or similar to site operational emergency plan but will be reviewed as part of the wider decommissioning plan in support of NPSCY decommissioning. Emergency response arrangements proportionate to the radiological hazards identified during decommissioning planning will be established.

Final Environmental Survey

11.16 An environmental survey addressing conventional and radiological hazards will be undertaken at the end of the decommissioning process (See paragraph 11.8). The purpose of this final survey is to demonstrate compliance with a commitment to return the site to its initial state and demonstrate to the general public and the appropriate regulators that there is no ongoing radiological or conventional risk associated with the decommissioned site.