Friends of the Earth Adelaide
c/- Conservation Council of SA, 111 Franklin St, Adelaide SA 5000
adelaidefoe.org | facebook.com/foe.adelaide | e: adelaide.office@foe.org.au

Response to Osborne Submarine Construction Yard Strategic Assessment

We submit that the *Draft Strategic Impact Assessment Report for the Osborne Submarine Construction Yard* (hereafter referred to as the *Report*) should be awarded a 'fail' mark, for reasons outlined below.

Recommendations

1. Correct the factual errors regarding the effects of radiation.
2. Include active commissioning in the assessment.
3. Include the disposal of radioactive waste in the assessment and publish plans for management, storage and disposal of all streams of radioactive waste, including intermediate and high-level waste and spent nuclear fuel.
4. Include a proper analysis of the risks and consequences of incidents and accidents that could lead to a release of radioactive material into the environment.
5. Inform the public about the potential for exposure to radiation and the levels of radiation they could be exposed to.
6. The Commonwealth Government should consult with other levels of government, the Australian Radiation Protection and Nuclear Safety Agency, emergency services and with the general public to develop a response plan for radiological emergencies.
7. Publish the Strategic Assessment Plan before finalizing the Strategic Impact Assessment Report.

Excluding and trivialising health effects of radiation

The *Report* unjustifiably excludes most issues related to radiation and trivialises those radiation risks that it does include. It states,

> *Information on potential sources of radiation has been provided to inform, however does not form part of the Strategic Assessment as these sources will be managed via separate environmental assessment processes and approvals as necessary (p. 6-41).*

The problems with excluding radiation-related matters are outlined in the next section, but, to the extent that the *Report* addresses radiation, it provides factually incorrect information about the health effects. Based on the discussion below, we can only assume that the *Report* deliberately misrepresents the scientific evidence in order to dismiss the issue.

According to the *Report*,

> *The effects of 0 - 10 mSv of radiation received in a short period or over a long period is considered safe and it is not expected to see observable health effects. 10 - 100 mSv received in a short period or over a long period is also considered not likely to result in observable health effects (p. 6-41).*

In fact, it is recognised by leading international authorities that there is no such thing as a 'safe' level of radiation exposure. The International Commission on Radiological Protection (ICRP – the primary international body in protection against ionising radiation) states, "The LNT [linear, non-threshold] theory remains the most prudent risk model for the practical purposes of radiological

protection" (ICRP 2005, p. 113).[1] In other words, there is no lower limit beneath which there are no health effects and the incidence of radiation effects increases in proportion to the increase in radiation dose. This relates to the incidence of health conditions and mortalities in the exposed population as a whole, rather than the effect on each exposed individual.

Even though it is impossible to distinguish cancers and other conditions that were caused by low doses of radiation from the same conditions caused by something else, there is ample epidemiological and other evidence for 'stochastic' (probabilistic) effects. At the low doses quoted above, the effects on individuals might not be directly measurable, but, at a population level, it is expected that there would be an increased incidence of radiation-induced health conditions and mortalities.

Over many years, the INWORKS (ionising radiation in workers) studies have followed a cohort of "309,932 workers with individual monitoring data for external exposure to ionising radiation" in France, the United Kingdom, and the United States. In a recent report they concluded,

> *The summary estimate of excess relative rate solid cancer mortality per Gy is larger than estimates currently informing radiation protection, and some evidence suggests a steeper slope for the dose-response association in the low dose range than over the full dose range.*[2]

In other words, the current ICRP radiation protection standards are probably inadequate. The LNT theory, which has been officially accepted for a long time, is actually an underestimate of the health effects of low doses. The *Report* blithely ignores both the ICRP's recommendations and authoritative research that recommends more stringent measures.

Exclusions from Strategic Assessment Scope

According to 'Attachment 2: Strategic Assessment Scope' of the 19 December 2024 variation of the *Osborne Submarine Construction Yard Strategic Assessment Agreement*, "The Strategic Assessment for the Osborne Submarine Construction Yard (SCY) includes construction and operation of the SCY." Operation of the SCY includes "Integration of the power module into the nuclear steam-raising plant". It is defined as including "Submarine system testing and set-to-work activities", but as "excluding active commissioning".

However, under the definition of "operation" in the original 22 November 2023 *Agreement*, the following were included:

- Assembly, testing and commissioning of the nuclear propulsion system;
- Consolidation of large submarine sections into a complete submarine;
- Submarine system testing and set-to-work activities;
- Testing and commissioning of the submarine will utilise river water cooling;
- Pre-commissioning testing and contractor sea trials of the completed submarine.

In the 19 December 2024 variation of the *Agreement*, activities specifically listed as "out of scope of the Strategic Assessment for the Osborne SCY" included the following:

---

[1] International Commission on Radiological Protection, *ICRP Publication 99: Low-dose Extrapolation of Radiation-related Cancer Risk*, 2005
https://www.icrp.org/publication.asp?id=ICRP%20Publication%2099

[2] David B Richardson et al, 'Cancer mortality after low dose exposure to ionising radiation in workers in France, the United Kingdom, and the United States (INWORKS): cohort study', *The BMJ*, 16 August 2023
https://www.bmj.com/content/bmj/382/bmj-2022-074520.full.pdf

- The operation, sustainment and decommissioning of the submarines built at the Osborne SCY is considered out of scope of the Strategic Assessment and will be managed via separate environmental assessment processes and approval as necessary.
- The reactor power module will be sealed and delivered to Osborne SCY for integration into the nuclear steam-raising plant. The manufacture, delivery ***and subsequent operation*** of the reactor power module is considered outside of the scope of the Strategic Assessment, however the assembly into the submarine is included.
- ***As a responsible nuclear steward, Australia will manage all radioactive waste generated by Australia's nuclear powered submarine program. The disposal pathway for such radioactive waste*** is considered outside the scope of the Strategic Assessment and will be managed via separate environmental assessment processes and approvals as necessary.

The words in bold italics (added by FoE Adelaide) are different from the original 22 November 2023 *Agreement*.

As far as we are aware, public comments were not invited on the variation to the *Agreement*, even though the amendments are significant. In particular, exclusion of "active commissioning" in the variation, which presumably refers to activities such as "testing and commissioning of the nuclear propulsion system" and "sea trials of the completed submarine" listed in the original *Agreement*, is a major change which should not have been made without the public being given an opportunity to comment.

This change is reflected in the *Strategic Assessment Report* where it states that "Commissioning of the power module is considered outside the scope of this Strategic Assessment and will be managed via separate environmental assessment processes and approvals as necessary" (p. 3-19).

Regarding radioactive waste, the *Report* states,

> *Most of the low-level radioactive waste will comprise of personal protective equipment, such as gloves and materials including wipes that may become contaminated when using tools to commission or test parts and systems.*
> *Storage and transport of radioactive waste is a routine and regulated activity that occurs at hundreds of sites across Australia in mining, health and research industries. Low level radioactive waste management activities at the Submarine Construction Yard will be similar to those that occur in over 100 locations nationwide, including hospitals, science facilities and universities (p.3-19,20).*

The purpose of this statement is not so much to inform as to allay concerns about safety. We are sceptical that the radioactive waste will be so similar as to be equivalent in radioactivity, longevity, and hazard level. The relevant consideration is the particular radioactive isotopes and their concentrations, rather than whether it comprises of personal protective equipment. Broad generalisations like this must be backed up with information about what specific radioactive isotopes will be stored and disposed of.

No mention is made of intermediate or high-level radioactive waste, except to say,

> *The facility would handle exempt waste, very short lived waste, very low level waste and low level waste. It would not receive, handle, process or store intermediate-level waste or high level waste. (p 3-20)*

It might be true for quite some time that intermediate-level and high-level waste will not be handled at Osborne, but when the time comes for the submarines to be decommissioned and their spent nuclear fuel removed, where will that happen? We are unaware of any binding commitments that

Osborne won't be chosen. In accepting the submarine construction project, there is every chance that Osborne will end up with a large consignment of intermediate and high-level radioactive waste.

The exclusions listed in the 19 December 2024 variation of the *Agreement* appear to be deliberately designed to exclude the most serious radiation-related risks from the assessment. There is nothing in the Environment Protection and Biodiversity Conservation Act that suggests that radioactive components of submarine construction should not be included in the strategic environmental assessment. We believe they should be included for reasons including the following:

- Submarine construction is not complete until the power module has been tested and commissioned.
- The submarines cannot leave the Osborne construction yard until the power modules have been tested and commissioned.
- By arbitrarily excluding testing and commissioning of the power modules, the risks associated with the most dangerous aspects of the submarine construction are not assessed or publicly scrutinised before key decisions are made.
- By embarking on this nuclear-powered submarine construction project, the government is committing to accepting radioactive waste, including highly radioactive spent nuclear fuel.
- International experience (including the difficulties experienced by the UK and the US in disposing of their nuclear submarines and associated radioactive waste) demonstrates that we should expect radioactive waste to be stored at Osborne for a long time, potentially for decades after the end of the submarines' operational lives.
- The strategic assessment of submarine construction at Osborne should cover everything that the project commits Osborne and the wider region to.
- It is not satisfactory to say that these matters will be assessed by another body at a later date. The moment construction at Osborne is approved, the government is committing to expose the people of Osborne and surrounds to all the associated risks.

Nuclear accident risks not considered

If there is an accident during the commissioning of the nuclear power module, this could potentially lead to the release of fission products and transuranic isotopes. This highly radioactive material will be produced while the submarines are in Osborne after each reactor goes critical. Whether the commissioning phase is short or long will depend on many unknown factors, but even if this phase is quite short, there is a risk of an accident causing a release of high-level radioactive material into the environment. The inventory of radioactive isotopes would be less than for a submarine that had been operating for several years, but nevertheless these are dangerous substances with the potential to harm human health.

One particular accident scenario that the AUKUS program gives rise to is the possibility of a nuclear powered submarine and/or the construction site being sabotaged or attacked by a hostile foreign power. As we witnessed the recent attacks on Nuclear Power Plants in Ukraine, we were forced to realise that attacks on nuclear facilities are not confined to the realm of fantasy. Inevitably, a hostile power (be it China, or Russia, or some other country in future) would perceive Australian nuclear powered submarines operated in alliance with the United States and the United Kingdom as a threat. We cannot rule out the possibility that such a hostile power might one day decide to attack an Australian nuclear powered submarine, or a US or UK nuclear vessel while it is in an Australian port or in waters near the Australian coast.

Emergency planning is necessary to respond to potential accidents, but this is not addressed in the *Report*. The *Report* rather emphasises the unlikeliness of accidents, tritely stating,

> *Each phase of the power module journey from delivery, to installation in the submarines, to testing and commissioning will be risk assessed with appropriate levels of rigour by suitably qualified and experienced personnel. Consequently, it is highly unlikely that there would be an unplanned release that would breach established containment barriers during commissioning and testing. Controls will be put in place to ensure that this unlikely scenario will not impact the aquatic and terrestrial areas of the Strategic Assessment Area (6-42,43).*

This is a vacuous statement. Its purpose is to dismiss legitimate concerns. "[A]ppropriate levels of rigour by suitably qualified and experienced personnel" guarantees nothing. It is no basis for concluding that an unplanned release is "highly unlikely". Statements like this rather make us worry about the lack of awareness of nuclear risks. The "focus" points listed below this statement are also meaningless without any indication of how they will be achieved.

By contrast, in the case of port visits by foreign nuclear vessels, there is a recognition that there are genuine risks. Organisations including the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the Department of Defence, and State and Territory authorities each play a role in planning and responding to accidents involving the release of radioactive material.[3] According to the Department of Defence,

> *1.4 The Australian Government requires contingency arrangements to be in place at all Australian ports visited by NPWs and also requires that there be the capability to undertake radiation monitoring of the port environment. These arrangements are formulated to cover two potential release mechanisms, which are failure or malfunction of radioactive waste control systems within the vessel and an accident involving the reactor plant.*[4]

Contingency arrangements should be made to at least this level for any nuclear submarines constructed, tested and commissioned at Osborne. People who could potentially be affected, particularly emergency workers, should be thoroughly informed of and consulted about the risks. The radiological risks and the 'right to know' are discussed by David Noonan in the following quote:

> *SA emergency services workers — first responders, the police, fire, ambulance and hospital personnel — have a right to know what nuclear health risks they face. Federal emergency provisions apply in event of a nuclear sub reactor accident at Port Adelaide. The civilian Australian Radiation Protection and Nuclear Safety Agency "Guide for Radiation Protection in Emergency Exposure Situations" and "Nuclear powered vessel visit planning" set out the studies and Emergency response measures that are to be put in place.*
> *The ARPANSA Guide authorises very high ionising radiation dose exposures to emergency workers in tasking them to undertake "urgent protective actions" on site at a nuclear accident, at a dose of up to 50 milliSieverts (mSv). That is 50 times in excess of the recommended civilian maximum allowed dose of 1 mSv per year.*
> *Affected members of the public within an "Urgent Protective Action Zone" of 2.8 km radius from the site of a nuclear sub reactor accident also face authorised high ionising radiation dose exposure of up to 50 mSv. In a "Reference Accident" the local population may face evacuation and may require "decontamination" and medical treatment.*
> *A wider zone where "the surrounding population may be subject to hazards" is described as having a radius of several kms. ARPANSA also require studies of a local population out to 15 km from a nuclear submarine mooring.*
> ***Catastrophic conditions***
> *In an even more severe AUKUS nuclear accident, federal provisions provide for civilian SA emergency workers to face "the development of catastrophic conditions". Emergency workers and designated shipyard workers are then to be called upon to "volunteer" to risk dangerously high*

[3] Department of Defence, 'Defence Operations Manual (Opsman 1): Visits to Australia by Nuclear-Powered Warships', Edition 11, 2023
[4] Ibid.

ionising radiation dose exposures of up to 500 mSv. The ARPANSA Guide states female emergency workers are to be excluded: "Female workers who might be pregnant need to be excluded from taking actions that might result in an equivalent dose exceeding 50 mSv".
The ARPANSA Guide authorises "actions to prevent the development of catastrophic conditions" by civilian workers. "Category 1 Emergency workers" may "receive a dose of up to 500 mSv", a dangerously high ionising radiation dose exposure that is 500 times the maximum allowed civilian annual dose.[5]

Clearly, plans must be put in place to cope with a potential evacuation. For example, the impact of traffic congestion on a radiologically-related evacuation needs to be assessed. The *Report* mentions the possibility of "additional heavy vehicle traffic during construction and operation" (6-2), but it says nothing about the traffic problems that would arise in the case of a nuclear accident.

Even if the probability of a nuclear accident is low, the potential consequences could be catastrophic. The fact that there are grave risks is essentially acknowledged in the high 'permissible radiation dose[s]' envisaged under the existing emergency response plans for port visits by foreign nuclear vessels.[6,7] It is irresponsible to impose these risks on the people of Osborne and beyond without assessing the risks and consulting about them from the outset. These issues should be addressed at the strategic assessment stage.

Strategic Assessment Plan
Where is the *Strategic Assessment Plan*? The *Strategic Impact Assessment Report* seems to have been produced in the absence of a *Strategic Assessment Plan* for it to report on. The *Strategic Assessment Agreement* is for an "Agreement to undertake a Strategic Assessment of the impacts of a Plan…", but references in the 22 November 2023 *Agreement* to the "publication of the draft plan" and "Endorsement Criteria for the Plan" were deleted in the revised Agreement of 19 December 2024. The draft *Plan* should have been made public at the same time as the *Strategic Impact Assessment Report*, so that the public could make informed judgements about the adequacy of the *Report*.

Clause 1 of Attachment 2 of the original *Agreement*, stated, "In determining whether they are satisfied that the SIAR adequately addresses the Impacts to which this agreement relates, the Commonwealth Minister must have regard to the extent of which the draft Plan meets the objectives of the EPBC Act…" The Commonwealth Minister must have regard, but in the absence of a publicly available *Plan*, we the public are not in a position to scrutinize the basis of the Minster's decision.

Other matters
This submission focuses on nuclear issues, but that doesn't mean we believe the other aspects of the *Report* are unproblematic. The *Report* is premised on the dubious assumption that since the area is already degraded it doesn't matter if it is degraded a bit more. The mitigation measures listed in Chapter 8 are general in nature, mainly just preparing plans, monitoring and complying with legislation. These measures are necessary but not sufficient to prevent adverse impacts.

---

[5] David Noonan, 'AUKUS "impact assessment" report ignores nuclear sub risks in SA', *Pearls and Irritations*, 28 February 2025
https://johnmenadue.com/aukus-impact-assessment-report-ignores-nuclear-sub-risks-in-sa/
[6] ARPANSA, 'Guide for Radiation Protection in Emergency Exposure Situations – Planning, Preparedness, Response and Transition', Radiation Protection Series G-3 Part 2, 30 May 2019
[7] David Noonan, 'Labor imposes AUKUS nuclear submarines while failing to inform the affected SA community of the health risks they face in a potential reactor accident', 29 July 2024
https://nuclear.foe.org.au/wp-content/uploads/Noonan-Health-Risks-in-an-AUKUS-N-Sub-Reactor-Accident-Briefer-29-July-2024.pdf

As an example of credibility problems with the assessment, it is difficult to believe that dredging much deeper than in the past would not adversely affect the resident and transient dolphins, from noise and vibration, as well as from increased turbidity. No justification is given for the following statement, nor analysis of other potential impacts besides restriction of movement:

> *Movement of dolphins and other ocean life along Port Adelaide River would not be restricted as a result of the Actions and Classes of Actions proposed under The Plan (Appendix H, Significance of Impact Assessments, Table 4.9, p. 219).*

Conclusion

The *Draft Strategic Impact Assessment Report for the Osborne Submarine Construction Yard* is not fit for purpose. If the government is determined to proceed with the project, it should produce a strategic impact assessment report that includes testing and commissioning of the nuclear propulsion system and management and disposal of radioactive waste. Before any approvals are given, the people who could be affected by any nuclear accident should be properly informed of and consulted about the risks, accident scenarios and emergency responses.

A better outcome would be to acknowledge that nuclear powered submarines are not in Australia's security interests and abandon the project. The *Report* uncritically states, "The submarine capability provides security and a means to protect Australian waters and interests" (p. 3-23). This is a highly controversial statement. We, along with many highly qualified defence experts,[8] regard it to be false.

Philip White
for Friends of the Earth Adelaide

---

[8] For example:
Hugh White, "From the submarine to the ridiculous", *The Saturday Paper*, 18 September 2021
https://www.thesaturdaypaper.com.au/2021/09/18/the-submarine-the-ridiculous/163188720012499#mtr
Major General Michael G Smith AO (Ret'd), 'How should Australia defend itself in the 21st century? Silencing the drums and dogs of war', *The New Daily*, May 26, 2023
https://thenewdaily.com.au/news/world/2023/05/26/how-should-australia-defend-itself-in-the-21st-century-silencing-the-drums-and-dogs-of-war/
Sam Roggeveen, 'Spiky questions remain for AUKUS proponents', *Inside Story*, 19 March 2024
https://insidestory.org.au/spiky-questions-remain-for-aukus-proponents/