Australian Government
Department of Industry, Innovation and Science

Site Assessment Report

National Radioactive Waste Management Facility

January 2020

Contents

Preface

About

This report has been prepared by the Department of Industry, Innovation and Science (the department) to assist the Minister for Resources and Northern Australia, Senator the Hon Matthew Canavan (the Minister), to make a decision about selection of a site for the National Radioactive Waste Management Facility (the facility), under section 14 of the *National Radioactive Waste Management Act 2012* (Cth) (the NRWM Act).

This report contains information about three sites: Lyndhurst, Napandee, and Wallerberdina. Following the nomination and approval processes specified in the NRWM Act, the sites are under consideration as sites for the facility. The sites are referenced in alphabetical order throughout this report.

The department has taken an evidenced-based approach to gathering and analysing the available information about each of the three sites. Each site is assessed against the site suitability criteria, designed by the department to consider the various aspects of site suitability, and identify key risks.

The report is structured to enable the Minister to work logically and methodically through the required considerations under the NRWM Act.

- Key findings about each site regarding the site suitability criteria are clearly emphasised.
- Detailed results of all assessments are presented both in written form and visually in matrices, which are similar to traffic light reports. A full set of assessment matrices is included (pp. 9-14).
- Where the full assessment is not included in the body of the report, it is attached (refer to the list of attachments, p. LXVI).

The information presented in this report is based on independent specialist reports commissioned by the Australian Government, and are attached in full to this report. Summaries of these reports have been author reviewed for accuracy and included at the end of the report (pp. XV-LXV)

The data from the independent reports (and where applicable, preliminary facility design information) has informed assessments against the site suitability criteria by technical specialists and the department. The assessment methodology and ratings definition is explained at the beginning of each site suitability assessment.

This report contains information classified as Sensitive: Legal which may be subject to legal privilege.

A snapshot of key events and activities

Pre 2012

Before the enactment of the current legislation, the Australian Government (the Government) led a number of processes to establish national facilities for Low Level Waste (LLW) disposal and Intermediate Level Waste (ILW) storage arising from medical, industrial and scientific use of radioactive materials in Australia.

- In 1978, the Government agreed to co-ordinate a national approach to the management of Australia's produced radioactive waste. However, it was not until 1985 that state and territory Governments were asked to identify potential sites for a facility. The Northern Territory initially suggested a site but then withdrew this site in 1991.
- Between 1992 and 2004, the Government undertook an Australia-wide survey to site the construction of a near-surface repository for disposal of Australia's low level and short-lived intermediate level radioactive waste.
- Between 2000 and 2002, the Woomera Protected Area (WPA) was investigated as a possible site for the facility (culminating in a 2002 Environmental Impact Statement). There were three sites identified as being suitable in that report: one within the WPA and two outside the WPA.
    - In May 2003, a site was chosen site for the facility by the then Minister for Science, the Hon Peter McGauran MP.
    - The South Australian Government passed the *Nuclear Waste Storage Facility (Prohibition) Act 2000* (Prohibition Act), as well as moving to declare the proposed site a park in 2003. Before the South Australian Government could formally declare the site a park, the Commonwealth compulsorily acquired the land in 2003.
    - Following a Federal Court case in 2004, it was determined that the process by which the land was acquired by the Commonwealth for the facility was illegal and the project was abandoned.
- In 2005, the *Commonwealth Radioactive Waste Management Act 2005* (Cth) was passed by Federal Parliament to facilitate the construction of co-located facilities on Commonwealth land for the management of low and intermediate level radioactive waste produced by Australian Government agencies. This legislation was repealed and replaced in April 2012 by the NRWM Act.

2012

The NRWM Act provides the legislative framework for the selection of a site and the establishment and operation of a radioactive waste management facility. The NRWM Act is built on the principle of voluntarism, where anyone who has suitable interest in the land can voluntarily nominate the land to be considered as a site for the facility. The relevant Minister must accord procedural fairness to each nominator of the land (for approving nominations or declaring a site) in accordance with the requirements of the NRWM Act.

While the provisions in the NRWM Act allow the Minister to approve nominations of a site and declare a site for the facility with 'absolute discretion', successive Ministers have committed that the facility will not be imposed on an unwilling community.

2015

March

The former Minister for Industry and Science, The Hon Ian Macfarlane MP, called for voluntary site nominations from landholders under section 6 of the NRWM Act. The department received 28 site nominations under section 7 of the NRWM Act, including the Wallerberdina nomination. A desktop multi-criteria assessment was conducted on the high level technical merits of the sites.

November

Former Minister for Resources, Energy and Northern Australia, The Hon Josh Frydenberg MP identified six sites within five communities:

- Sallys Flat—Hill End, New South Wales
- Hale—Northern Territory
- Cortlinye—Kimba, South Australia
- Pinkawillinie—Kimba, South Australia
- Wallerberdina—Hawker, South Australia
- Oman Ama—Gore, Queensland.

The Minister announced a 120-day community consultation period and an independent survey was conducted by ORIMA Research to indicate the level of community support to progress to the next stage of the site selection process. The level of community support for five of the six sites progressing was 51 per cent or lower and these nominated sites were not approved under section 9 of the NRWM Act. Community support for Wallerberdina progressing to the next phase of the process was measured at 65 per cent by ORIMA Research.

2016

April

Part of the nominated Wallerberdina site was approved under section 9 of the NRWM Act. The department commenced site selection activities (referred to as 'phase two' activities) including Aboriginal cultural heritage assessments, preliminary site assessment, continuing community consultation, and the delivery of a $2 million per annum Community Benefits Programme (CBP) grants package in 2017 and 2018.

2017

January

Two additional sites (Lyndhurst and Napandee) near Kimba were nominated under section 7 of the NRWM Act.

March to June

The Minister for Resources and Northern Australia, Senator the Hon Matthew Canavan, announced a 90-day community consultation period at Kimba. At the request of the District Council of Kimba, the Australian Electoral Commission conducted a community ballot to measure community support for progressing to the next stage of the process. The ballot result showed 57.4 per cent community support for moving forward in the process.

The Lyndhurst and Napandee nominations were approved under section 9 of the NRWM Act. Phase two activities commenced, including Aboriginal cultural heritage assessments, preliminary site assessments, continuing community consultation and the delivery of a $2 million CBP grant package in 2018.

PHASE TWO: KEY ACTIVITIES

Phase two of the site selection process has involved the collection of relevant information about each of the three sites, first to inform a generic concept design and s47C Case in 2018, and secondly to inform the Minister's site selection decision.

Information collection is ongoing and the preliminary assessments undertaken cover:

- physical characterisation of nominated sites
- requirements for enabling infrastructure
- Aboriginal cultural heritage
- socio-economic impact.

Site-specific technical work to progress facility design and approvals will be undertaken post-site selection.

2018

February to November

The Senate referred an inquiry into the selection process for a facility in South Australia to the Senate Economics References Committee for report on 6 February 2018. Submissions to the Committee focussed on the appropriateness and thoroughness of the site selection process for a radioactive waste management facility. On 14 August 2018, the Committee released its report which found no fault with the site selection process but made five recommendations, including enhancing consultation with key stakeholders, undertaking independent valuations of the land to be acquired, and exploring how the land acquired for the facility could be used to support research and development activities for the local community. The Government agreed to the Committee's recommendations (in full or in principle) in a response dated 20 November 2018 and committed to continuing engagement with involved parties to progress site selection and facility establishment. There were two dissenting statements with recommendations from the Australian Greens and the Centre Alliance, which the Government did not support.

Report: www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Wastemanagementfacility/Report

Government Response: www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Wastemanagementfacility/Government_Response

PHASE TWO: KEY ACTIVITIES

During phase two, significant engagement activities occurred to inform the communities about the potential facility.

The department engaged locally employed community liaison officers in each community, and facilitated community engagement through the communities' Consultative Committees and Economic Working Groups.

Information about various aspects of the facility proposal was provided using a variety of methods including specialist visits, social media, workshops, information sessions, newsletters, fact sheets and independent reports.

Public education community visits to ANSTO were arranged for community members to learn about nuclear waste management.

April

The Government released the Australian Radioactive Waste Management Framework (the framework). The framework sets out principles and long-term goals for radioactive waste management in Australia.

The framework:

- ensures consistency of how waste is managed across Australian government agencies (as the largest waste holders and generators in Australia)
- identifies appropriate accountability for Australia's radioactive waste management practices
- provides explicit and mutually agreed principles and long-term goals to form the basis of Australia's national approach to radioactive waste policy-making
- provides greater certainty to Commonwealth, state and territory regulators in facility licencing decisions
- ensures that Australia's domestic arrangements align with its international obligations.

The establishment of a facility to dispose of Low Level Waste (LLW) and temporarily store Intermediate Level Waste (ILW) is a centrepiece of the framework.

Australian Radioactive Waste Management Framework: www.industry.gov.au/data-and-publications/australian-radioactive-waste-management-framework

August

The Kimba District Council and the Flinders Ranges Council planned to hold community ballots to be undertaken by the Australian Electoral Commission. However, the community ballots were suspended pending the outcome of a Federal Court hearing of the *Barngarla Determination Aboriginal Corporation (BDAC) v. Kimba Council* case.

PHASE TWO: KEY ACTIVITIES

To understand community sentiment and expectations, the department continues to undertake a variety of activities, including direct consultation with neighbours, businesses and Aboriginal groups.

A public submission process has remained open, for those both within and outside of the communities to express their views.

The District Council of Kimba and the Flinders Ranges Council have also commissioned the Australian Electoral Commission to conduct community ballots to inform a determination on community sentiment.

2019

January

The Federal Court heard the *BDAC v. Kimba Council* matter on 30 January and reserved judgement.

July

On 12 July, the Federal Court handed down its decision to dismiss BDAC's application, on the grounds that BDAC had not established any contravention of the *Racial Discrimination Act 1975* (Cth). Following this decision, the District Council of Kimba and the Flinders Ranges Council resolved to conduct community ballots before the end of 2019.

September

BDAC lodged an appeal to the Full Bench of the Federal Court in *BDAC v. Kimba Council*. The appeal will be heard in the South Australian Registry of the Federal Court of Australia at a time and date to be advised. While BDAC sought a further injunction to stop the ballots, the injunction application was dismissed.

About the approved sites

Lyndhurst

Figure 1: Landscape of the approved site at Lyndhurst

Nomination

- Section 38, Hundred of Moseley, Certificate of Title Volume 5925 Folio 858 (Lyndhurst) was nominated under section 7 of the NRWM Act in January 2017, by Brett Anthony Hutchinson Rayner and Michelle Angela Rayner.
- The Lyndhurst nomination was approved by the Minister under section 9 of the NRWM Act in June 2017, after a community consultation period which included a community ballot.

Proposed acquisition parcel

- Preliminary site characterisation works at Lyndhurst and other volunteered sites have determined approximately 160 hectares in total would need to be acquired to accommodate a buffer zone, community uses and supporting infrastructure.

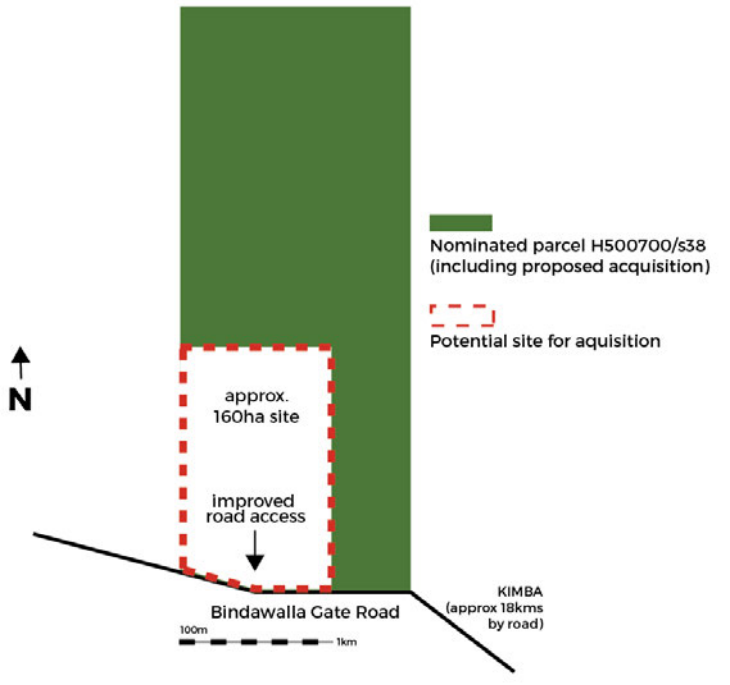


Figure 2: Map of proposed acquisition parcel within the approved site at Lyndhurst

Nearby interests (Figure 3)

- Located 15-20 kilometres north-east of Kimba on the Eyre Peninsula and approximately 10 kilometres north of the Eyre Highway.
- The site sits within the District Council of Kimba.
- While there is no Native Title on the approved site, the Barngarla People and Gawler Ranges People[1] hold Native Title in the surrounding area (see images showing Native Title at attachment Q, p. 7).

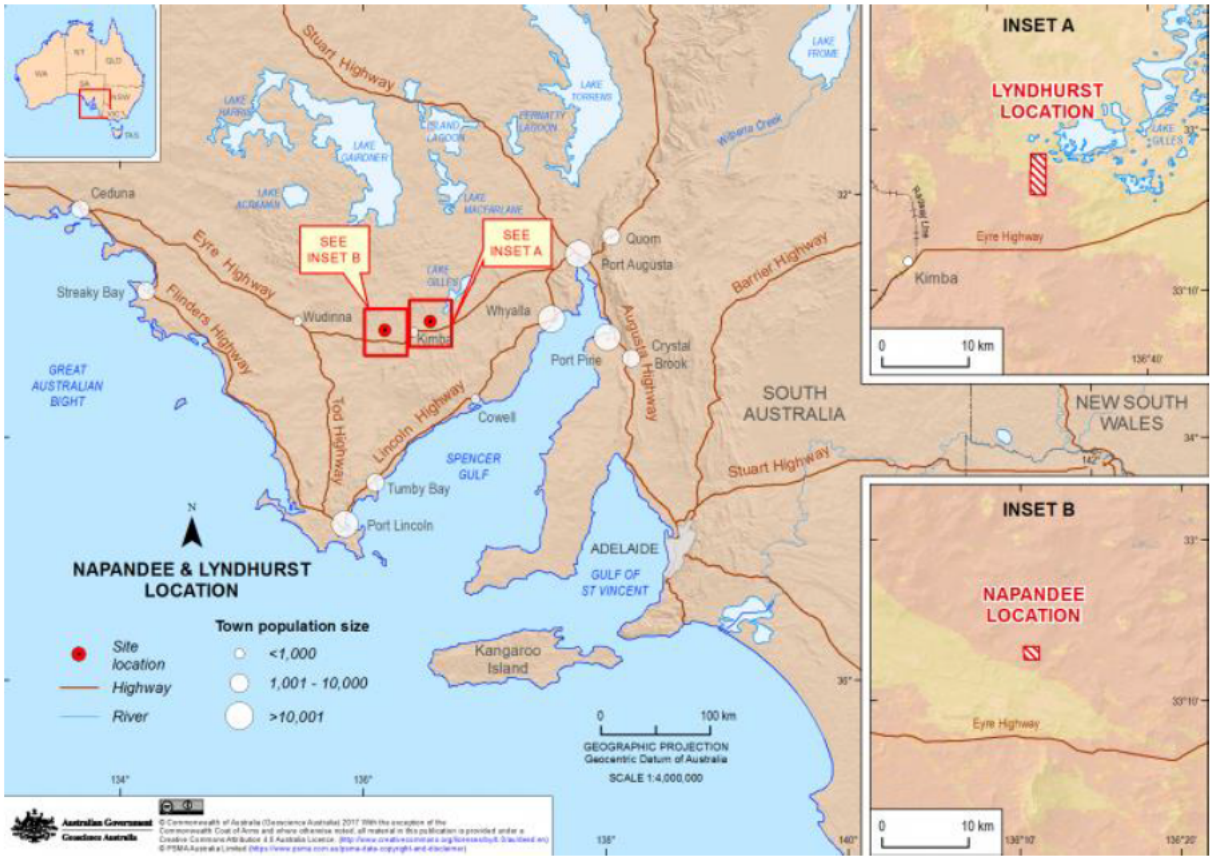


Figure 3: Map of the approved site at Lyndhurst, in relation to Napandee and the broader region

[1] The registered Native Title body corporate (RNTBC) for the Gawler Ranges People, the Gawler Ranges Aboriginal Corporation (GRAC), has written to the department indicating that it does not wish to be further involved in site selection activities, deferring to BDAC which is the RNTBC for the Barngarla People, as Traditional Owners of lands in the vicinity of the Lyndhurst and Napandee sites.

Napandee

Figure 4: Landscape of the approved site at Napandee

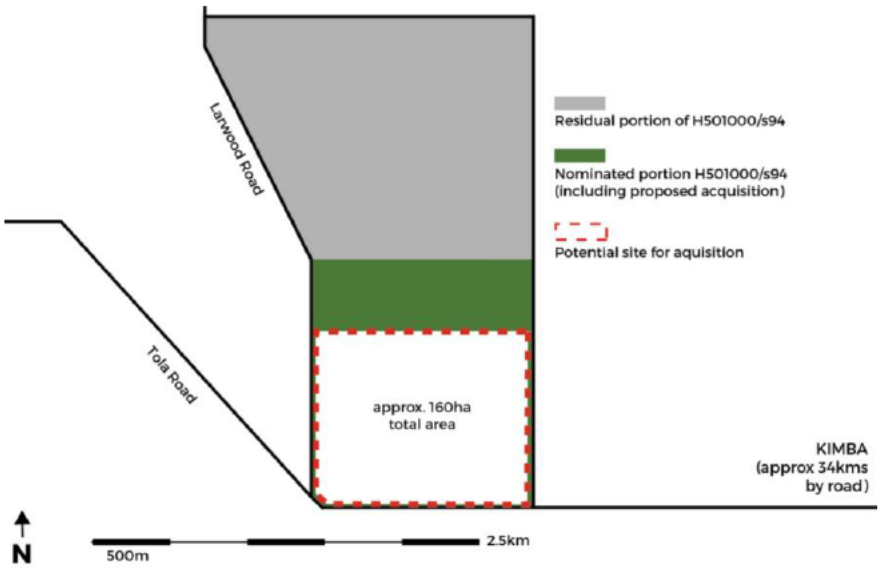
Nomination

- Part of section 94, Hundred of Pinkawillinie, Certificate of Title Volume 5937 Folio 542 (Napandee) was nominated under section 7 of the NRWM Act in January 2017, by Jeffrey Frank Baldock and Jennifer Anne Baldock.
- The Napandee nomination was approved by the Minister under section 9 of the NRWM Act in June 2017, after a community consultation period which included a community ballot.

Propose acquisition parcel

- Preliminary site characterisation works at Napandee and other volunteered sites have determined approximately 160 hectares in total would need to be acquired to accommodate a buffer zone, community uses and supporting infrastructure.

Figure 5: Map of proposed acquisition parcel within the approved site at Napandee



Nearby interests (Figure 6)

- Located 25 kilometres west of Kimba on the Eyre Peninsula and approximately 10 kilometres north of the Eyre Highway.
- The site sits within the District Council of Kimba.
- While there is no Native Title on the approved site, the Barngarla People hold Native Title in the surrounding area (see images showing Native Title at attachment Q, p. 7).

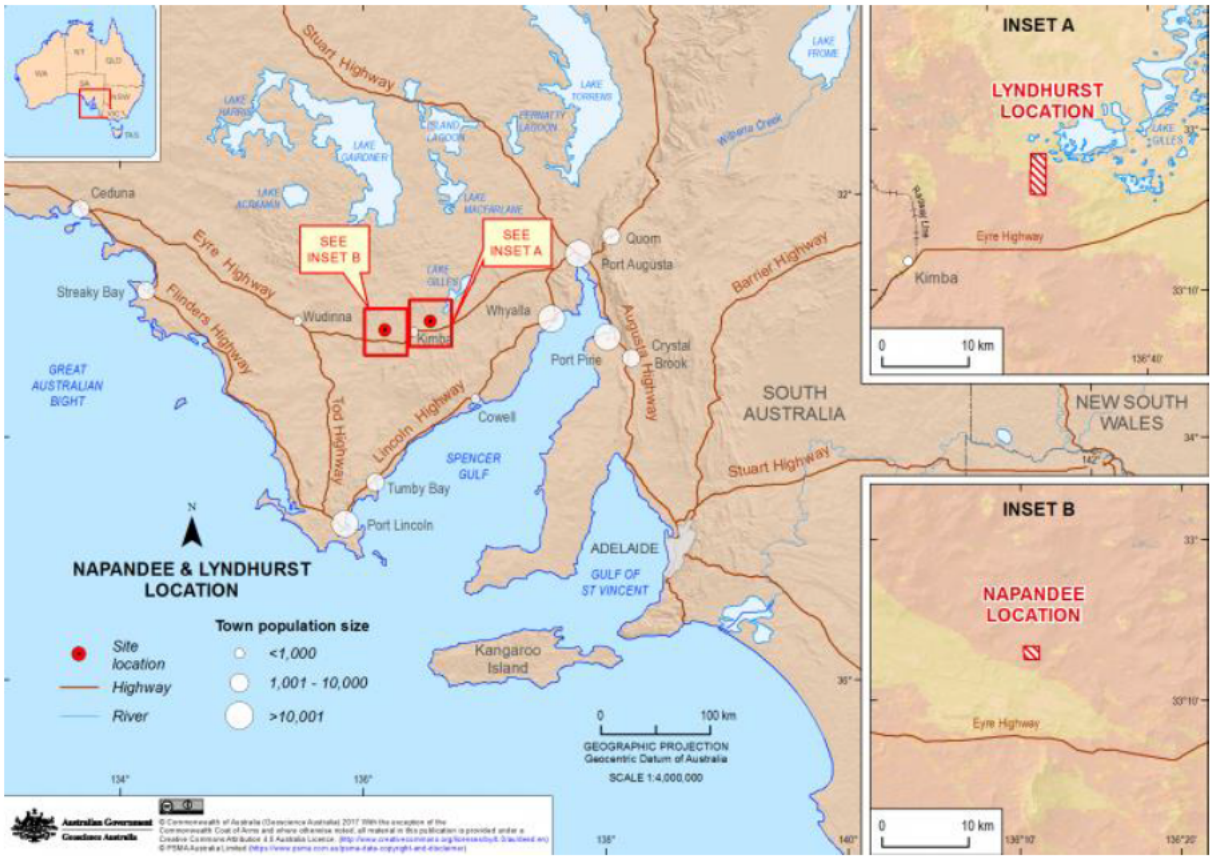


Figure 6: Map of the approved site at Napandee, in relation to Lyndhurst and the broader region

Wallerberdina

Figure 7: Landscape of the approved site at Wallerberdina

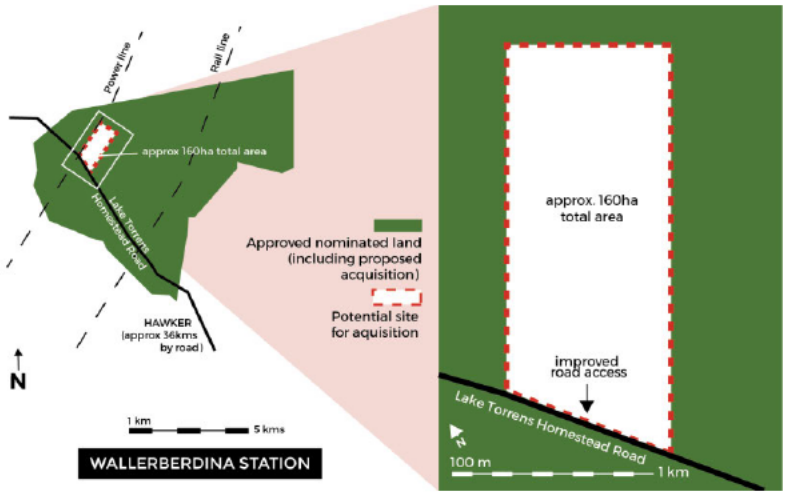
Nomination

- Perpetual Crown Lease Register Book Volume 1215 Folio 28 (now Crown Lease Volume 6200 Folio 237) and Crown Lease Register Book Volume 1280 Folio 1 (Wallerberdina) was nominated under section 7 of the NRWM Act, in March 2015 by Wallerberdina Pty Ltd, as trustee for the Wallerberdina Pastoral Trust. Philip Alan Speakman and Hedley Grant Pearson Chapman are the directors of Wallerberdina Pty Ltd.
- Crown Lease Register Book Volume 1215 Folio 28 (now Crown Lease Volume 6200 Folio 237) was approved by the Minister under section 9 of the NRWM Act in April 2016 after a community consultation period, which included a community survey.

Proposed acquisition parcel

- Preliminary site characterisation works at Wallerberdina and other volunteered sites have determined approximately 160 hectares in total would need to be acquired to accommodate a buffer zone, community uses and supporting infrastructure.

Figure 8: Map of proposed acquisition parcel within the approved site at Wallerberdina



Nearby interests (Figure 9)

- The Wallerberdina locality is also known as Barndioota.
- The site is located 30 kilometres north-west of Hawker, 90 kilometres north-east of Quorn and 130 kilometres north-east of Port Augusta, and approximately 10 kilometres west of The Outback Highway.
- The site straddles the Flinders Ranges Council (FRC) area and the Outback Communities Authority (OCA)T
- While there is no Native Title on the approved site, the Adnyamathanha People hold Native Title in the surrounding area (see images showing Native Title at attachment R, p. 7).

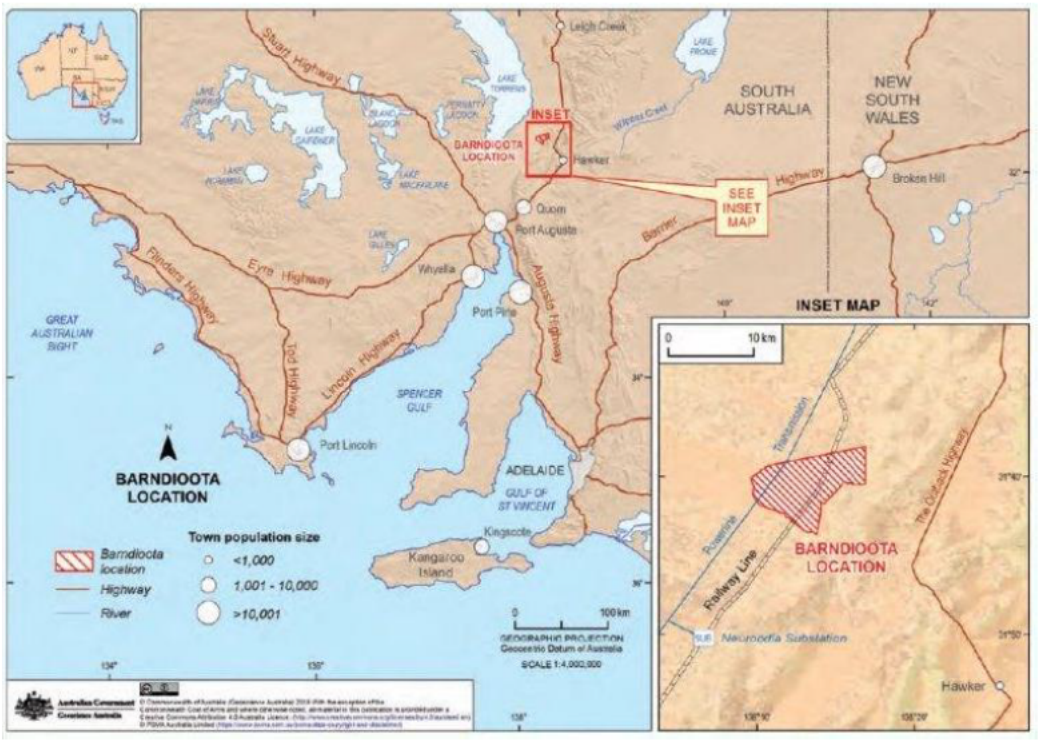


Figure 9: Map of the approved site at Wallerberdina in relation to the broader region

Selecting a site

The process for selecting a site for a facility, under the NRWM Act

The NRWM Act prescribes the process for selecting and acquiring, by declaration, a site for a facility which has been nominated and approved under the NRWM Act, for the purpose of ensuring the safe and secure management of radioactive waste.

The sites considered in this report were nominated under section 7 of the NRWM Act, in response to a call for voluntary nominations made under section 6. The nominated sites (or at Wallerberdina, a portion of the nominated site) were declared by the Minister as approved sites under section 9 of the NRWM Act.

Section 14

Section 14(2) of the NRWM Act provides that the Minister may, in their 'absolute discretion', declare that an approved site or part of an approved site is selected as the site for a facility. Only one site may be declared and the Minister has the option not to select any of the approved sites. After the procedural fairness requirements under section 18 of the NRWM Act are fulfilled, the Minister can select a site by making a written declaration under section 14(2) of the NRWM Act.

Section 18

Section 18 of the NRWM Act prescribes that the Minister must: give a written notice to each nominator of the land, and publish notices in the Gazette, in a daily newspaper circulating generally in each state, the Australian Capital Territory and the Northern Territory, and in a local newspaper (if any) circulating in the area where the land is situated. These notices must set out the details of the declaration the Minister proposes to make under section 14 and invite each nominator or persons with a right or interest in the land to comment on the proposed declaration. A minimum of 60 days after the notice is given or published must be provided for such comments to be received. In deciding whether to make a declaration under section 14, the Minister must take into account relevant comments (provided in response to the invitations referred to above) by the nominator or by others with a right or interest in the preferred site.

Acquisition of the site

Any site declared as the site for a facility under a declaration made under section 14(2) is acquired by the Commonwealth under the NRWM Act. The effect of making such a declaration is that:

- All rights or interests in the selected site that are specified in the declaration are acquired by the Commonwealth or extinguished and freed and discharged from all other rights and interests (section 19 of the NRWM Act).
- The Commonwealth becomes liable to pay a reasonable amount of compensation to any person whose right or interest has been acquired, extinguished or otherwise affected by the declaration, including the landowner (section 35 of the NRWM Act).

How the NRWM Act informs the site suitability assessment

The Minister's 'absolute discretion' to declare that a particular site has been selected as the site for the facility under section 14 of the NRWM Act is limited by the subject matter, purpose and scope of the NRWM Act. Section 3 of the NRWM Act states:

> The object of this Act is to provide for:
>
> a) the selection of a site for a radioactive waste management facility on voluntarily nominated land in Australia; and
> b) the establishment and operation of such a facility on the selected site;
>
> to ensure that radioactive waste generated, possessed or controlled by the Commonwealth or a Commonwealth entity is safely and securely managed.

This means that in making a decision to declare a site as the site for a facility, the Minister should have regard to the extent to which the site is suitable in relation to subsections 3(a) and 3(b) of the NRWM Act, to ensure that radioactive waste generated, possessed or controlled by the Commonwealth or a Commonwealth entity is safely and securely managed.

The site suitability criteria

The following site suitability criteria have been developed to enable a suitability assessment to support a decision about site selection:

1. The extent to which it is reasonably likely that, at the site, radioactive waste can be safely and securely managed by the establishment and operation of the NRWM facility that meets the necessary regulatory or other approvals, licences and permits.
2. The costs to acquire the site and realise the NRWM facility at the site.
3. Other matters relevant to the suitability of the site for the establishment and operation of the NRWM facility.
4. The extent to which there is broad community support for the NRWM facility to be hosted at the site.

Site suitability criterion 1

The extent to which it is reasonably likely that, at the site, radioactive waste can be safely and securely managed by the establishment and operation of the NRWM facility that meets the necessary regulatory or other approvals, licences and permits.

Safe and secure management of radioactive waste controlled by the Commonwealth is the primary objective of the NRWM Act. To assess the potential capacity of each site to meet this objective, the assessment methodology used for criterion 1 is based on the likely requirements of future regulators for whom the safe and secure management of radioactive waste is also a priority.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)[2], the Australian Safeguards and Non-Proliferation Office (ASNO)[3], and the Department of Environment and Energy (DoEE)[4] will require extensive evidence that radioactive waste will be safely and securely managed at the facility, before issuing the licences and approvals necessary for the establishment and operation of the facility.

Robust guidance on siting nuclear facilities, including radioactive waste management facilities and incorporating international best practice, already exist. The first criterion 1 assessment (in attachment A) draws on ARPANSA documentation (including licence applications, regulatory assessment principles, regulatory guides and codes), ASNO documentation (including specific safety guidelines and specific safety requirements), and International Atomic Energy Agency (IAEA) siting criteria and guidance documents. While IAEA is not a regulator for this facility, it produces international nuclear safety standards which provide guidance and success criteria to consider in the siting of radioactive waste management facilities.

A comparative technical assessment of the suitability of the sites for the facility in terms of the likelihood of meeting regulatory requirements and IAEA guidance has been prepared by specialists and the department. This considers desk top information and site characterisation investigations carried out to date. This includes a rating of the technical risk for each site

[2] ARPANSA's purpose is to protect the Australian people and the environment from the harmful effects of radiation through understanding risks and best practice regulation, including to ensure the safety and security of radioactive and nuclear material. ARPANSA draws on international best practice and guidance, including from the IAEA and the International Committee on Radiation Protection (ICRP) to understand risks and best practice regulation and is the Australian Government's primary authority on radiation protection and nuclear safety.

[3] ASNO will regulate the security arrangements for storage of some waste at the facility which is subject to international security treaties, as part of its wider role enhancing Australian and international security through activities that contribute to effective regimes against the proliferation of weapons of mass destruction.

[4] The DoEE regulates the EPBC Act (Cth), ensuring the protection of flora, fauna and the environment.

using the Australian Nuclear Science and Technology Organisation (ANSTO) risk assessment methodology (recognised by the regulators).

The assessment is framed in terms of the likelihood of a regulator being concerned about a particular site characteristic associated with a future licence application, rather than the likelihood of meeting regulatory requirements as such (which would require presumption of the regulator's actual responses to applications). The approach provides an appropriate proxy assessment of the safety and security risk of the sites using the information that is currently available.

A second assessment has been prepared to identify potential site differentiators of interest to regulators in terms of a future *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) approval (see attachment I). This assessment followed a similar approach to the technical ARPANSA/ASNO/IAEA site suitability assessment.

A range of future regulatory and other considerations, apart from those considered in criterion 1, have also been identified and considered for completeness. For example the *Public Works Committee Act 1969* (Cth) requires that the facility be referred to the Parliamentary Standing Committee on Public Works for consideration. More detail on these other considerations is at p. 57. No risk rating has been applied to these considerations, as the available information is currently too preliminary to conduct comparative assessments.

Site suitability criterion 2

The costs to acquire the site and realise the NRWM facility at the site.

This criterion relates to the financial costs associated with establishing the facility at each site. There are two distinct costs associated with the facility: the cost of the facility itself, and the compensation costs associated with acquiring land or property needed to support the facility. The cost of operating the facility has not been examined. Costs are presented, where these are known, and the department has assessed the risk that proposed expenditure would not result in a fit-for-purpose facility. A traffic light rating indicates if this risk is low, medium or high, and explanatory comments are provided.

Facility (and enabling works) cost estimates for each site have been prepared by specialists (see attachments B, E and P). The cost estimates take into account ss 34(1)(a) and (2)/ s47C [redacted], and estimates for additional works to address risks associated with each site. An assessment of the possible compensation costs associated with each of the sites has been prepared by the department (see pp. 66-74).

Site suitability criterion 3

Other matters relevant to the suitability of the site for the establishment and operation of the facility.

The facility will have a presence within the environment and community over hundreds of years across the pre-operational, operational and post operational phases. Criterion 3 considers matters that could potentially impact the suitability of the site for facility establishment, operation and decommissioning, beyond the consideration of regulatory approvals, costs and community sentiment as examined in criterion 1, 2 and 4. This includes the consideration of the possible practical, legal and stakeholder risks associated with the discrete tasks necessary to achieve the object of the NRWM Act across the lifecycle of the facility.

The department identified and grouped the factors relevant to assessing this criterion, then each group of factors was evaluated using the approach described in the department's risk management framework (see pp. 75-77).

Site suitability criterion 4

The extent to which there is broad community support for the facility to be hosted at the site.

Successive ministers have made a commitment that the facility will be established in a community where there is broad community support. To assist the Minister's consideration of this criterion, a report of key community sentiment indicators will be provided to supplement this site assessment report, after the community ballots have been conducted. Indicators may include: the results of the community ballots, business surveys and neighbour surveys, analysis of public submissions and Ministerial correspondence, and views of Traditional Owner groups.

Executive summary of findings

The following pages of this executive summary include detailed matrices explaining the rating definitions and written summaries of the findings of this report.

The below graphic is a visual representation of the level of risk for each site.

The Lyndhurst site has **3 high/very high risk ratings** relating to s42 / s47C (page 90) and potential regulator concern about flooding (pages 33 and 47). There are 3 medium risk ratings and 35 low/very low risk ratings.

The Napandee site has **no high/very high risk ratings**, 4 medium risk ratings and 37 low/very low risk ratings.

The Wallerberdina site has **7 high/very high risk ratings** s 42, s 47C: potential regulator concern about flooding (pages 33 and 47), seismicity (page 31), implementation of the emergency plan (page 39) and ground water access (pages 36 and 49); s42 / s47C (page 85). There are 6 medium risk ratings and 28 low/very low risk ratings.

Matrices

The matrices present the outcomes of the site suitability assessments in a visual format, grouped by the site suitability criterion. Each matrix corresponds to a site suitability assessment and draws on that assessments methodology to define the ‘traffic-light’ ratings. The rating definitions are summarised at the top of each matrix and described full in the relevant section of the report.

Elements of the site suitability assessments which were not assessed are represented by grey circles in all matrices.

Site suitability criterion 1

Technical assessment (ARPANSA, ASNO and IAEA)

This is an assessment of the likelihood of ARPANSA/ASNO being concerned about particular site characteristics associated with a future licence application, not pre-empting any outcome from an assessment by the regulator. The assessment was carried out by specialists and the department using available information and ARPANSA, ASNO and IAEA guidance and regulations. The assessment used the ANSTO risk assessment methodology and matrix to derive risk rating for the site characteristics which are shown here. The full summary can be found from p. 24 and the full assessment at attachment A.

Table 1: Technical assessment (ARPANSA, ASNO and IAEA) ratings definitions

	N/A	Very low	Low	Medium	High	Very high
Traffic light						

Table 2: The department's assessment of the risk that the regulator would have concerns about a particular site characteristic, technical factor or measurement, based on the currently available information

	Lyndhurst	Napandee	Wallerberdina
Long-term closure safety (p. 30)			
Volcanism (p. 30)			
Geology—earthquake and active Faulting (p. 31)			
Meteorology (p. 32)			
Hydrology/transfer processes—flooding and RN dispersion in surface water (p. 33)			
Geology—geotechnical considerations (p. 35)			
Geology/transfer processes—groundwater risk (p. 36)			
Radionuclide dispersion in atmosphere (p. 37)			
Human induced events (p. 37)			
Demographics—populations (p. 38)			
Demographics—nearby human activities and land use (p. 38)			
Ambient radioactivity (p. 38)			
Specific events—bush fire risks (p. 39)			
Implementation of emergency plan (p. 39)			
Ecology and non-radiological environmental impacts (p. 40)	*Refer to the EPBC Act assessment*		
Services and enabling works (p. 40)			
ASNO permits and IAEA requirements (p. 41)			

EPBC Act assessment

This is an assessment of the likelihood of the Department of the Environment and Energy being concerned about particular site characteristics associated with a future licence application, not pre-empting any outcome from an assessment by the regulator. The assessment was carried out by specialists and the department using available information and EPBC guidance and regulations. The assessment used the ANSTO risk assessment methodology and matrix to derive risk rating for the site characteristics which are shown here. The full summary can be found from p. 42 and the full assessment at attachment I.

Table 3: EPBC assessment ratings definitions

Risk rating	N/A	Very low	Low	Medium	High	Very high
Traffic light						

Table 4: The department's assessment of the risk that the regulator would have concerns about a particular site characteristic, technical factor or measurement, based on the currently available information. Asterisks indicate differentiators where mitigations are found in the separate ARPANSA/ASNO/IAEA assessment

	Lyndhurst	Napandee	Wallerberdina
Water supply, storage, monitoring, sewage and treatment (p. 46)			
Surface water quality and hydrology* (p. 47)			
Groundwater* (p. 49)			
Seismic risk* (p. 50)			
Flora and fauna (p. 51)			
Landscape and visual amenity (p. 52)			
Traffic and transport (p. 53)			
Aboriginal cultural heritage (p. 54)			
Land use planning (p. 55)			
Agriculture (p. 56)			

Future regulatory and other considerations matrix

The department has considered the likelihood that requirements can be met with respect to future regulatory processes, outside of the other ARPANSA, ASNO and EPBC Act requirements considered in criterion 1 (pp. 57-59). The site-specific information available for such additional requirements is currently too preliminary to conduct comparative assessments. Although no risk ratings have been applied, the future regulatory requirements discussed in the department's preliminary assessment are listed here for completeness.

Table 5: The extent to which it is reasonably likely that the requirements can be met for the necessary regulatory or other approvals, licences and permits with respect to establishment and operation of the facility at the site.

	Lyndhurst	Napandee	Wallerberdina
Parliamentary Standing Committee on Public Works (PWC)			
Prohibition regulation			
Waste regulation			
Transport regulation			
Other regulation			

Site suitability criterion 2

The costs to acquire the site and realise the facility at the site.

In this section consideration is given to two distinct financial costs associated with the facility: the cost of the facility itself and the compensation costs (initial and future) associated with acquiring land or property needed to support the facility. The cost of operating the facility has not been examined.

The department has assessed the risk that proposed expenditure would not result in a fit-for-purpose facility at the site. A traffic light rating indicates if this risk is low, medium or high, and explanatory comments are provided. Costs are presented, where these are known. The full assessment of criterion 2 is from p. 60.

Table 6: The department's colour code for rating the risk that proposed expenditure would not result in a fit-for-purpose facility.

Rating	Low	Medium	High
Traffic light			

Facility cost estimates matrix

Table 7: The department's assessment of the risk that proposed expenditure would not result in a fit-for-purpose facility at the site

	Lyndhurst	Napandee	Wallerberdina
ss 34(1)(a) and (2)/ s47C	ss 34(1)(a) and (2)/ s47C		
Capital cost Differentials	+$22.5m	$0 (baseline)	+$150.9m
Total capital cost (estimated) (p. 60-65)	ss 34(1)(a) and (2)/ s47	ss 34(1)(a) and (2)/ s4	ss 34(1)(a) and (2)/ s4

Compensation matrix

Table 8: The department's assessment of the risk that proposed expenditure would not result in a fit-for-purpose facility at the site

	Lyndhurst	Napandee	Wallerberdina	Summary of legal advice — subject to legal professional privilege
Landowners (and associated rights or interests) (p. 69)				**Lyndhurst:** Negotiations have not commenced. s 42 [redacted] **Napandee:** s 42 [redacted]. The land valuation underlying the claim amount is consistent with the independent land valuation obtained by the department. The claim is less than the amount set aside in contingency reserve for site acquisition. Negotiations are ongoing and the department considers an amount of in-principle 'reasonable compensation' will be agreed. **Wallerberdina:** s 42 [redacted]. The land valuation underlying the claim amount is not consistent with the independent advice obtained by the department to date. The department has requested further independent advice from the landowners to substantiate their position. The claim exceeds the amount set aside in contingency reserve for site acquisition. Negotiations are ongoing.
Mining or exploration interests (p. 70)				**Wallerberdina:** s 42 [redacted]
South Australian Government (p. 71)				South Australian Government is yet to confirm its rights or interests.
s 42 [redacted]				s 42 [redacted]
Additional liabilities (p. 73, 74)				N/A

Site suitability criterion 3

Other matters relevant to the suitability of the site for the establishment and operation of the facility.

Beyond the consideration of regulatory approvals, costs and community sentiment as examined in criterion 1, 2 and 4, criterion 3 considers other matters that could impact the suitability of each site across the lifecycle of the facility. This includes the consideration of the possible practical, legal and stakeholder risks associated with the discrete tasks necessary to achieve the object of the NRWM Act. The assessment of this criterion was undertaken by a panel of experienced Commonwealth policy and legal officers. Initially, the factors relevant to assessing this criterion were identified and grouped. Each group of factors was evaluated using the approach described in the department's risk management framework, with the resulting ratings shown here (the full assessment is at pp. 75-92)

Table 9: The following colour code from the department's risk management framework represents risk ratings assigned to factors.

Risk rating	Low	Minor	Medium	High	Very high
Traffic light					

Table 10: The department's assessment of the risk that a particular factor would impact the suitability of the site for the establishment and operation of the facility

	Lyndhurst	Napandee	Wallerberdina	Summary of legal advice — subject to legal professional privilege
Aboriginal cultural heritage (p. 78)				The NRWM Act allows for the override of laws that 'regulate, hinder or prevent' authorised activities i.e. activities related to the construction and operation of the facility and this could extend to overriding state and Commonwealth heritage protection laws.
Transport and road use (p. 80)				N/A
Noise, dust, visual and other disturbance (p. 81)				s 42 [redacted] There is also a general offence of causing environmental nuisance in section 82 of the *Environment Protection Act 1993* (SA), s 42 [redacted]
Security (p. 82)				N/A
s 42 [redacted] (p. 83)				s 42 [redacted]
Future land use and activities (p. 84)				N/A
Additional land or property acquisitions (p. 85)				N/A
Environment (p. 87)				N/A
Socio-economic (p. 88)				N/A
Community relationships (p. 90)				s 42/s 47F [redacted]
Legislative override provisions of the NRWM Act (p. 92)				s 42 [redacted]

Lyndhurst

Site suitability criterion 1

The extent to which it is reasonably likely that, at Lyndhurst, radioactive waste can be safely and securely managed by the establishment and operation of the NRWM facility that meets the necessary regulatory or other approvals, licences and permits.

The department assessed the likelihood of a regulator, in the context of future applications for ARPANSA licences, ASNO permits and EPBC approval, being concerned about a particular site characteristic and determined there is a:

- **high risk** that the regulator would be concerned about flood risk (pages 33 and 47)
- **medium risk** that the regulator would be concerned about geotechnical hazards (page 35)
- **low risk** that the regulator would be concerned about earthquake and active faulting (pages 31 and 50), emergency plan delivery (page 39), and ASNO permit and IAEA requirements (page 41), and
- **very low risk** that the regulator would have concerns about any of the remaining factors assessed under this criterion (pages 32, 36 – 40, 46, 49, 51 – 56).

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

Site suitability criterion 2

The costs to acquire the site and realise the facility at Lyndhurst.

s 42 [redacted] that the estimated facility capital costs would not result in a fit-for-purpose facility. ss 34(1)(a) and (2) [redacted]

There is **no risk** that expenditure for compensation, whether agreed or court-imposed, would not result in a fit-for-purpose facility – even though s 42 [redacted] (pages 66 – 74). If an amount of 'reasonable compensation' cannot be agreed by the Commonwealth's delegate and the affected person/s, the NRWM Act provides that the Federal Court of Australia may determine the amount. This is the case for compensation associated with:

- s 34(1)(a) and (2) [redacted]
- mining or exploration licences (none identified at Lyndhurst),
- the South Australian Government, which is yet to confirm its rights or interests,
- minor additional acquisitions which may be required to support secondary road access to the site, or to facilitate drainage works,
- s 42 [redacted]

[redacted]

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

Site suitability criterion 3

Other matters relevant to the suitability of the site at Lyndhurst for the establishment and operation of the facility.

The department considers there is a s 42/ s 47F [redacted]

The department considers there is a **medium risk** to site suitability s 42 [redacted]

The department considers there is a **medium risk** to site suitability that Aboriginal cultural heritage and Native Title claims will give rise to legal challenges and public criticism, even with mitigations in place (pages 78 – 79):

- A detailed assessment of Aboriginal cultural heritage values has not been completed. Aboriginal cultural heritage sites may be located during future EPBC or other land assessment work.
- The Barngarla Determination Aboriginal Corporation is opposed to the facility and has initiated legal challenges to the site selection process.
- s 42 [redacted]

The department considers there is a:

- **minor risk** to site suitability associated with transport and road use (page 80), and acquisitions of additional land and property (page 85), and
- **low risk** to site suitability in relation to the other factors assessed under this criterion (pages 81, 82, 84, 87 and 89).

Napandee

Site suitability criterion 1

The extent to which it is reasonably likely that, at Napandee, radioactive waste can be safely and securely managed by the establishment and operation of the NRWM facility that meets the necessary regulatory or other approvals, licences and permits.

The department assessed the likelihood of a regulator, in the context of future applications for ARPANSA licences, ASNO permits and EPBC approval, being concerned about a particular site characteristic and determined there is a:

- **medium risk** that the regulator would be concerned about flood risk (pages 33 and 47),
- **low risk** that the regulator would be concerned about earthquake and active faulting (pages 31 and 50), geotechnical considerations (page 35), emergency plan delivery (page 39), and ASNO permits and IAEA requirements (page 41), and
- **very low risk** that the regulator would have concerns about any of the remaining factors assessed under this criterion (pages 32, 36 – 40, 46, 47, 49, 51 – 56).

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

Site suitability criterion 2

The costs to acquire the site and realise the facility at Napandee.

s 42 [redacted] hat the estimated facility capital costs would not result in a fit-for-purpose facility. ss 34(1)(a) and (2) [redacted]

There is **no risk** that expenditure for compensation, whether agreed or court-imposed, would not result in a fit-for-purpose facility – even though there is not enough information to identify what further compensable rights or interests may be affected (pages 66 – 74). If an amount of 'reasonable compensation' cannot be agreed by the Commonwealth's delegate and the affected person/s, the NRWM Act provides that the Federal Court of Australia may determine the amount. This is the case for compensation associated with:

- [redacted]
- mining or exploration licences (none identified at Napandee),
- the South Australian Government, which is yet to confirm its rights or interests,
- s 42 [redacted]

[redacted]

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

Site suitability criterion 3

Other matters relevant to the suitability of the site at Napandee for the establishment and operation of the facility.

The department considers there is a **medium risk** to site suitability s 42 [redacted]

- While the department's view is that the Prohibition Act does not prohibit SA Water from performing works necessary to supply water to the site, the South Australian Government may choose to discourage the establishment of the facility by arguing that SA Water is prohibited from supplying services under state legislation.

The department considers there is a **medium risk** to site suitability that Aboriginal cultural heritage and Native Title claims will give rise to legal challenges and public criticism, even with mitigations in place (page 78):

- A detailed assessment of Aboriginal cultural heritage values has not been completed. Aboriginal cultural heritage sites may be located during future EPBC or other land assessment work. The Barngarla Determination Aboriginal Corporation is opposed to the facility and has initiated legal challenges to the site selection process.

s 42 [redacted]

The department considers there is a:

- **minor risk** to site suitability associated with transport and road use (page 80), and acquisitions of additional land and property (page 85), and
- **low risk** to site suitability in relation to the other factors assessed under this criterion (pages 81, 82, 84, 87 and 88).

Wallerberdina

Site suitability criterion 1

The extent to which it is reasonably likely that, at Wallerberdina, radioactive waste can be safely and securely managed by the establishment and operation of the NRWM facility that meets the necessary regulatory or other approvals, licences and permits.

The department assessed the likelihood of a regulator, in the context of future applications for ARPANSA licences, ASNO permits and EPBC approval, being concerned about a particular site characteristic and determined there is a:

- **very high risk** that the regulator would be concerned about flood risk (pages 33 and 47), earthquake and active faulting (page 31) - the assessment also determined that measures to mitigate against flood risk may not satisfy the regulator,
- **high risk** that the regulator would be concerned about groundwater (pages 36 and 49) and emergency plan delivery (page 39),
- **medium risk** that the regulator would be concerned about services and enabling works (page 40) and Aboriginal cultural heritage (page 54),
- **low risk** that the regulator would be concerned about geotechnical considerations (page 35), ASNO permits and IAEA requirements (page 41), and traffic and transport (from an environmental perspective only, page 53), and
- **very low risk** that the regulator would have concerns about any of the remaining factors assessed under this criterion (pages 32, 37 – 39, 46, 51, 52, 55 and 56).

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

Site suitability criterion 2

The costs to acquire the site and realise the facility at Wallerberdina.

s 42 [redacted] that the estimated facility capital costs would not result in a fit-for-purpose facility. ss 34(1)(a) and (2) [redacted]

There is **no risk** that expenditure for compensation, whether agreed or court-imposed, would not result in a fit-for-purpose facility – even though s 42 [redacted] (pages 66 – 74). If an amount of 'reasonable compensation' cannot be agreed by the Commonwealth's delegate and the affected person/s, the NRWM Act provides that the Federal Court of Australia may determine the amount. This is the case for compensation associated with:

- landowners for site acquisition, whose current claim [redacted] – an amount which exceeds the funds set aside in contingency reserve for site acquisition costs,
- mining or exploration licences (one Geothermal Exploration Licence identified at Wallerberdina),
- the South Australian Government, which is yet to confirm its rights or interests,
- significant additional acquisitions required to support primary and secondary road access to the site,
- s 42 [redacted]

[redacted]

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

Site suitability criterion 3

Other matters relevant to the suitability of the site at Wallerberdina for the establishment and operation of the facility.

The department considers there is a **high risk** to site suitability associated with acquisitions of additional land and property due to the significant parcels of land required for roads, the complex stakeholder management required, and significant Aboriginal cultural heritage values surrounding the site, which could be impacted by facility related activities (pages 85 - 86):

- s 42 [redacted]
- Recent land surveys indicate that the proposed primary physical access road deviates significantly from the road reserve boundaries and further survey work is required to determine the extent to which the route would encroach on private land and determine the landowner. If a secondary (emergency) access point is required by the regulator, it is anticipated this road would intersect with an existing road about 48 kilometres from the facility, requiring the acquisition of a significant amount of approved and other land.

The department considers there is a **medium risk** to site suitability that Aboriginal cultural heritage and Native Title claims will give rise to legal challenges and public criticism, even with mitigations in place (pages 78 – 79). The Adnyamathanha Traditional lands Association has expressed ongoing opposition to the facility. s 42 [redacted].

The department considers there is a:

- **minor risk** to site suitability associated with transport and road use (page 80), and the environment (page 87), and
- **low risk** to site suitability in relation to the other factors assessed under this criterion (pages 81 – 84, 89).

Site assessments

Site suitability criterion 1

The extent to which it is reasonably likely that, at the site, radioactive waste can be safely and securely managed by the establishment and operation of the NRWM facility that meets the necessary regulatory or other approvals, licences and permits.

Technical assessment (ARPANSA, ASNO and IAEA)

The purpose of the ARPANSA/ASNO/IAEA site suitability assessment of site-specific characteristics is to inform the Minister of: the potential risks of each site; areas where a regulator is likely to require more information than is currently known; or areas where the information to date suggests that further design work and mitigations may be required to build the facility on a particular site to safely and securely manage radioactive waste. This purpose does not include a risk assessment of the concept design against risk events or a comparison of the current concept design basis against possible events.

Based on the preliminary site characterisation studies conducted to date and relevant publicly available information, this section provides a technical basis for differentiating between approved sites. It assesses the suitability for safe and secure management of radioactive waste by evaluating the likelihood of a regulator being concerned about a particular site characteristic associated with a future licence application. This section provides a technical basis for site comparison and selection in the context of risk and likelihood of gaining regulatory approval, without pre-empting any outcome from an assessment by the regulator. This is not a risk assessment of whether the concept design will address specific risk events.

The assessment results on the following pages have been extracted from the technical assessment performed using ARPANSA, ASNO and IAEA guidance or regulations. The full assessment report can be viewed at attachment A.

The assessment draws on the preliminary site characterisation studies conducted to date and relevant publicly available information. It is a comparative technical risk assessment of the suitability of the approved sites in the context of ARPANSA, ASNO and IAEA guidance and regulations. Potential risk mitigations are highlighted in the assessment. Costs associated with these mitigations are captured in site suitability criterion 2.

ARPANSA documents (including licence applications, regulatory assessment principles, regulatory guides and codes); ASNO documents (including specific safety guidelines and specific safety requirements), and International Atomic Energy Agency (IAEA) criteria were used to inform the likely areas of interest for future regulatory approvals. Assessment against ARPANSA, ASNO and IAEA criteria will ensure consistency with international best practice, and with the factors likely to be important in the regulatory siting licence determinations for the facility.

ARPANSA officials have reviewed the ARPANSA/ASNO/IAEA site suitability assessment and indicated they are comfortable with the assessment, while retaining ARPANSA's right to make a different assessment when considering future completed regulatory applications.

The ARPANSA/ASNO/IAEA site suitability assessment process comprised the following:

1. Identification of the IAEA, ARPANSA, and ASNO criteria for use in the assessment (site exclusion and discretionary/site comparators).
2. Comparison of the available information with IAEA exclusionary criteria to identify whether the sites offered a feasible option for the facility.
3. A more detailed assessment, comparing the available site information with IAEA discretionary criteria to assess and differentiate between the sites on the likely level of regulatory concern (which is also indicative of the practicability).
4. Identification of the types of mitigation measures that may be required and estimation of the mitigation costs at an order of magnitude level.

The assessment included four IAEA exclusionary criteria and further 13 non-exclusionary criteria as described in table 12. For exclusionary criteria (site volcanism, earthquake/active faulting, major geotechnical hazards, emergency plan implementation) if the site risk level was too great, or not mitigatable, this could be used as a reason for excluding/ rejecting the site. Non-exclusionary criteria were used in addition to the exclusionary criteria to create a well-based assessment of risk of regulatory concern.

In the tables set out from pages 30 to 41 below, the department has provided its rating of the risk that a regulator will be concerned about particular characteristics of a site (the 'risk rating'). The department has used ANSTO's risk methodology determinations matrix to produce those risk ratings, having regard to the likelihood and regulatory consequence associated with each characteristic (see table 11).

In this matrix, 'likelihood' is the department's assessment of the probability that the regulator will have concern that the particular site characteristic will affect approval. This is not the likelihood of a significant or catastrophic event resulting from one of the assessment factors and is not an assessment of the design risks against reference events.

The consequence assigned per characteristic, indicates the department's assessment of the level of potential regulator concern. This is the overall consequence for achieving facility approval, for example, 'catastrophic impact' means the worst case scenario for meeting

ARPANSA requirements, that regulatory approval may not be attainable. 'Severe impact' indicates significant regulatory impact, and additional mitigation work and/or studies may be required to satisfy the regulator. This is not the consequence of an issue concerning a certain characteristic, for example, not the consequence of a seismic event. The level of consequence can additionally indicate need for the mitigations to be addressed and integrated in facility siting or design.

The department then used the ANSTO risk assessment methodology risk determination matrix to combine likelihood and consequence to determine a final risk rating.

Table 11: Risk determination matrix, combining likelihood and consequence levels to determine a final risk rating (adapted from the ANSTO risk assessment methodology)

Medium	High	High	Very High	Very High	Very High	Very High	6	Catastrophic	Consequence
Low	Medium	Medium	High	High	Very High	Very High	5	Severe	
Low	Low	Medium	Medium	High	High	Very High	4	Major	
Very Low	Very Low	Low	Low	Medium	Medium	High	3	Moderate	
Very Low	Very Low	Very Low	Very Low	Low	Low	Medium	2	Minor	
Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	1	Negligible	
A	B	C	D	E	F	G			
Extremely Unlikely	Highly Unlikely	Very Unlikely	Unlikely	Likely	Very Likely	Almost Certain			
Likelihood									

Table 12: non-technical description of the criteria used in the ARPANSA/ASNO/IAEA site suitability assessment report (attachment A)

Criterion included in assessment	Criterion characteristics
Long term closure safety *(non-exclusionary criterion)*	The extent to which there is an adequate understanding and confidence in post closure safety. The operator should undertake an ongoing programme of assessment of safety of the disposal facility. The aim of the safety assessment should not be solely to evaluate the performance and radiological impact of the disposal system, but should also be to develop an understanding of how the disposal system (the facility and its surrounding environment) may behave and evolve.
Volcanism *(exclusionary criterion)*	Assessment of proximity to active volcanoes.
Geology–earthquake and active faulting *(exclusionary criterion)*	Assessment of potentially active, near surface and nearby faults and ridge crests, which would have the potential to affect the feasibility of design, construction and safe operation of the facility.
Meteorology *(non-exclusionary criterion)*	Assessment of existing climatic conditions to identify any potential hazards that could impact the facility or workers. This includes assessing extreme values, rare events and the risk of climate change impacts.
Hydrology/transfer processes–flooding and radionuclide dispersion risk in surface water *(non-exclusionary criterion)*	Assessment of surface processes (or the potential for them) that may affect the safety of the facility, such as flooding, landslides, erosion, drainage, ponding and water accumulation.
Geology–geotechnical considerations *(exclusionary criterion)*	Assessment of geotechnical hazards, including potential for slope instability, soil liquefaction, collapsing or expansive soils, subsidence due to ground features, long-term settlement, and soil scour and erodibility. Site geology is an important consideration in the long-term safety of the facility, as these can impact the required building foundations and also the potential movement of radionuclides.
Geology/transfer processes–groundwater risk *(non-exclusionary criterion)*	Assessment of the potential impact of the contamination of groundwater on the population, including assessment of water table depth, potential for migration of water, soil absorption capacity, limited or no current groundwater users, and poor quality groundwater to discourage future use.
Radionuclide dispersion in atmosphere *(non-exclusionary criterion)*	Assessment of pathways for airborne dispersion of radionuclides, including consideration of proximity of population/human receptors, radionuclide transfer risk and operational accidents (in particular on-site fire incidents).

Criterion included in assessment	Criterion characteristics
Human-induced events *(non-exclusionary criterion)*	Assessment of potential interactions with the site as a result of human activity – human induced events. This includes assessment of flight paths, proximity to chemicals and industrial gas depots, high voltage power lines, tourists and airstrips.
Demographics–populations *(non-exclusionary criterion)*	Assessment of potential risk of health effects (for local populations and critical groups) resulting from site operations or accidents.
Demographics–nearby human activities and land use *(non-exclusionary criterion)*	Assessment of the risk of human uses/land uses impacting on the establishment, operation and safety of the facility, which could impact regulatory approval. For example, existing residences or community facilities in close proximity, mining tenements, hazardous facilities and airfields.
Radiological baseline *(non-exclusionary criterion)*	Assessment of the current radiological characteristics of the site so to establish a baseline from which to progress environmental impacts, safety case and monitoring for the next stages. Determining baseline radiological levels is also important to ensure that the radiation levels at the sites are within normal ranges and that a facility could be operated within the ARPANSA requirements for worker safety.
Specific events–bushfire risks *(non-exclusionary criterion)*	Assessment of bushfire risk and potential for impacts on site operations (e.g. curtailment of operations or need to evacuate staff). Factors include climatic conditions, fuel loadings and topography, plus potential mitigations such as buffers and setbacks.
Implementation of emergency plan *(exclusionary criterion)*	Assessment of ability to meet regulatory requirements to enact an emergency plan to cover incidents such as, but not limited to fires, radiological emergency, severe weather, suspicious package, site utilities disruption, medical emergencies, terrorism and protests. The emergency plan needs to consider the design of facilities and site access.
Ecology and non-radiological environmental impact	ARPANSA will consider ecology and non-radiological impacts as part of the facility assessment. Factors include vegetation types and abundance, wildlife and threatened and endangered species. These are considered through the EPBC assessment.
Services and enabling works *(non-exclusionary criterion)*	Assessment of the availability and vulnerability of site services and the difficulty in providing enabling works for the facility (such as power, water, sewerage, transport, communications, and emergency services).
ASNO permits and IAEA requirements *(non-exclusionary criterion)*	Assessment of any site-specific differences that would impact the ability to meet ASNO and IAEA requirements for the safe and secure storage of nuclear safeguard material and the ability to inspect this material for verification and accounting purposes.

The tables below have been compiled with information extracted from section 5 ‘summary assessment—siting criteria and regulatory risk’ in the full ARPANSA/ASNO/IAEA site suitability assessment report at attachment A. They show: the risk rating assigned to the criteria for each approved site, a description of each criterion and a summary of information, mitigation and residual risk. Where a criterion has not been rated, the reasons are listed in the tables.

Long term post closure safety

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The information summary for this element was authored by ANSTO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**N/A**	**N/A**	**N/A**
Information summary	For the LLW disposal system, a conceptual stage model has been developed for assessing potential dose rates to humans in the post-closure period. The modelling has been developed in accordance with Radiation Safety Assessment guidance of IAEA SSR-5, IAEA SSG-23 and IAEA SSG-29. The conceptual stage dose modelling is currently based on the available generic siting information for the LLW disposal system. In the iterative approach, the base model does not yet differentiate between the three candidate sites, as it has incorporated data generally representative of the region as well as generic internationally-recognised data. The dose assessment modelling has been undertaken using the computer package called RESRAD OFFSITE which has been developed by, and is supported by nuclear regulatory agencies in the United States and has a record of international use. In accordance with the IAEA guidance, assumptions about the future conditions have been made that are conservative in that they tend to over-predict potential dose rates and therefore provide a level of safety assurance. The key assumptions for the conceptual model are: • Modelling starts at the end of the 100-year operational period (2127). • People may access the site at the end of the operational period. No credit is given to the institutional control measures. • At the end of the 100-year operational period, the model assumes the waste is mixed homogenously and spread over a portion of the facility site (assumed to be 500m x 500m). No credit is given to the engineered vault structure or waste conditioning processes. Assessment is performed using varying thickness of clean covers. • The bounding case is a farmer that: spends 100% time at the site, lives 'outdoors' and consumes garden and meat products grown at the site. A water well (groundwater) provides irrigation and drinking water. • A conservative waste source term (bounding estimate for LLW) is assumed (no radioactive decay is currently factored in till end of operational period). • The conceptual stage generic model assumes 1m depth to groundwater and varying clean cover thickness of 0m, 1m and 3m. The main outcome from the conceptual modelling indicates that potential dose rates to future receptors, even the conservative bounding cases, are well below the relevant regulatory criteria of 1 mSv/yr. However, the results also indicate that future exposures vary according to the protective capabilities of the cover over the wastes (e.g. assumed cover thickness, resistance to erosion). Potential dose rates decrease relative to increasing cover thickness when they were assessed for 0-3m clean cover depths. The scenarios that involve potential direct exposure to the wastes (assuming minimal cover effectiveness) are likely to result in greater dose rates than those associated with groundwater pathways according to modelling results on near-surface disposal configurations. The results so far are preliminary and indicate the need to incorporate site-specific data once that is available to refine the models and allow comparison between the candidate sites. Refined modelling is also needed to assess the potential dose rates that result from scenarios where receptors may penetrate any protective barriers and be exposed directly to the wastes at some time in the future. Also needed under the IAEA process, is a sensitivity/uncertainty analysis on the refined well-developed site-specific models. Not considered to be a differentiator at this point, with further future development of the model required to incorporate additional site characterisation information, plus the development of the inventory, design and safety case.		

Geology—Volcanism

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The information summary for this element was authored by Geoscience Australia

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**N/A**	**N/A**	**N/A**
Information summary	Criterion not relevant to sites. The nearest active (but dormant) volcanoes are located in the Newer Volcanics Province (NVP) that that extend from approximately Melbourne in the east to Mount Gambier in the west. The western extent of this region is over 500km from the sites. The key point is that there are active (but dormant) volcanoes in Australia but these are located a long way from the Lyndhurst, Napandee and Wallerberdina sites, so the 'not exclusionary' criteria is still valid. The closest active but dormant volcanoes to the sites are located in the Newer Volcanics Province (NVP) that extends from approximately Melbourne in the east to Mount Gambier in the west. The western extent of this region is over 500km from the sites so the risk of impact on the sites from lava flow, pyroclastic flow and lahars (massive) is very low given these events would extend only a few tens of kilometres from an erupting volcano in the NVP. Cas et al (2017) suggest that given that heat flow and other geophysical anomalies indicate the presence of partial melts at depth under the Bendigo–Ballarat region, and that the most recent eruptions occurred approximately 5000 years ago in the Mt Gambier region, these are the two areas where future eruptions are most likely to occur.		

Geology - Earthquake and active faulting

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department and AECOM have assessed this element taking into account specialist inputs from AECOM, ANSTO and Jacobs, and review from ARPANSA, ANSTO, AECOM and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Low**	**Low**	**Very high**
Residual risk	No change	No change	There is residual risk associated with seismic events after design mitigations have been applied, which may concern regulators.
Criterion of differentiator	IAEA SSG9 para 8.8: Where reliable evidence shows that there may be a capable fault with the potential to affect the safety of a plant at a site, the feasibility of design, construction and safe operation of a plant at this site should be re-evaluated and, if necessary, an alternative site should be considered. For the facility this means: • absence of potentially active fault that could cause surface faulting through the facility. • absence of near surface faults that could cause folding or other deformation within the facility. • absence of nearby faults that could cause hanging wall or rupture directivity effects, which amplify ground motions. • absence of ridge crests, which amplify ground motions.		
Summary	Seismic hazards are not as high as identified at WBD due to the absence of potentially active faults in the foundation, near-surface faults beneath or near the foundation, and faults in the nearby area are not present (excluding the possibility of one-off faulting). However, additional seismic studies will be required to inform design and give confidence to the regulator that this has been considered.	Seismic hazards are not as high as identified at WBD due to the absence of potentially active faults in the foundation, near-surface faults beneath or near the foundation, and faults in the nearby area are not present (excluding the possibility of one-off faulting). However, additional seismic studies will be required to inform design and give confidence to the regulator that this has been considered.	Seismic hazards from ground shaking and deformation are higher at WBD (by 2.4 times) than the Lyndhurst and Napandee sites and will require additional structural mitigations to be incorporated into the facility design (typically applied in constructing buildings in earthquake prone regions in the world). The greater likelihood of an active fault at WBD compared to Lyndhurst and Napandee sites will drive regulatory focus.
Risk mitigation(s)	No additional engineering enhancement required	No additional engineering enhancement required	For WBD mitigation for fault activity/potential ground movement will need to be included in design. Mitigation by engineering enhancement (e.g. design enhancement to foundations, structural elements and key services to cater for increased accelerations above generic site) are similar to those required for earthquake mitigation. Further layers of containment such as concrete disposal containers may need to be considered if the regulator is not accepting of the safety assessment, but this is of low likelihood. Further seismic survey and analysis will need to be undertaken post-site selection to locate faults of the western range-front, to determine the likely impact of any seismic event on ground motion and to inform design parameters. Detailed fault mapping would be required on-site if a fault line is located to determine the age of the fault (i.e. active or not active). Site layout of items important to radiological safety and key operational elements will to consider any identified fault locations. The greater ground accelerations predicted at the WBD site will also result in enhanced specifications for service infrastructure.

Meteorological events (includes historic records)

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department and CSIRO have assessed this element taking into account specialist inputs from CSIRO, and review from CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**Very low**
Residual risk	N/A	N/A	N/A
Criterion of differentiator	Establish existing climatic conditions for the site based on historic average and identify likely changes to climate based on projections. From this, identify resultant key hazards that could impact on the future facility and workers. Establish the risk of extreme values and rare events to allow for design basis and beyond design basis considerations. Establish the effect of climate change on sites. Future (projected) climate conditions where the frequency and intensity of climatic events has minimal impact upon the site and facility, or where design intervention can reasonably mitigate risks.		
Summary	All sites are arid and have similar temperature range, wind speed and average rainfall profiles. Climate projections are the same for all sites and indicate hotter and drier conditions, and increased days above 40°C. More intense rainfall events are predicted. The consequence of climate change on hydrology is addressed in the hydrology/flooding section.		
Risk mitigation(s)	Flooding mitigation at Lyndhurst is dealt with in the following section. Climate change review and risk assessment to be completed as part of design process, including adaptations	Climate change review and risk assessment to be completed as part of design process, including adaptations	Flooding mitigation at WBD is dealt with in the following section. Climate change review and risk assessment to be completed as part of design process, including adaptations

Hydrology/transfer processes—flooding and radionuclide dispersion risk in surface water

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM, ANSTO and Jacobs, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**High**	**Medium**	**Very High**
Residual risk	The minimum length of time for which the mitigation must remain in place and functional is about 400 years (100 years of operations plus 300 years of institutional control). Further investigations are required to determine appropriate mitigations, which will satisfy the safety case, in this context.	The minimum length of time for which the mitigation must remain in place and functional is about 400 years (100 years of operations plus 300 years of institutional control). Further investigations are required to determine mitigations, which will satisfy the safety case in this context.	The minimum length of time for which the mitigation must remain in place and functional is about 400 years (100 years of operations plus 300 years of institutional control). Further investigations are required to determine mitigations, which will satisfy the safety case in this context. However, it is likely that there will be residual risk associated with flooding after all potential design mitigations have been applied, which may concern regulators.
Criterion of differentiator	IAEA SSG-29 identifies that surface processes that may affect the safety of the facility need to be considered in the siting process, and recommends: • Verification that surface processes such as flooding of the disposal site, landslides or erosion do not occur with such frequency or intensity that they could affect the ability of the disposal system to meet safety requirements. • That the disposal site is generally well drained and free of areas subject to flooding or frequent ponding. • That accumulation of water in upstream drainage areas due to precipitation or snowmelt and the failure of water control structures, channel obstruction, or landslides is evaluated and minimised so as to decrease the amount of runoff that could erode or inundate the facility. • That preference is given to areas or sites with topographical and hydrological features that preclude the potential for flooding.		
Summary	Local catchment (21km^2) flooding risk with risk of significant inundation of the site. Climate change predictions include higher intensity of rainfall events that could increase flooding risk Low risk of regional scale flooding No creek lines Potential for on-site localised flash flooding. IAEA SSG-29 identifies that surface processes that may affect the safety of the facility need to be considered in the siting process and recommends include 'that the disposal site is generally well drained and free of areas subject to flooding or frequent ponding'.	Local catchment (5km^2) flooding risk with reduced risk of inundation of the site due to higher elevation. Climate change predictions include higher intensity of rainfall events that could increase flooding risk. No creek lines Low risk of regional scale flooding. Potential for on-site localised flash flooding.	Large 1700km^2 catchment area, water course adjacent to site Risk of regional flooding to the site. For example, for 1:2000 AEP–0.25-0.5m inundation, including breakout of Hookina Creek Potential for more frequent on-site localised flooding at lower recurrence intervals. Climate change predictions include higher intensity of rainfall events that could increase flooding risk at Wallerberdina. Risk of erosion of engineered barriers, principally engineered cap over the vaults, and pathway to Hookina Creek. Risk of loss of site access in flood events affecting the ability to mount an emergency response at this site. Potential connectivity to receptors during flooding events (likely more a community perception issue). Note: Direction of surface water flow is towards Lake Torrens and away from human receptors.
Risk mitigation(s)	Investigations – Further refined modelling; a detailed, quantitative assessment of the consequences of floods, using robust models for all possible radionuclide release mechanisms, dispersion patterns, and exposure pathways be developed. This will help to quantify the potential for and, if relevant, risks of flooding within the catchment, the site and the site access road. Design flood protection may include all or a combination of the following: • placing key structures that are important to safety, operations, and security on higher ground • localised land filling (depressions) • provision of flood levee structures to protect the facility (and the access route) against large episodic flood events	Additional investigations should be carried out including on the consideration of the change of the magnitude of floods based on climate change scenarios, to collect the necessary information to support a robust comparative risk assessment; a detailed, quantitative assessment of the consequences of floods, using robust models for all possible radionuclide release mechanisms, dispersion patterns, and exposure pathways be developed. This will help to quantify the potential for and, if relevant, risks of flooding within the catchment, the site and the site access road. Design site drainage to protect against local catchment modelling flood predictions. Review of site access with consideration of flood modelling, considering a route that avoids flood risk or one that requires flooding upgrades to site	Investigations - Further work is required including on the consideration of the change of the magnitude of floods based on climate change scenarios, to collect the necessary information to support a robust comparative risk assessment; a detailed, quantitative assessment of the consequences of floods, using robust models for all possible radionuclide release mechanisms, dispersion patterns, and exposure pathways be developed. This will help to quantify the potential for and, if relevant, risks of flooding and also avulsion within the catchment, the site and the site access road. Design flood protection is likely to require all of the following: • placing key structures that are important to safety, operations, and security on higher ground

	Lyndhurst	Napandee	Wallerberdina
	• creation of local catch drains to intercept external catchments • increasing the scale and capacity of site surface and subsurface drainage arrangements. • Excavate 4m deep drainage channel through ridge line on adjacent local western area • water-proofing and or protection of buildings/key services. • Adjustment of site location Flood levee/landraising of the site will need to be remodelled in the flood model once designed. Operational and maintenance if a flood occurs • repair of access road • repair to site flood protection • repair of engineered earth structures over LLW vaults. Mitigation for flooding/potential inundation of the facility will need to be included in design or could result in risk of: damage to structures, buildings and waste packages; damage to key services; or lead to the dispersion of radioactive material. It is recommended that all radioactive waste storage, characterisation, and conditioning facilities be located beyond the reach of a 1 in 2000 AEP flood event of the selected site; and LLW disposal vaults be located beyond the reach of PMF level on the selected site without relying on bunds and levees as a mitigation measure to ensure that disposal vaults continue to provide containment and isolation to radioactive waste beyond the operational phase. To site the vaults and other items that are important to safety at Lyndhurst may require selective placement to avoid the areas that are impacted by localised flooding. Develop an emergency access plan that can be enacted if road is flooded.	access road. Design flood protection may include all or a combination of the following: • placing key structures that are important to safety, operations, and security on higher ground • increasing the scale and capacity of site surface and subsurface drainage arrangements • water-proofing and or protection of buildings/key services. Any flood protection and site drainage will need to be remodelled in the flood model once designed. Operational and maintenance if a flood occurs • repair of access road • repair to site drainage • repair of engineered earth structures over LLW vaults. Mitigation for flooding/potential inundation of the facility will need to be included in design or could result in risk of: damage to structures, buildings and waste packages, damage to key services, or lead to the dispersion of radioactive material. It is recommended that all radioactive waste storage, characterisation, and conditioning facilities be located beyond the reach of a 1 in 2000 AEP flood event of the selected site; and LLW disposal vaults be located beyond the reach of PMF level on the selected site without relying on bunds and levees as a mitigation measure to ensure that disposal vaults continue to provide containment and isolation to radioactive waste beyond the operational phase. Develop an emergency access plan that can be enacted if road is flooded.	• more extensive building and infrastructure raising (compared to LYN) • provision of flood levee structures to protect the facility (and access route) against large episodic flood events • increasing the scale and capacity of site surface and subsurface drainage arrangements • water-proofing and or protection of buildings/key services. Flood levee/land raising of the site would need to be remodelled in the flood model once designed. Operational and maintenance if a flood occurs: • repair of access road • repair to site flood protection/levees. • management of stream banks to prevent/ recover from avulsion • repair of engineered earth structures over LLW vaults. Mitigation for flooding/potential inundation of the facility will need to be included in design or could result in risk of: damage to structures, buildings and waste packages; damage to key services; or lead to the dispersion of radioactive material. It is recommended that all radioactive waste storage, characterisation, and conditioning facilities be located beyond the reach of a 1 in 2000 AEP flood event of the selected site; and LLW disposal vaults be located beyond the reach of PMF level on the selected site without relying on bunds and levees as a mitigation measure to ensure that disposal vaults continue to provide containment and isolation to radioactive waste beyond the operational phase. Given the site-wide nature of the flooding at WBD, selective placement of items related to safety would be insufficient to address the risk posed by flooding. Proposed that road access is an unsealed road due to the flooding risk and increased O&M required to respond to flood events. Develop an emergency access plan that can be enacted if road is flooded.

Geology — Geotechnical considerations

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM, ANSTO and Jacobs, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Medium**	**Low**	**Low**
Residual risk	N/A	N/A	N/A
Criterion of differentiator	Geotechnical: Absence of geotechnical hazards (potential for slope instability, soil liquefaction, collapsing or expansive soils, subsidence due to ground features, long-term settlement, soil scour and erodibility). Geotechnical: Site geology is the principal long-term safety barrier. Site geotechnical characteristics impact the selection of the type of building foundations. Deep pile foundations may impact the underground water table and provide an additional potential pathway for radionuclide contamination of groundwater. The ability for site to support both raft (shallow) and pile (deep) foundations has been assessed.		
Summary	No geotechnical hazards present. Shallower groundwater. Piled foundations are proposed in the generic design for all warehouse style waste storage buildings (excluding LLW), the visitor centre and the administration building. Piled foundation solutions at Lyndhurst were less favourable than the other sites, due to longer proposed pile lengths with the potential to intersect with the shallower water table. If used for the LLW vaults, this could result in interaction with the water table, providing a potential pathway between waste storage and the groundwater. Deep raft foundations combined with ground stabilisation in the form of Cement Injected Columns are currently proposed for the LLW vaults and are viable across all three sites. The choice between a pile and a raft foundation design for other items important to safety would be based on the requirement of the LLW safety case. It is noted that Cement Injected Columns are a structural form similar to piles and may have the same relationship with the water table as noted above, but would not be connected to the base structural slab of the LLW vaults.	No significant geotechnical hazards present. Deeper groundwater. Piled foundations are proposed in the generic design for all warehouse style waste storage buildings (excluding LLW), the visitor centre and the administration building. Piled foundation solution is more favourable at Napandee, as the proposed pile lengths are unlikely to directly interact with the water table at this site. Deep raft foundations combined with ground stabilisation in the form of Cement Injected Columns are currently proposed for the LLW vaults and are viable across all three sites. The choice between a pile and a raft foundation design for other items important to safety would be based on the requirement of the LLW safety case. It is noted that Cement Injected Columns are a structural form similar to piles and may have the same relationship with the water table as noted above, but would not be connected to the base structural slab of the LLW vaults.	No geotechnical hazards present. Deeper groundwater. Piled foundations are proposed in the generic design for all warehouse style waste storage buildings (excluding LLW), the visitor centre and the administration building. Piled foundation solution is more favourable at Wallerberdina, as the proposed pile lengths are unlikely to directly interact with the water table at this site. Deep raft foundations combined with ground stabilisation in the form of Cement Injected Columns are currently proposed for the LLW vaults and are viable across all three sites. The choice between a pile and a raft foundation design for other items important to safety would be based on the requirement of the LLW safety case. It is noted that Cement Injected Columns are a structural form similar to piles and may have the same relationship with the water table as noted above, but would not be connected to the base structural slab of the LLW vaults.
Risk mitigation	Detailed geotechnical investigations of the chosen site. Further geotechnical analysis of the ground conditions during construction phase. LLW foundations design specific to the sites to meet requirements of the safety case. Preliminary analysis suggests that a raft slab is structurally viable and be adopted as the generic base case for all 3 sites. The concept raft design currently includes the provision and detailing of a geomembrane below the LLW vault facility, subject to the requirements of the LLW safety case. The geomembrane would act as an additional safety barrier delaying infiltration to the underlying geology and ground water, but may impact structural loading.	Detailed geotechnical investigations of the chosen site. Further geotechnical analysis of the ground conditions during construction phase. LLW foundations design specific to the sites to meet requirements of the safety case. Preliminary analysis suggests that a raft slab is structurally viable and be adopted as the generic base case for all 3 sites. The concept raft design currently includes the provision and detailing of a geomembrane below the LLW vault facility, subject to the requirements of the LLW safety case. The geomembrane would act as an additional safety barrier delaying infiltration to the underlying geology and ground water, but may impact structural loading.	Detailed geotechnical investigations of the chosen site. Further geotechnical analysis of the ground conditions during construction phase. LLW foundations design specific to the sites to meet requirements of the safety case. Preliminary analysis suggests that a raft slab is structurally viable and be adopted as the generic base case for all 3 sites. The concept raft design currently includes the provision and detailing of a geomembrane below the LLW vault facility, subject to the requirements of the LLW safety case. The geomembrane would act as an additional safety barrier delaying infiltration to the underlying geology and ground water, but may impact structural loading.

Geology/Transfer processes —Groundwater risk

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM and ANSTO, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**High**
Residual risk	N/A	N/A	There will be residual risk associated with groundwater (that the current use of groundwater provides an ongoing exposure pathway) after design mitigations have been applied, which may concern regulators.
Criterion of differentiator	IAEA NSR-3: An assessment of the potential impact of the contamination of groundwater on the population shall be performed by using the data and information collected in a suitable model. Advantageous aspects include: • Deep water table. • Low potential for vertical or horizontal migration of water through underlying soil. • Available sorption capacity to mitigate in case of RN releases. • Limited or no current groundwater users, low incidence of exposure pathways. • Poor quality groundwater to discourage future use.		
Summary	Shallower water table but of limited use based on saline groundwater quality and low yield, and no known groundwater users. The presence of clayey soil conditions above the groundwater will limit potential vertical migration to groundwater. Radionuclide dispersion mitigated to some extent by sorption/attenuation properties of the clayey soil layers in the vadose zone.	Deeper water table of limited use based on saline groundwater quality and low yield, and no known groundwater users. The presence of clayey soil conditions above the groundwater will limit potential vertical migration to groundwater. Radionuclide dispersion mitigated to some extent by sorption/attenuation properties of the clayey soil layers in the vadose zone.	Deeper water table providing separation from surface. Current groundwater use is limited to stock watering and irrigation. Potential further future beneficial use based on groundwater quality. Possible viable pathway for radionuclide transfer due to nearby groundwater use and also potential connectivity to Hookina Creek (probably perception issue only as groundwater flow is from Hookina Creek towards Lake Torrens). Risk of radionuclide transfer pathway for any future users of the resource. However, mitigated to some extent by sorption/attenuation properties of the clayey soil layers in the vadose zone. The presence of clayey soil conditions above the groundwater will limit potential vertical migration to groundwater, however it is noted the upper soil layers include clayey and gravelly silts that have a lower potential to limit vertical migration compared to the clays observed at the Lyndhurst and Napandee sites.
Risk mitigation	Investigations: Further drilling and testing will be required to further characterise the site to input into the design, safety case and environmental approvals. Conceptual modelling: A Conceptual Site Model (CSM) will need to be developed that will be used to assess the combined relationship and impact of sub-surface materials, groundwater, key facility elements (for example, vault foundation or capping) and safety scenarios where radionuclides are released to the environment. A suitable code, in this case ResRad will be used to quantify the risk. Planning controls: Restriction on future installation of water bores in close proximity to the site. Resource development: Location of water supply bores to be up gradient. Long term: Monitoring network set up prior to operations to allow comparative studies and early remediation.	Investigations: Further drilling and testing will be required to further characterise the site to input into the design, safety case and environmental approvals. Conceptual modelling: A Conceptual Site Model (CSM) will need to be developed that will be used to assess the combined relationship and impact of sub-surface materials, groundwater, key facility elements (for example, vault foundation or capping) and safety scenarios where radionuclides are released to the environment. A suitable code, in this case ResRad will be used to quantify the risk. Planning controls: Restriction on future installation of water bores in close proximity to the site. Resource development: Location of water supply bores to be up gradient. Long term: Monitoring network set up prior to operations to allow comparative studies and early remediation.	Investigations: Further drilling and testing will be required to further characterise the site to input into the design, safety case and environmental approvals. Conceptual modelling: A Conceptual Site Model (CSM) will need to be developed that will be used to assess the combined relationship and impact of sub-surface materials, groundwater, key facility elements (for example, vault foundation or capping) and safety scenarios where radionuclides are released to the environment. A suitable code, in this case ResRad will be used to quantify the risk. Planning controls: Restriction on future installation of water bores in the close proximity to the site. Resource development: Location of water supply bores to be up gradient. Long term: Monitoring network set up prior to operations to allow comparative studies and early remediation.

Transfer process — Atmospheric dispersion of radioactive materials

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM and ANSTO, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very Low**	**Very Low**	**Very Low**
Residual risk	N/A	N/A	N/A
Criterion of differentiator	IAEA NSR-3: The atmospheric dispersion of radioactive material released shall be assessed with the use of appropriate models. These models shall include all significant site-specific and regional topographic features and characteristics of the installation that could affect atmospheric dispersion. Key factors include: • proximity of population/human receptors • radionuclide transfer risk • operational accident event for regulation will be a fire at the operating facility leading to offsite releases.		
Summary	All sites have similar pathways for airborne dispersion. All sites have the same inventories and inventory characteristics. Relevant safety studies are still to be undertaken for operations.		
Risk mitigation	For all sites includes site and vehicle inspections and maintenance. Limiting the fuel available for bush fire or other fires on-site. Fire suppression designs.		

Human induced event

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM and ANSTO, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very Low**	**Very Low**	**Very Low**
Residual risk	N/A	N/A	N/A
Criterion of differentiator	Relatively low susceptibility to human induced events. s47C		
Summary	Lyndhurst closer to airport flight path than other sites although site location was moved south, to avoid flight path All sites are in areas of low population density. Significant distance to the sites from nearest town. Airports used by small aircraft very infrequently. Significant effort required for human impact events.	All sites are in areas of low population density. Significant distance to the sites from nearest town. Airports used by small aircraft very infrequently. Significant effort required for human impact events.	All sites are in areas of low population density. Significant distance to the sites from nearest town. Airports used by small aircraft very infrequently. Significant effort required for human impact events.
Risk mitigation	None	None	None

s47C

Demographics—Populations

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very Low**	**Very Low**	**Very Low**
Residual risk	N/A	N/A	N/A
Criterion of differentiator	IAEA siting - knowledge of population to allow evaluation of potential impact of normal and accident releases, the dose to the critical group, demonstrate ALARP and demonstrate feasibility of emergency response.		
Summary	All sites have a low population density limiting the collective impact of normal operations and accidents. Main towns are located 15km or more from the sites.		
Risk mitigation	Not required	Not required	Not required

Demographics — nearby human activities and land use

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very Low**	**Very Low**	**Very Low**
Residual risk	N/A	N/A	N/A
Criterion of differentiator	Minimal sensitive land uses (e.g. residences, community facilities) on or proximal to the site, suitable buffer distances from nearest sensitive land uses. Minimal land uses (e.g. mining tenements, hazardous facilities, airfields) on the site which could adversely impact on the facility.		
Summary	Low intensity farming. No current or past mining activity.	Low intensity farming. No current or past mining activity.	Very low intensity farming, low land occupancy. No current or past mining activity
Risk mitigation	Acquisition of the site by the Commonwealth will extinguish the tenements over the site (note that other mining rights on surrounding land may would not be extinguished). Future planning controls to maintain buffers.		

Radiological baseline—ambient site baseline radioactivity

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM and ANSTO, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very Low**	**Very Low**	**Very Low**
Residual risk	N/A	N/A	N/A
Criterion of differentiator	Background radiation levels within the ARPANSA Action Levels for workplaces. Background radiation levels are not sufficiently elevated to impact on the effectiveness of environmental monitoring.		
Summary	A radiological baseline would be used during operation of the facility to monitor performance of safety features, and in due course to set values for post operational phases. Background radiation level at all the sites is within normal range for this area of Australia, based on data collected to date via aerial survey. However soil and groundwater testing to be completed in future stages to provide confirmation.		
Risk mitigation	Not applicable	Not applicable	Not applicable

Specific events — Bushfire risks

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM, ANSTO and Jacobs, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very Low**	**Very Low**	**Very Low**
Residual risk	N/A	N/A	N/A
Criterion of differentiator	IAEA NSG 3.1: Requires the assessment of local factors which might result in significant risk. For the Australian situation bush fire is identified as such a factor.		
Summary	Combination of climatic conditions, fuel loadings and topography makes bushfires an intermittent danger across all the sites. With appropriate mitigations, design and engagement with Country Fire Service/regulator, all of the sites are likely to meet the criteria. This includes ability to create buffers which minimises the risk and potential severity of bushfires and allows for sufficient setbacks/buffers to meet the Australian Standard for building in bushfire prone areas (see mitigations).		
Risk mitigation	Bushfire risk will also be mitigated through detailed bushfire risk assessments of the site and proposed infrastructure with setbacks being determined based on asset vulnerability to bushfire attack, building design measures and also the level of provision of firefighting infrastructure.	The nominated site is not unduly impacted by bushfire hazards if setbacks/areas of cleared vegetation are established around assets, commensurate with asset vulnerability to bushfire attack, building design measures and provision of firefighting infrastructure.	Bushfire risk could be readily mitigated by implementing appropriate setbacks and buffer areas from vegetation and through building design measures.

Implementation of emergency plan

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM and ANSTO, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Low**	**Low**	**High**
Residual risk	N/A	N/A	There will be residual risk associated with implementation of emergency plan after design mitigations have been applied, which may concern regulators. New emergency access road has risk of flooding due to the site also being on a floodplain.
Criterion of differentiator	Location of site and site characteristics make implementation of emergency plans more, or less, practicable.		
Summary	Lyndhurst, Napandee and Wallerberdina sites are all located away from main populations.	Lyndhurst, Napandee and Wallerberdina sites are all located away from main populations.	Lyndhurst, Napandee and Wallerberdina sites are all located away from main populations. Wallerberdina more likely to be affected such that emergency plans will be difficult to implement (for emergencies associated with flood or seismic events)
Risk mitigation	On-site facilities designed and fully resourced to deal with all credible emergencies (assuming no access to local services such as firefighting and medical) e.g. staff evacuation, sustained emergency response, provisioning on site by air/helicopter access maintained.	On-site facilities designed and fully resourced to deal with all credible emergencies (assuming no access to local services such as firefighting and medical) e.g. staff evacuation, sustained emergency response, provisioning on-site by air, helicopter access maintained.	On-site facilities designed and fully resourced to deal with all credible emergencies (assuming no access to local services such as firefighting and medical) e.g. staff evacuation, sustained emergency response, provisioning on-site by air, helicopter access maintained. Design mitigations for flooding and seismic risk are key and contribute to risk mitigation by making the site more resilient - see previous sections. New emergency access built above flood levels. 48km emergency access road constructed downstream of the former rail line.

Ecology and non-radiological environmental impacts

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has authored the information for this element, and this was reviewed by ANSTO.

	Lyndhurst	Napandee	Wallerberdina
Information summary	Information for each site is presented in the EPBC assessment. Refer to this separate assessment for an evaluation of ecology and non-radiological environmental impacts (attachment I)		
Criterion of differentiator	Site-specific differences in ecology and potential environmental impacts may influence ARPANSA considerations. According to ARPANSA guidelines (appendix 1 in attachment I), these include information and details related to: • vegetation types and abundance • wildlife • threatened and endangered species. The IAEA guidelines include the presence of bio-sensitive areas adjacent to site and natural reserves, monuments or tourist spots, as examples of non-radiological environmental impacts.		

Services and enabling works

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from AECOM and ANSTO, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very Low**	**Very Low**	**Medium**
Residual risk	Engagement with stakeholders, detailed studies for enabling works may highlight factors that have not yet been considered. Change in facility system requirements (as the design progresses).	Engagement with stakeholders, detailed studies for enabling works may highlight factors that have not yet been considered. Change in facility system requirements (as the design progresses).	There will be residual risk associated with service and enabling works (due to risk of flooding of access roads) after design mitigations have been applied, which may concern regulators. Site access road has flooding risks and emergency access road required to be constructed (see implementation of emergency plan). Engagement with stakeholders, detailed studies for enabling works may highlight factors that have not yet been considered. Change in facility system requirements (as the design progresses).
Criterion of differentiator	The availability and vulnerability of services provision to the facility, including enabling works for the construction of the facility, may be considered in site assessment by ARPANSA. The main services required are electricity (and other power systems), water, sewerage, transport, communications, and emergency services. The 'implementation of emergency plan' criterion assesses access to emergency services.		
Summary	N/A	N/A	N/A
Risk mitigation	Transport and Access: 21km upgrade of Aerodrome and Bindawalla Gate Road including upgrade of intersection with Eyre Highway, upgrade of the existing road and intersections and site access point. Power: Microgrid on site (note 11kV connection is unsuitable as requires network upgrades upstream and also due to the length of the 11kV line this option isn't reliable and multiple regulator stations may be required to support the voltage along the length. Water: Dedicated supply to the site via connection at the Kimba tanks with a 19km pipeline. Communications: Primary connection via a 19.5km direct buried fibre optic cable connected to the Kimba Exchange. Secondary connection via VSAT Sewerage: On site sewerage system – included in facility design – excluded from costs below as treated on site.	Transport and Access: 26km upgrade of Tola Road including upgrade of intersection with Eyre Highway, upgrade of the existing road and intersections and site access point. Power: Microgrid on site (note 11kV connection is unsuitable as requires network upgrades upstream and also due to the length of the 11kV line this option isn't reliable and multiple regulator stations may be required to support the voltage along the length. Water: Dedicated supply to the site via connection at the Kimba tanks with a 24km pipeline. Communications: Primary connection via a 26km direct buried fibre optic cable connected to the Kimba Exchange. Secondary connection via VSAT Sewerage: On site sewerage system – included in facility design – excluded from costs below as treated on site.	Transport and Access: 26km upgrade of Old Hookina and Lake Torrens Homestead Road including upgrade of intersection with Outback Highway, upgrade of the existing road and intersections and site access point. An unsealed road is proposed and no allowance made for flood mitigation of the road due to the flood risk of the area and crossing of Hookina Creek Power: 132kV connection with 132/11kv substation on site. Water: Local groundwater source with desalination for potable water only, not firefighting water. Communications: Primary connection via a 34km direct buried fibre optic cable connected to the Hawker Exchange. Secondary connection via VSAT Sewerage: On site sewerage system – included in facility design – excluded from costs below as treated on site.

ASNO permits and IAEA requirements

This summary is extracted from the ARPANSA/ASNO/IAEA site suitability assessment (attachment A). The department has assessed this element taking into account specialist inputs from ANSTO, and review from AECOM, ANSTO, ARPANSA and CSIRO.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Low**	**Low**	**Low**
Residual risk	No change	No change	No change
Criterion of differentiator	Site-specific differences that would impact the ability to meet ASNO and IAEA requirements for the safe and secure storage of nuclear safeguard material and the ability to inspect this material for verification and accounting purposes.		
Summary	The facility design will feature appropriate physical security and inspection measures to meet ASNO permit and IAEA inspection requirements. This is an inherent part of the facility design requirements irrespective of the selected site.		
Risk mitigation(s)	Facility design will incorporate security and inspection requirements.	Facility design will incorporate security and inspection requirements.	Facility design will incorporate security and inspection requirements.

EPBC Act assessment

Establishment of the facility is classified as a nuclear action under the EPBC Act. Therefore, a referral to the Australian Government Department of the Environment and Energy (DoEE) will be required for a decision by the Minister for the Environment on what assessment and approval is required under the EPBC Act.

The EPBC Act site suitability assessment is a preliminary, comparative assessment of potential risks and risk mitigations for the approved sites, in the context of the likelihood of meeting EPBC Act regulatory approval requirements for facility establishment (construction and operation) and decommissioning. The assessment provides a technical basis for site comparison and selection, without pre-empting any outcome from an assessment by the regulator in future. The assessment is based on currently available information, as technical characterisation of the sites is only at a preliminary stage. DoEE officials have reviewed the EPBC Act site suitability assessment and indicated their comfort with the assessment, while retaining the department's right to make a different assessment when considering completed regulatory applications in the future.

This section presents extracts showing the results of the EPBC Act site suitability assessment. The full assessment report can be viewed at attachment I.

The assessment process involved the following steps:

1. Identified criteria: based on the assumed requirements for an Environmental Impact Statement (EIS) for EPBC Act approval for a nuclear action using DoEE guidance[6].
2. Assessment Part 1: compared the available site characterisation information against the identified criteria, selecting the factors most likely to be differentiators between sites.
3. Assessment Part 2: undertook a more detailed assessment against the criteria that were chosen as possible differentiators, and identified the potential extent of regulatory risk and the facility mitigations required.

The criteria that were identified as potential differentiators for the assessment, and were subsequently assessed in part 2 of the EPBC Act site suitability assessment report, were:

1. water management, infrastructure, supply, storage, monitoring, sewage and treatment
2. surface water quality and hydrology
3. groundwater
4. seismic risk
5. flora and fauna

[6] DOEE guidance document 'Significant impact guidelines 1.2-Actions on or impacting upon Commonwealth land and Actions by Commonwealth Agencies'.

6. landscape and visual amenity
7. traffic and transport
8. Aboriginal cultural heritage
9. land use planning
10. agriculture.

In the tables set out from pages 46 to 56 below, the department has provided its rating of the risk that a regulator will be concerned about particular characteristics of a site when assessing a referral of a proposal to establish the facility at each site (the 'risk rating'). The department has used ANSTO's risk methodology determination matrix to arrive at those risk ratings, having regard to the likelihood and regulatory consequence associated with each characteristic (see table 13). In this matrix, 'likelihood' is the department's assessment of the probability that the regulator will have concern that the particular site characteristic will affect approval. This is not the likelihood of a significant or catastrophic event resulting from one of the assessment factors and is not an assessment of the design risks against reference events.

The consequence assigned per characteristic, indicates the department's assessment of the level of potential regulator concern. This is the overall consequence for achieving facility approval, for example, 'catastrophic impact' means the worst case scenario that regulatory approval may not be attainable. 'Severe impact' indicates significant regulatory impact, and additional mitigation work and/or studies may be required to satisfy the regulator. This is not the consequence of an issue concerning a certain characteristic, for example, not the consequence of a seismic event. Impact can additionally indicate need for the mitigations to be addressed and integrated in facility siting or design.

For 'consequence', the ANSTO matrix descriptions from negligible to catastrophic were used and a consequence in terms of regulatory outcome was developed for each description. The department then used the ANSTO risk assessment methodology risk determination matrix to combine likelihood and consequence to determine a final risk rating.

Table 13: Risk determination matrix, combining likelihood and consequence levels to determine a final risk rating (adapted from the ANSTO risk assessment methodology)

Medium	High	High	Very High	Very High	Very High	Very High	6	Catastrophic	Consequence
Low	Medium	Medium	High	High	Very High	Very High	5	Severe	
Low	Low	Medium	Medium	High	High	Very High	4	Major	
Very Low	Very Low	Low	Low	Medium	Medium	High	3	Moderate	
Very Low	Very Low	Very Low	Very Low	Low	Low	Medium	2	Minor	
Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	1	Negligible	
A	B	C	D	E	F	G			
Extremely Unlikely	Highly Unlikely	Very Unlikely	Unlikely	Likely	Very Likely	Almost Certain			
Likelihood									

Table 14: non-technical description of the criteria used in the EPBC assessment

Criterion included in assessment	Criterion characteristics
Water management (infrastructure, supply, storage, monitoring, sewage, treatment)	Assessment of the extent to which water supply from either mains or groundwater might have consequences for other users and the environment. Understanding the current groundwaters, their depth and quality. Evaluation of subsequent management and treatment of process and wastewaters on the environment.
Surface water quality and hydrology	Evaluation of the meteorological and surface processes which would affect the candidate sites, including the likelihood (and environmental safety implications) of flood events. Assessment of the potential need for additional facility design requirements (such as the addition of ground raising for buildings and formation of raised flood banks) which could affect the environment.
Groundwater	Understanding the site groundwaters; depth, salinity, flow rate, flow direction and environmental receptors. Understanding the properties of the site soil strata which would prevent or delay migration of radionuclides into the groundwaters. Evaluate the implication of different building foundation design options on the potential for radionuclides to enter the groundwater/environment.

Seismic Risk	Understanding the historic and current seismic activity for the sites, including the position and type of potentially active near surface faults, which might affect the environmental safety of the facility. Evaluating the consequence for the environment of the facility design mitigations for site seismic risk.
Flora and fauna	Understanding and evaluating the conservation importance and sensitivity of the flora and fauna present on the sites, and any potential mitigations which might be required.
Landscape and visual amenity	Evaluating the implications of the facility design and site-specific layouts on the landscape and visual amenity of the locale.
Traffic and transport	Evaluating the environmental implications of creating or upgrading existing access roads from the sites to the highways. Understanding and evaluating the implication of traffic to the sites on local townships.
Aboriginal cultural heritage	Investigating and evaluating the aboriginal heritage value of the sites and aspects which could be affected by the facility. Evaluation includes registered aboriginal heritage site information, site archaeological investigations, and include consultation with Traditional Owners.
Land use planning	Investigation of the sensitive land uses in the area which could affect, or could be affected by, the facility. This includes residential development and mineral and mining tenements.
Facility Agriculture	Understanding the agricultural land uses at the candidate sites and evaluating the implication of the facility on farm viability and agricultural output. Understanding and developing radiation monitoring requirements (such as for air, soil, biota and crops) which would demonstrate environmental protection and reassure farmers and customers.

The tables below have been compiled with information extracted from ‘Part 2: assessment of regulatory risk from the identified potential differentiators’ of the full assessment report at attachment I. They show: the risk rating assigned to the criteria for each approved site, comments/details of the reason for potential differentiation (between the sites), and mitigation measures. Costs associated with these mitigations are captured in site suitability criterion 2.

Water management (infrastructure, supply, storage, monitoring, sewage and treatment)

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department and AECOM have assessed this element, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**Very low**
Risk conclusion	Water management is not considered a differentiator between the approved sites. There is considered to be a very low risk that the regulator will have concerns about this site characteristic affecting regulatory approval for Lyndhurst, Napandee or Wallerberdina, even with a slightly higher consequence for Wallerberdina.		
Risk likelihood and consequence	It is **very unlikely** that utilising water from the mains supply would cause regulator concern that would affect EPBC approval. The level of any concern would be **negligible**.		It is **very unlikely** that utilising water from the groundwater aquifer would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.
Mitigation	N/A	N/A	Pump/yield testing of the groundwater formation at Wallerberdina, and modelling of any drawdown that will occur from extraction of groundwater for use on the site, will be undertaken prior to the formal EPBC Act assessment process. A groundwater extraction network would need to be designed in a manner that does not impact current or realistic future users of groundwater.
General comments	This criterion considers the use of water as a service/supply to the site; consequences of groundwater have been assessed separately. At this stage of design, there are no differentiators in the facility design and water management on site. From an EPBC perspective, the potential consequences of on-site management, storage, monitoring and treatment of water/wastewater can be considered the same across all sites.		
Specific site comments	N/A	N/A	For Wallerberdina, an environmental assessment will need to consider the consequence of drawing groundwater for use on the site, and demonstrate that this will not have consequences for other users of groundwater (for example, those using groundwater for stock watering) from the same groundwater formation.
Detail	Water proposed to be sourced from SA Water mains supply with a new dedicated connection and pipeline at the SA Water Kimba tanks. No mains sewer connection point available (on site treatment included in facility design).	Water proposed to be sourced from SA Water mains supply with a new dedicated connection and pipeline at the SA Water Kimba tanks. No mains sewer connection point available (on site treatment included in facility design).	Water proposed to be sourced from groundwater aquifer and pumped to surface. Potable water (and water for other industrial applications) will be treated with a desalination plant, which features a brine evaporation pond. There are other potential local users for this aquifer. No mains sewer connection point available (on site treatment included in facility design).

Surface water quality and hydrology

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department and AECOM have assessed this element, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**High**	**Very low**	**Very high**
Risk conclusion	Hydrology is considered a differentiator between the approved sites. There is considered to be a high risk that the regulator will have concerns about this site characteristic affecting regulatory approval for Lyndhurst, a very low risk for Napandee and a very high risk for Wallerberdina.		
Risk likelihood and consequence	It is **very likely** that flooding would cause regulator concern that would affect EPBC approval. The level of any concern would be **major**.	It is **highly unlikely** that flooding would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **very likely** that flooding would cause regulator concern that would affect EPBC approval. The level of any concern would be **severe**.
Mitigation	The separate ARPANSA/ASNO regulatory assessment (p. 24) for site suitability criterion 1 considers potential flooding risk mitigations for this hydrology differentiator. Any potential impacts on surface water quality would be mitigated by the multiple barriers of protection.		
General comments	Climatic conditions are typically consistent across the three sites and climate change impacts are also expected to be consistent (lower average rainfall, higher average temperatures and increased intensity in episodic rainfall events). Future environmental assessment development will require review of the impact of flooding on: • containment of radioactive waste materials and other stored substances, including wastewater • the flow paths of existing water channels • the erosion of landforms from any flood water diversions.		
Specific site comments	Lyndhurst is expected to experience ponding of water in flood events due to the larger catchment and the site topography which does not allow the water to flow off site. For both Lyndhurst and Wallerberdina, the potential for flooding and ponding poses a risk to the isolation of stored radioactive waste and any other stored materials from the environment, and could impact access to the site during a flood event. Use of Lyndhurst and Wallerberdina as a facility site would therefore require the introduction of significant engineering mitigations.	The Napandee site is expected to be minimally impacted by episodic flooding events with typical mitigations for stormwater management.	From predictive flood modelling already undertaken, the Wallerberdina site is at risk of flooding during the lifetime of the facility. For both Lyndhurst and Wallerberdina, the potential for flooding and ponding poses a risk to the isolation of stored radioactive waste and any other stored materials from the environment, and could impact access to the site during a flood event. Use of Lyndhurst and Wallerberdina as a facility site would therefore require the introduction of significant engineering mitigations.

	Lyndhurst	Napandee	Wallerberdina
Detail	Conditions on site are normally arid, and there are no creek lines on site. The site is located within an approximate 10km^2 local catchment, located to the south east of the site. The main overland flow path flows from the south-east onto the site. Hydraulic modelling indicates that in its current form significant flooding will occur on the site at relatively low recurrence intervals (i.e. high frequency). The topology promotes ponding of water at two main locations however these undrained low points are not distributed across the whole site and despite the depth of this ponding (for existing climate conditions approximately 2.0m for the 1 in 5 AEP (Annual Exceedance Probability), 3.6m for the 1 in 100 AEP and 5.6m in the PMF (Probable Maximum Flood event) sufficient unimpacted land can be made available to site the facility and engineering measures may be employed to mitigate this issue. The localised flooding at Lyndhurst is more significant than at Napandee but can be more easily mitigated that the regional flooding identified at the Wallerberdina site. The land surrounding the Lyndhurst site is relatively elevated, whereas the site itself is situated in a depression, receiving inflows from the south-east that contribute to flooding from a larger regional upstream catchment of 142km^2. A number of flow paths from this regional catchment also cross the proposed site access road (Aerodrome Road). Flooding across the access road occurs in a 1 in 5 AEP event with maximum depths estimated up to 1.2m, at a point 4.8km along Aerodrome Rd, towards the site. In extreme flood events (PMF event), depths of up to 3.0m are estimated along the road. Flood data for the access road is based on SRTM terrain data of much lower accuracy than the LiDAR terrain data for the site, thus the information provides an indication only of the extent and potential scale of flood risks along the road. Engineering/design mitigations for the site would be required based on the modelling for the local catchment to ensure safety of facility, staff and continuation of site safety functions.	Conditions on site are normally arid, and there are no creek lines on site or in the local area, but some drainage channels exist within the site between the sand ridges. The site promotes the free flow of water given its topology and location on a ridge within the larger catchment. The site is located within an approximate 5km^2 local catchment. Hydraulic modelling indicates isolated flooding is largely contained to local site drainage paths, with areas of ponding predicted in the lower lying areas of the site predominantly along the southern boundary of the site adjacent to Tola Road. For existing climate conditions, depth of flood waters is approximately 0.3m for the 1 in 5 AEP (Annual Exceedance Probability), 0.7m for the 1 in 100 AEP and 1m in the PMF. It is anticipated these local catchment flooding impacts could be mitigated through diversion and/or on-site stormwater management. At the regional scale, the site is well elevated relative to its surrounding area. As the site is situated on higher ground it is not inundated from flood water from regional creeks, waterways or overland flow paths from the wider regional catchment in which it is located. Hydraulic modelling at the regional scale indicates that the main risk to this site from regional scale flooding relates to access to the site. However, there are no major overland flow paths that cross the site from a regional perspective. Modelling also confirms that the previously anticipated flow path to the south western portion of the site would not impact the site. Flooding across the access road (Tola Road) occurs in a 1 in 5 AEP event. Maximum depths are estimated up to 2.5m at a point 4.5km east of the site along Tola Road. In extreme flood events (1 in 10,000 AEP and PMF) depths of up to 9.8m are estimated at a road crossing located within the main flood plain, located approximately 1km from the south eastern corner of the site. Flood data for the access road is based on SRTM terrain data of much lower accuracy than the LiDAR terrain data for the site, thus the information provides an indication only of the extent and potential scale of flood risks along the road. Engineering/design mitigations for the site would be required based on the modelling results for both the local site catchment with site drainage design and earthworks considering the anticipated local catchment flooding impacts, to ensure safety of the facility, staff and continuation of site safety functions.	Conditions on site are normally arid. The site is located on an alluvial fan of the ephemeral Hookina Creek, which is located approximately 2.5km south of the site and flows north-west away from the site into Lake Torrens. Flows in the creek are of a semi-arid nature with long dry period between flows. There is a large (1700km^2) catchment upstream of the site, and there is a depression 1km east of the site which conveys stormwater from catchments further east. A non-perennial drainage line is also present to within 1km east of the site, but is associated with a minor catchment in comparison to Hookina Creek. Hydraulic modelling indicates the site is subject to regional flooding by surface water from a number of sources including breakout from Hookina Creek and catchments to the south and east. A flow path runs from the south-east corner to the south-west corner of the site parallel to Lake Torrens Homestead Road. Another flow path flows north from the middle of the site. Due to the topography on the site there are some areas of ponding in the flow path running parallel to Lake Torrens Homestead Road. For the high frequency events, flooding is due to localised overland surface flow from rain. Maximum flood depths predicted for the existing climate conditions range from 0.2m for the 1 in 5 AEP to 0.3m in the 1 in 100 AEP. In less frequent events, such as the 1 in 1000 AEP, breakout flows from Hookina Creek contribute to flooding across the whole site, by contributing to the flow along local drainage lines. Maximum flood depths range from to 0.7m in the 1 in 1000 AEP and 2.5m in the PMF event (across considerable portions of the site). There is a risk of bank erosion and streambed realignment or avulsion (relocation of stream change during major floods) on rare or repeated events at Hookina Creek which could exacerbate the impact of future flooding. Further, in a 1 in 100 AEP event, maximum depths of around 8m are experienced on the access road to the site at the Hookina Creek crossing approximately 10km south-east from the site. In extreme flood events (i.e. PMF) depths of up to 13.2m are estimated where this road crosses the creek. Significant engineering/design mitigations would be required to ensure the safety of the facility and staff and the continuation of site safety functions. These would need to address the ongoing risk of erosion of engineered barriers, principally engineered cap over the vaults. It is noted that due to the complex nature of the catchment and some built structures (railway line) the impact on flood patterns and effects will need further investigation including the consideration of geomorphological impacts.

Groundwater

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department and AECOM have assessed this element, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**High**
Risk conclusion	Groundwater is considered a differentiator between the approved sites. There is considered to be a very low risk that the regulator will have concerns about this site characteristic affecting regulatory approval for Lyndhurst or Napandee, and a high risk for Wallerberdina.		
Risk likelihood and consequence	It is **unlikely** that groundwater would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **highly unlikely** that groundwater would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **likely** that groundwater would cause regulator concern that would affect EPBC approval. The level of any concern would be **major**.
Mitigation	The separate ARPANSA/ASNO regulatory assessment for site suitability criterion 1 will consider potential groundwater risk mitigations for this differentiator. Potential mitigation and planning actions considered include: • implementing institutional controls to prevent extraction of groundwater by other users in the close vicinity of the site • separating the radioactive waste from groundwater (through waste acceptance criteria, defence-in-depth barriers and design of foundations) • detailed groundwater investigations to determine the groundwater flow direction and velocity • detailed site characterisation and modelling to determine radionuclide transport mechanisms in groundwater.		
General comments	All sites contain groundwater at depth, together with clayey geological profiles or profiles with clayey layers present. Presence of these characteristics limits the potential for radionuclide transport from the surface to the underlying groundwater formation. Note: depth to groundwater is as observed in site characterisation monitoring rounds. Groundwater depths can experience seasonal change.		
Specific site comments	The saline groundwater at the Lyndhurst and Napandee sites will act as a deterrent to other future groundwater use (the water is salty therefore people are less likely to want to use it for drinking water or for stock). The use of Lyndhurst and Napandee groundwater by other future users cannot however be ruled out.		At Wallerberdina, groundwater is currently used for stock watering on Wallerberdina Station and on surrounding station properties.
Detail	Depth to groundwater is 10m or greater. Groundwater has low yield and is saline. There are no current or realistic future users in the local area. Investigations suggest there is limited connectivity between the water table and deeper aquifers which would prevent transport of potential contaminants between these layers. The environmental receptor of groundwater in the local area is unknown. Groundwater-surface water interaction with the ephemeral Lake Gilles to the north-east of the site is yet to be investigated. The subsurface clays provide a substantial sorption capacity which may limit the transport of radionuclides in the unlikely event of a subsurface release of waste material. Underlying soil conditions include shallow sands, overlying interbedded clayey sands/sandy clays, underlain by silty sands and marl clay, with groundwater observed in the clayey sand and sandy clay layers. The presence of clayey soil conditions above the groundwater will limit potential vertical migration to groundwater. Preliminary analysis suggests that a shallow raft slab is structurally viable, particularly for the LLW vaults where this may be required for the safety case, but is not as cost effective as piles. Piles could interact with the groundwater at this site. However, from an EPBC perspective, if piles are used for waste vaults, this may provide an additional pathway for potential contamination into ground water.	Depth to groundwater is 24m or greater. Groundwater has low yield and is saline. There are no current or realistic future users in the local area. There are no known ecological receptors of groundwater within the vicinity of the site. Investigations suggest there is limited connectivity between the water table and deeper aquifers which would prevent transport of potential contaminants between these layers. There are no known environmental receptors of groundwater within the vicinity of the site. The subsurface clays provide a substantial sorption capacity which may limit the transport of radionuclides in the unlikely event of a subsurface release of waste material. Underlying soil conditions include shallow sands, overlying sandy clay and kaolin (where groundwater is present), underlain by weathered bedrock. The presence of clayey soil conditions above the groundwater will limit potential vertical migration to groundwater. Preliminary analysis suggests that a shallow raft slab is structurally viable, particularly for the LLW vaults where this may be required for the safety case, but is not as cost effective as piles. Piles could interact with the groundwater at this site. However, from an EPBC perspective, if piles are used for waste vaults, this may provide an additional pathway for potential contamination into ground water.	Depth to groundwater is in excess of 20m. Groundwater is used for stock watering on Wallerberdina Station and surrounding station properties. Groundwater could potentially be utilised for domestic uses at homesteads (with or without pre-treatment). The depth of and flow of groundwater between the site and Hookina Creek still requires assessment. The subsurface clays provide a substantial sorption capacity which may limit the transport of radionuclides in the unlikely event of a subsurface release of waste material. Underlying soils included clay and gravelly silts, underlain by interbedded sand and clay layers, with groundwater observed in the sand and clay layers. The presence of clayey soil conditions above the groundwater will limit potential vertical migration to groundwater, however it is noted the upper soil layers include clayey and gravelly silts that have a reduced potential to limit vertical migration to the clays observed at the Lyndhurst and Napandee sites. While stock watering bores exist in shallow aquifers in the area, the enabling works currently suggests a groundwater source on-site with a desalination unit which would provide a further and deeper linkage between the groundwater and human receptors/the biosphere. Preliminary analysis suggests that a shallow raft slab is structurally viable, particularly for the LLW vaults where this may be required for the safety case, but is not as cost effective as piles. Piles could interact with the groundwater at this site. However, from an EPBC perspective, if piles are used for waste vaults, this may provide an additional pathway for potential contamination into ground water.

Seismic risk

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department and AECOM have assessed this element, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Low**	**Low**	**Medium**
Risk conclusion	Seismic risk is considered a differentiator between the approved sites. There is considered to be a low risk that the regulator will have concerns about this site characteristic affecting regulatory approval for Lyndhurst or Napandee, and a medium risk for Wallerberdina.		
Risk likelihood and consequence	It is **extremely unlikely** that seismic activity would cause regulator concern that would affect EPBC approval. The level of any concern would be **major**.	It is **extremely unlikely** that seismic activity would cause regulator concern that would affect EPBC approval. The level of any concern would be **major**.	It is **very unlikely** that seismic activity would cause regulator concern that would affect EPBC approval. The level of any concern would be **major**.
Mitigation	The separate ARPANSA/ASNO site suitability assessment for site suitability criterion 1 (p. 24) will consider potential seismic risk mitigations for this differentiator. The structural design for the facility can accommodate increased accelerations caused by a seismic event, but cannot mitigate the impact if the facility was located on an active fault. More detailed site investigations are required to determine the location and types of faults. Items that are important to safety (and therefore minimising impacts to the environment) could be moved away from such a feature[7].		
General comments	N/A		
Specific site comments	N/A	N/A	Potentially active faults in or near the facility foundation are expected to be present in direct proximity to Wallerberdina, which could lead to ground shaking occurring on site in the event of a rare seismic event.
Detail	The site is within a seismically stable area, the Gawler Craton. A seismic survey has determined an absence of potentially active faults.	The site is within a seismically stable area, the Gawler Craton. A seismic survey has determined an absence of potentially active faults.	The site lies within a seismically active region on the western range front of the central Flinders Ranges, which comprises a series of prominent and identifiable active faults, and an earthquake-generating feature in Australia. The site is expected to be located between these major fault lines; a seismic survey has not identified any potentially active fault in the foundation (ground) directly beneath the site. Further seismic survey is required to identify the locality of these potentially active faults in reference to the site. Hazard analysis modelling indicates that peak accelerations to be expected during an event (1 in 2,500 and 1 in 10,000 annual exceedance probability: AEP) are over double that of what would occur at the Lyndhurst and Napandee sites. The Wallerberdina site is located in a relatively active seismic area for Australia, but notably less than would be expected in seismically active regions elsewhere in the world, such as California in the USA.

[7] Sufficient land is being acquired to manage this risk.

Flora and fauna

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department and AECOM have assessed this element, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**Very low**
Risk conclusion	Presence of flora and fauna is not considered a differentiator between the approved sites. There is considered to be a very low risk that the regulator will have concerns about this site characteristic affecting regulatory approval for Lyndhurst, Napandee or Wallerberdina.		
Risk likelihood and consequence	It is **unlikely** that flora and fauna considerations would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **highly unlikely** that flora and fauna considerations would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **highly unlikely** that flora and fauna considerations would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.
Mitigation	Further detailed surveys of all three sites are required, to assess presence of annual and ephemeral plant species (plants with a short life cycle that avoid drought periods or unfavourable conditions as seeds). A targeted survey is required for the Lyndhurst and Napandee sites, to formally confirm the presence of a state-listed threatened plant species in a vegetation patch and presence of Malleefowl. Facility design will need to include mitigations such as limiting vegetation clearance for facility construction, and light spill during facility operation. A mitigation action for any Malleefowl populations could include speed restrictions on roads.		Further detailed surveys are required of all three sites, to assess presence of annual and ephemeral plant species (plants with a short life cycle that avoid drought periods or unfavourable conditions as seeds). Facility design will need to include mitigations such as limiting vegetation clearance for facility construction, and light spill during facility operation.
General comments	None of the sites exhibit current evidence of any Commonwealth-listed threatened habitats or species. Vegetation in the road reserves has not yet been surveyed.		
Specific site comments	There is potential for Commonwealth-listed threatened species, the Malleefowl, to exist in habitats near the Lyndhurst site. Further work may be required on the Lyndhurst and Napandee sites to determine presence of Malleefowl on site or in adjacent vegetation.	There is potential for Commonwealth-listed threatened species, the Malleefowl, to exist in habitats near the Napandee site. Further surveying is required to confirm the presence of a state-listed threatened plant species, the Ridged Noon-flower, in the south-west corner of the Napandee site. Further work may be required on Lyndhurst and Napandee sites to determine presence of Malleefowl on site or in adjacent vegetation.	N/A
Detail	No Commonwealth-listed threatened ecological communities, flora or fauna species were observed during surveys of the site and its surrounds. Malleefowl, a Commonwealth-listed, threatened species, may be present in high quality, large patches of mallee woodland near to the site. Malleefowl would not occupy the poorer quality, small, fragmented patches of vegetation on the site and its immediate surrounds. The site is unlikely to provide suitable habitat for the Commonwealth-listed threatened Sandhill Dunnart, a small marsupial. It is possible that Sandhill Dunnarts are present in the larger area of mallee vegetation to the north-west and east of the site. This is due to records of the Mitchell's Hopping Mouse, which is known to occur in association with Sandhill Dunnarts and to occupy burrows.	No Commonwealth-listed threatened ecological communities, flora or fauna species were observed during surveys of the site and its surrounds. Malleefowl, a Commonwealth-listed, threatened species, may be present in high quality, large patches of mallee woodland near to the site. Malleefowl would not occupy the poorer quality, small, fragmented patches of vegetation on the site and its immediate surrounds. The state-listed threatened Ridged Noon-flower was recorded in the patch of vegetation in the south-west corner of the site; further assessment is required to obtain flower specimens for formal identification and confirmation. The site and the Tola Road Reserve are considered unlikely to support the Sandhill Dunnart.	The Wallerberdina site has no threatened ecological communities. There are no Commonwealth-listed species with potential for occurrence; but one plant (Desert Lime) and one bird (Elegant Parrot) that are state-listed species have been recorded more than 10km from the site but are considered unlikely to be present at the site and its immediate surrounds due to a lack of suitable habitat.

Landscape and visual amenity

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department and AECOM have assessed this element, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**Very low**
Risk conclusion	Landscape and visual amenity is not considered a differentiator between the approved sites. There is considered to be a very low risk that the regulator will have concerns about this site characteristic affecting regulatory approval for Lyndhurst, Napandee or Wallerberdina.		
Risk likelihood and consequence	It is **highly unlikely** that landscape and visual amenity considerations would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.		
Mitigation	A landscape and visual impact assessment, as part of the environmental assessment process and using an industry standard approach, will need to be undertaken at the future declared site. Such an assessment will demonstrate the view of facility development at fixed points in the construction process and facility lifetime. A visual impact assessment can explore the use of buffers and visual breaks if desired. The visual impact of LLW vaults could be minimised through considered placement on site (utilising the existing topography of the site) and/or introduction of appropriate vegetation. Further community consultation is required to incorporate community preferences in the design and visual amenity, where possible.		
General comments	The conceptual facility layout differs for each the three sites; this is due to site shape, orientation and topography considerations. The size of the potential sites is however generically consistent, as is the number and the mass of the planned built structures. None of the sites are in the sight lines of significant local features or landmarks. For example, while the Wallerberdina site is located in the proximity to the Flinders Ranges, tourists or locals using highways to travel to attractions such as Wilpena Pound would not see the facility in the landscape as it's located on the eastern side of the Range. The highest impact, which is consistent for all sites, will be the TN81 building which stands 20m from natural ground level. There will also be up to six ILW buildings and six LLW cover buildings (over the vaults) that will be approximately 14 to 15m high that would be the dominant features in the landscape. In the long term, the LLW vault structures will be several metres high, and when earth-capped will be in the order of 12 to 14m high.		
Specific site comments	N/A	N/A	N/A
Detail	The site is located in a rural area, 16km from the Kimba township with access via local roads. The variance in landfall could be used to lower (or raise) built elements. Visual impact would be considered lower due to the vegetation and topography of the site.	The site is located in a rural area, 23km from the Kimba township with access via local roads. The roadside vegetation along the southern and western boundaries of the site currently limits visual impact.	The site is located in a rural area, 30km from the Hawker township with access via local roads. The site is not visible from the Outback Highway due to the presence of the ranges. The land is generally flat in the area of the site, and is located north of a local access road that is only used by a few pastoral stations.

Traffic and transport

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department and AECOM have assessed this element, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**Low**
Risk conclusion	There is considered to be a very low risk for Lyndhurst or Napandee, and a low risk for Wallerberdina, that the regulator will have concerns about this site characteristic affecting regulatory approval.		
Risk likelihood and consequence	It is **unlikely** that traffic and transport considerations would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **highly unlikely** that traffic and transport considerations would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **unlikely** that traffic and transport considerations would cause regulator concern that would affect EPBC approval. The level of any concern would be **moderate**.
Mitigation	Road upgrade planning and design will need to minimise the extent of vegetation clearance along site access roads. Targeted vegetation studies as well as traffic surveys will need to be taken along the proposed access roads.		
General comments	Vegetation clearance may be required for local access road upgrades at Lyndhurst, Napandee and Wallerberdina. Traffic to the sites will be reasonably consistent, as all traffic will generally pass through the Kimba or Hawker townships to reach the sites.		
Specific site comments	N/A	N/A	N/A
Detail	Local roads from the highway to the site will require upgrades; road widening could require vegetation clearance. The primary site access may be impacted during flood events, however there are alternative access points to the site. Construction of a secondary access road would have potential environmental impact. Depending on the route, the secondary access road to the site may require vegetation clearance between the site and Lake Gilles Road.	Local roads from the highway to the site will require upgrades; road widening could require vegetation clearance. The primary site access may be impacted during flood events, however there are existing alternative access points to the site.	Local roads from the highway to the site will require upgrades; road widening could require vegetation clearance. The access road is significantly longer than those at the Lyndhurst and Napandee sites, however the extent of vegetation is lower. The site access road crosses Hookina Creek and has a flooding risk. An alternative access route to the site may be required to mitigate the risk that the main access point is cut-off in a flood event. Construction of a secondary access road would have potential environmental impact, as the road would need to cross other creeks to the northeast of site.

Aboriginal cultural heritage

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department has assessed this element with specialist input from RPS, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**Medium**
Risk conclusion	Aboriginal cultural heritage is considered a differentiator between the approved sites. There is considered to be a very low risk for Lyndhurst or Napandee, and a medium risk for Wallerberdina, that the regulator will have concerns about this site characteristic affecting regulatory approval.		
Risk likelihood and consequence	It is **highly unlikely** that Aboriginal cultural heritage values would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **highly unlikely** that Aboriginal cultural heritage values would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **unlikely** that Aboriginal cultural heritage values would cause regulator concern that would affect EPBC approval. The level of any concern would be **major**.
Mitigation	While there is no registered Aboriginal cultural heritage value over the Lyndhurst and Napandee sites, comprehensive archaeological investigation, consultation and site visits with the relevant Traditional Owners will be required to fully assess the cultural values and to develop an Aboriginal Cultural Heritage Management Plan. Archaeological artefacts may be present in the vicinity of all the sites, and will require clearance and management during any future ground disturbance		A detailed, targeted anthropological and archaeological survey of the Wallerberdina site would need to be undertaken if it was selected. Archaeological artefacts may be present in the vicinity of all the sites, and will require clearance and management during any future ground disturbance.
General comments	N/A		
Specific site comments	The Lyndhurst and Napandee sites sit within recognised Barngarla land but there are no registered Aboriginal cultural heritage values. However, a detailed assessment of Aboriginal cultural heritage values has not been completed for the Lyndhurst and Napandee sites. As yet unrecorded sites, particularly areas with stone artefacts may be present in the vicinity of the sites.		A preliminary investigation has been undertaken for Wallerberdina and the land broadly surrounding Wallerberdina has both registered and unregistered Aboriginal cultural heritage sites, in addition to landscape features of anthropological value, such as creek lines, hills, and sand dunes.
Detail	There are no registered Aboriginal cultural heritage sites in the local area.	There are no registered Aboriginal cultural heritage sites in the local area.	There are no Aboriginal cultural heritage sites registered at the proposed acquisition parcel or in the immediate surrounds. Significant registered heritage sites occur near the southern boundary of the Wallerberdina approved site, for example, in association with Hookina Creek. Archaeological artefacts are expected to be present in the vicinity of the proposed acquisition parcel. However, the proposed acquisition parcel's archaeological potential has been mapped and classified as low in comparison to other areas on the property and its surrounds.

Land use planning

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department and AECOM have assessed this element, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**Very low**
Risk conclusion	Land use planning is not considered a differentiator between the approved sites. There is considered to be a very low risk that the regulator will have concerns about this site characteristic affecting regulatory approval for Lyndhurst, Napandee or Wallerberdina.		
Risk likelihood and consequence	It is **very unlikely** that land use planning would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **very unlikely** that land use planning would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.	It is **very unlikely** that land use planning would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.
Mitigation	Exploration of planning and/or other statutory constraints on adverse, nearby development could be useful for Lyndhurst, Napandee and Wallerberdina. It is possible to rely upon the existing planning and development controls to limit the extent to which future development could impact on the site once developed (e.g. Local Government Planning Scheme provisions).		
General comments	N/A		
Specific site comments	Residential land use is found closer to the Lyndhurst and Napandee sites than to Wallerberdina, although not close enough that noise, light spill or visual impacts would be significant. The risk of development for the mineral and mining tenements near the Lyndhurst and Napandee sites is considered to be low.		Wallerberdina is located further away from any sensitive land uses.
Detail	The site is separate from existing sensitive land uses; no adverse effects are expected. No mining or exploration licences have been identified over the proposed acquisition parcel. There are mineral and mining tenements adjacent and near to the approved nominated area. These nearby tenements would not be extinguished by making a declaration selecting the site and specifying that all rights and interests in the site are extinguished.[8]	The site is separate from existing sensitive land uses; no adverse effects are expected. No mining or exploration licences have been identified over the proposed acquisition parcel. There are mineral and mining tenements that include and are near to the approved nominated area. These nearby tenements would not be extinguished by making a declaration selecting the site and specifying that all rights and interests in the site are extinguished.	The site is separate from existing sensitive land uses; no adverse effects are expected. There is one geothermal exploration licence over the proposed acquisition parcel, which would be extinguished by making a declaration selecting the site and specifying that all rights and interests in the site are extinguished. Two petroleum exploration licence applications are held over the proposed acquisition parcel, which would also be extinguished by making such a declaration.

[8] Under the NRWM Act, the making of a declaration selecting a site for the facility has the effect of extinguishing any rights or interests in the site specified in the declaration. If the declaration specifies 'all rights and interests in the site', this would extinguish any mineral and mining tenements. The NRWM Act will not extinguish tenements that exist over any other properties, including properties neighbouring the declared site.

Agriculture

This summary is extracted from the EPBC Act site suitability assessment (attachment I). The department and AECOM have assessed this element, and this was reviewed by AECOM, ANSTO and DoEE.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very low**	**Very low**	**Very low**
Risk conclusion	Agriculture is not considered a differentiator between the approved sites. There is considered to be a very low risk that the regulator will have concerns about this site characteristic affecting regulatory approval for Lyndhurst, Napandee or Wallerberdina.		
Risk likelihood and consequence	It is **very unlikely** that development of agricultural land would cause regulator concern that would affect EPBC approval. The level of any concern would be **minor**.		
Mitigation	A radiation level baseline for soils, groundwater, surface water (ephemeral), air, native plants, crops and livestock should be established prior to facility construction. Ongoing radiation level monitoring during facility construction, operation and closure/maintenance activities is required to demonstrate that agricultural land and production is not impacted by the facility's presence. There is interest in the Kimba community to establish a cropping field trial area within facility infrastructure buffer zones.		
General comments	N/A		
Specific site comments	Facility development on either of the Lyndhurst and Napandee sites would use existing agricultural land, but the extent to which this would reduce overall agricultural potential for the region is negligible.		Facility development at Wallerberdina would not be expected to impact existing grazing use for the remainder of the Wallerberdina property, or for surrounding properties.
Detail	The site and its surrounds are used for broadacre dryland cropping.	The site and its surrounds are used for broadacre dryland cropping.	The site and surrounding properties are leasehold and are used for rangeland grazing of cattle (native vegetation, not pasture).

Future regulatory and other considerations

This assessment considers facility and site features that might affect whether regulatory approvals (apart from those considered above) can be obtained. There will be several other regulatory requirements relevant to the facility and the acquired site, outside of the ARPANSA (*Australian Radiation Protection and Nuclear Safety Act 1998* (Cth) (the ARPANS Act)), ASNO (*Nuclear Non-Proliferation (Safeguards) Act 1987* (Cth) (the Safeguards Act)) and EPBC Act requirements considered in criterion 1. The site-specific information available for such additional requirements is currently too preliminary to conduct additional comparative assessments of the possible risks associated with obtaining approvals in relation to such requirements. These future regulatory considerations are detailed below.

Parliamentary Standing Committee on Public Works (Public Works Committee: PWC)

The Parliamentary Standing Committee on Public Works (PWC), operates under the provisions of the *Public Works Committee Act 1969* (Cth). This Act is administered by the Department of Finance, and requires that all public works for the Commonwealth which are estimated to cost more than $15 million must be referred to the Committee. It is expected the cost of building the facility will exceed this $15 million cap.

Proposed public works can be referred to the Committee for consideration and report by the House of Representatives, the Senate, or by the Governor-General. Once a proposed public work has been referred, the responsible Minister must provide the referring body with:

- a statement about the public work, including the purpose of the work, and
- detailed designs and other particulars as required.

In practice, the sponsoring agency also provides the Committee with a submission. There is no set format for submissions. A submission may contain facts, opinions and argument and be accompanied by appendices and other supporting data.

The Committee is required to consider the: stated purpose of the proposed work and its suitability for that purpose, need for the work, cost-effectiveness of the proposal, amount of revenue it will produce if the work is revenue producing, and the current and prospective value of the work. Any public work referred to the Committee cannot be commenced until the Committee has presented its report on the proposed public work to both Houses of Parliament, and subsequently, the House of Representatives has resolved that it is expedient to carry out the work.

The department considers that the EPBC assessment process and facility design information will need to be firm before the PWC referral process can occur. Site acquisition will enable site-specific design development to progress, allowing for improved cost

accuracy for the facility so that it is suitable for consideration by the Committee. Referral to the Committee is expected to take place in 2023.

The relevant sponsoring agencies must undertake post-implementation reviews of the project, as per the Auditor-General Report No. 20 of 2008-2009 *Approval of Funding for Public Works*. The PWC Procedure Manual requires that the post-implementation review be provided to the PWC and the Department of Finance to enhance accountability and transparency and assist in identifying any lessons learned. A summary table of the project post-implementation review will be made publicly available.

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

Prohibition, waste, transport and other regulation

The facility will be subject to Commonwealth, state and territory, and common law.

State law

The NRWM Act significantly affects the operation of state and territory laws as they apply to the facility, because state and territory laws are overridden to the extent they 'regulate, hinder or prevent' activities authorised under section 23 of the NRWM Act, including activities necessary for, or incidental to, the establishment or operation of the facility.

s 42 [redacted]

Other state and territory laws may also regulate activities related to radioactive waste. These are laws that relate to:

- the use or proposed use of land or premises,
- the environmental consequences of the use of land or premises,
- the archaeological or heritage values of land, premises or objects (including the significance of land, premises or objects in the traditions of Aboriginal people),
- transport of controlled material, radioactive material or dangerous goods,
- controlled material, radioactive material or dangerous goods,
- licensing (however described) in relation to employment,
- licensing (however described) in relation to carrying on a particular kind of business or undertaking, and
- licensing (however described) in relation to conducting a particular kind of operation or activity.

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

These state and territory prohibition and other acts will have no effect to the extent that they would regulate, hinder or prevent an activity authorised by s 23, including activities that are necessary for, or incidental to, the establishment or operation of the facility. However, where the state and territory laws do not 'regulate, hinder or prevent' such activities, they will apply.

s 42 [redacted]

Commonwealth law

Commonwealth laws that would regulate, hinder or prevent activities authorised by s 23, including activities that are necessary for, or incidental to, the establishment or operation of the facility, may also be overridden where they have been prescribed in regulations made for the purposes of s 25 of the NRWM Act. The NRWM Act provides that the ARPANS Act, the Safeguards Act and the EPBC Act cannot be overridden.

Currently, there are no regulations prescribing Commonwealth laws to be overridden. s 42 [redacted]

Laws relating to transport

A person who is authorised to conduct activities under s 23 (including activities that are necessary for or incidental to the operation and establishment of a facility) may also, in relation to the selected site:

- transport (including through a state or territory) people and materials (including controlled material) to or from the facility, and
- use transport infrastructure for that transport.

Transport regulation is particularly critical to facility operation, as radioactive waste will be transported from holding places around Australia to the facility. Under the NRWM Act, state and territory laws that relate to the transport of controlled material, radioactive material or dangerous goods would have no effect to the extent that they would regulate, hinder or prevent transport authorised by section 23. Authorised Persons (which would include Commonwealth contractors, employees and agents) will be required to comply with licensing requirements, including: the Code for the Safe Transport of Radioactive Material (2014) under the ARPANS Act, any requirements of the EPBC Act approval relating to transport activities, and any conditions of permit under the Safeguards Act (which regulates the possession and transport of nuclear material).

Site suitability criterion 2

The costs to acquire the site and realise the facility at the site.

In this section consideration is given to two distinct financial costs associated with the facility: the cost of the facility itself and the compensation costs (initial and future) associated with acquiring land or property needed to support the facility. The cost of operating the facility has not been examined.

About costs

In making a decision to select a site under section 14(2) of the NRWM Act, the Minister will be required to comply with the requirements of the *Public Governance, Performance and Accountability Act 2013* (PGPA Act). This includes being satisfied, in the context of achieving the Government's policy objective to establish a facility, that the expenditure required to establish the facility and pay reasonable compensation under section 35 or 36 could be approved as a 'proper[9] use of relevant money' (PGPA Act, section 71).

The department has assessed the risk that proposed expenditure would not result in a fit-for-purpose facility. A traffic light rating indicates if this risk is low, medium or high, and explanatory comments are provided. Costs are presented, where these are known. As the extent of rights or interests with respect to the NRWM Act is yet to be fully determined, it is not possible to provide comparative figures for overall compensation costs in relation to each site.

Table 15: The department's colour code for rating the risk that proposed expenditure would not result in a fit-for-purpose facility

Rating	Low	Medium	High
Traffic light			

[9] Proper is defined in section 8 of the PGPA Act as 'efficient, effective, economical and ethical'.

Facility cost estimates

The estimates provided below show the overall capital cost differentials across the three approved sites being considered as a site for the facility. This includes enabling works and the design/cost modifications made in response to the ARPANSA/ASNO/IAEA site suitability assessment (attachment A).

Exclusions and notes

The estimates ss 34(1)(a) and (2)/ s47C

Cost planning activities

ss 34(1)(a) and (2) / s47C

ss 34(1)(a) and (2)/ s47C

For this report, relevant capital cost estimates[11] have been revised to address risk mitigation works ss 34(1)(a) and (2)/ s47C. These mitigation works were defined and costed in response to criterion 1 regulatory assessments and informed by these key documents:

ss 34(1)(a) and (2)/ s47C

- AECOM site characterisation reports and addendums for Lyndhurst, Napandee and Wallerberdina (see attachments K, L and M)
- AECOM enabling works reports and addendum (see attachments N, O and P)
- Altus report on costs (see attachment B).

Additional works (since DBC)

ss34(1)(a) and (2) / s47C . However, the assessment identified some additional capital mitigation works to address the following risks:

Flood/Hydrology/radionuclide dispersion in surface water risks

Lyndhurst, and to a lesser extent Napandee, have potential for localised undrained low points that may create localised ponding risks. At both sites, additional stormwater works could help respond to the IAEA SSG-29 requirements (see attachment A) to keep the site well drained and free of areas subject to flooding or frequent ponding.

There is a low risk of ponding at Wallerberdina, however hydrological modelling indicates there is a high risk of flood at the site from Hookina Creek. ss34(1)(a) and (2) / s47C already included significant provision for raising infrastructure and levee work at this site.

Geotechnical risks

Raft slab foundations will likely be required for LLW vault structures built at any of the three sites. ss34(1)(a) and (2) / s47C The cost of raft slab foundations has now replaced the cost of piling works for Napandee and Wallerberdina.

Emergency plan delivery/requirement risk

At Wallerberdina, it is highly likely that an alternate flood resistant emergency road access would be required to support the anticipated facility emergency plans. The proposed alternate access road would run parallel to the Cotabena Railway for approximately 48 kilometres. The costs associated with the acquisition of land or easements are considered in the compensation section of this report (see pp. 66-74).

ss 34(1)(a) and (2) / s47C

While flood mitigation works will reduce the potential impact and/or probability of an adverse event, some residual risks remain for Wallerberdina (and to a much lesser extent at Lyndhurst). It is uncertain the regulator will be satisfied with the risk outcomes achieved by the proposed mitigation works. For more information see the ARPANSA/ASNO/IAEA and EPBC Act site suitability assessments at attachments A and I.

[12] Geotechnical risks associated with Lyndhurst were considered and adequately provisioned for in the capital costs captured in the DBC (2018)

Capital Cost Differentials

ss 34(1)(a) and (2) / s47C

Each site has unique challenges which are reflected in the design and functional solutions adopted for enabling works (transport, water, power, and communications) and in the contingency allowances (both inherent and contingent). Napandee has the lowest overall site-specific delivery costs and has therefore been selected as a baseline to compare the sites (see table 17). Compared to Napandee ss 34(1)(a) and (2) / s47C is estimated Lyndhurst would cost an additional $22.5 million ss 34(1)(a) and (2) / s47C and Wallerberdina would cost an additional $150.9 million ss 34(1)(a) and (2) / s47C

Component	Lyndhurst Delta $M	Napandee (baseline)	Wallerberdina Delta $M
Enabling Works			
Transport	-22.7	-	+69.0
Communications	-0.8	-	+2.8
Water	-0.7	-	+1.7
Power	+0.1	-	-51.7
Facility buildings	+42.3	-	+88.7
Inherent Risks	+3.3	-	+35.7
Contingent Risks	+1.0	-	+4.7
Total Capital Cost (relative to Napandee)	**+22.5**	**-**	**+150.9**

Table 17: P80 Capital cost differentials, site-specific elements (real dollars, 2018 –19)

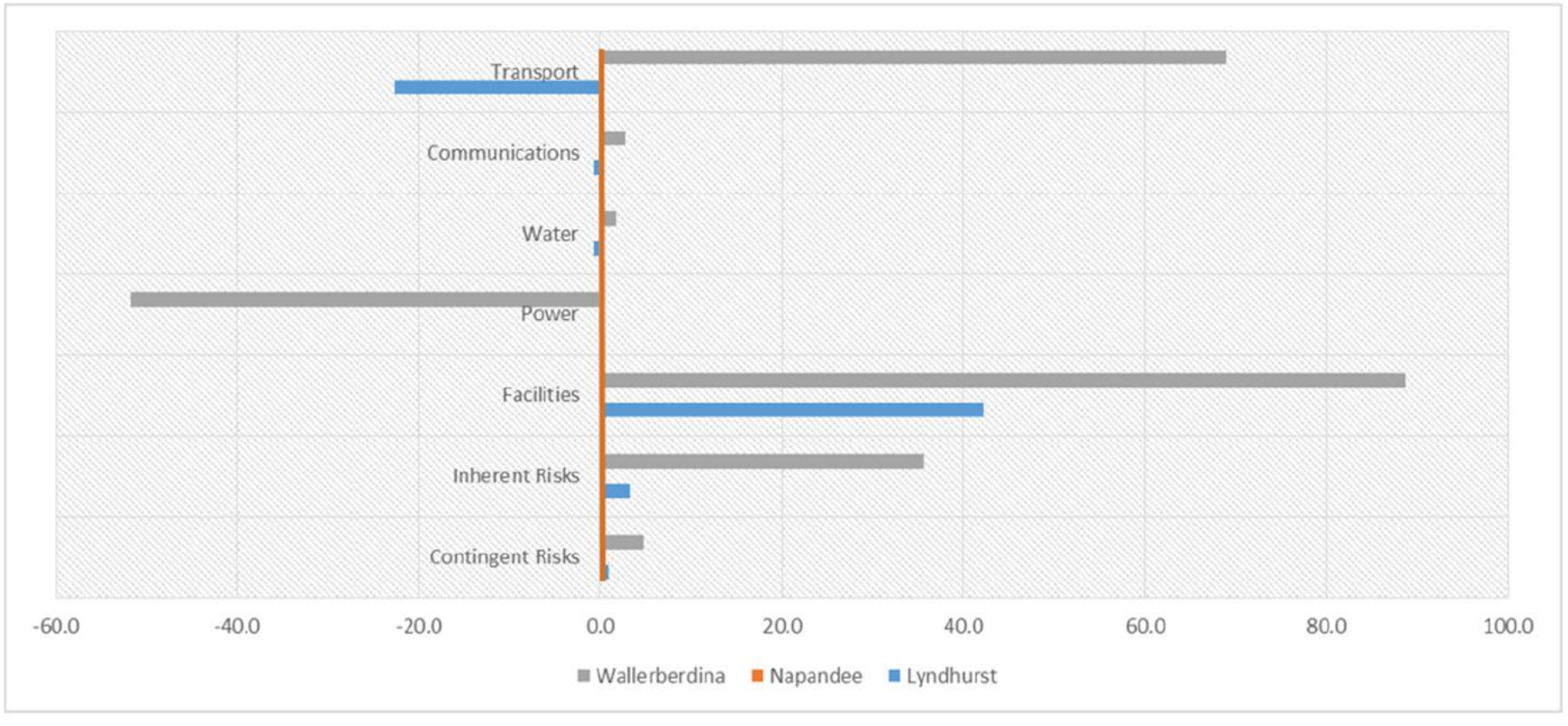


Figure 10: Cost advantage or disadvantage of Lyndhurst, Napandee (baseline) and Wallerberdina

Lyndhurst has an overall cost disadvantage relating primarily to ponding issues and the associated mitigation costs for the facility buildings.

Napandee has an overall cost advantage because the increased costs of road works (compared with Lyndhurst) or power (compared with Wallerberdina) is offset by the cost savings associated with the lower risk of flooding and ponding at the site.

Wallerberdina has an overall cost disadvantage relating to flooding risks and the construction of roads. The flooding risks require both levee works and raising of critical infrastructure in order to mitigate the risks. The road construction costs in table 17 and figure 10 are reflective of work required to build roads to the site. Although there is a cost advantage associated with the ease of connecting to existing power infrastructure, this saving does not overcome the costs associated with mitigating flooding risk and constructing roads.

Assessment of estimated facility costs

Table 18: The department's assessment of the risk that estimated facility capital costs would not result in a fit-for-purpose facility

	Lyndhurst	Napandee	Wallerberdina
Baseline capital cost (estimated)	ss 34(1)(a) and (2)/ s47C		
Capital cost Differentials	+$22.5m	$0 (baseline)	+$150.9m
Total capital cost (estimated)	ss 34(1)(a) and (2) / s47C		
Rating and comment	This site has a capital cost differential of +$22.5m to mitigate against identified risks. ss 34(1)(a) and (2) / s47C and is likely to deliver the mitigations required to satisfy the regulator.	This site has a capital cost differential of $0 to mitigate against identified risks, ss 34(1)(a) and (2) / s47C Of the three sites under consideration, this is the baseline and minimum amount required to establish the facility to a standard which is likely to satisfy the regulator.	This site has a capital cost differential of +$150.9m to mitigate against identified risks. ss 34(1)(a) and (2) / s47C While more than $120m has been identified to support measures to mitigate flood risk, there is a residual risk the mitigations will not be adequate to develop a safety case that satisfies the regulator as part of the licensing process.

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

Compensation

Sections 35 and 36 of the NRWM Act describe when the Commonwealth will be liable to pay a 'reasonable amount of compensation' to certain persons in relation to the acquisition, extinguishment or other impact on rights or interests under the NRWM Act.

Section 35 of the NRWM Act states:

> (1) If rights or interests are acquired, extinguished or otherwise affected under section 19, the Commonwealth is liable to pay a reasonable amount of compensation to a person whose right or interest has been acquired, extinguished or otherwise affected.
> (2) If the Commonwealth and the person do not agree on the amount of the compensation, the person may institute proceedings in the Federal Court of Australia for the recovery from the Commonwealth of such reasonable amount of compensation as the court determines.

Section 35 operates in conjunction with sections 14 and 19 of the NRWM Act.

Section 14(2) provides that the Minister may declare that the site approved by the Minister, of part of the site, is selected as the site for a facility. The declaration is limited to land which is part of an approved site unde[redacted] s 42 [redacted]

Section 14(4) provides that the Minister may declare that specified rights or interests in the land are required for the purposes of providing all-weather road access to the selected site. This declaration is not limited to an approved site and more than one declaration for all-weather road access may be in effect at a particular time. [redacted] s 42 [redacted]

Section 19 provides that, at the time a declaration under section 14(2) or 14(4) takes effect, any rights or interests specified in the declaration are acquired by the Commonwealth or extinguished, and freed/discharged from all other rights and interests. [redacted] s 42 [redacted]

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Section 36 of the NRWM Act states:

> (1) If the operation of this Act would result in an acquisition of property from a person otherwise than on just terms, the Commonwealth is liable to pay a reasonable amount of compensation to the person.
> (2) If the Commonwealth and the person do not agree on the amount of the compensation, the person may institute proceedings in the Federal Court of Australia for the recovery from the Commonwealth of such reasonable amount of compensation as the court determines.
> (3) In this section:
> ***acquisition of property*** has the same meaning as in paragraph 51(xxxi) of the Constitution.
> ***just terms*** has the same meaning as in paragraph 51(xxxi) of the Constitution.

Importantly, both sections 35 and 36 of the NRWM Act provide that the Commonwealth is liable to pay a 'reasonable amount' of compensation. That amount is to be agreed by the Commonwealth's delegate and the affected person/s, or determined in the Federal Court of Australia. Neither section includes a limitation period restricting the lodgement of 'reasonable compensation' claims.

When considering a 'reasonable' amount of compensation, the Minister (or the Secretary or departmental delegate, as applicable) must abide by two statutory frameworks: the PGPA Act and the NRWM Act.

- Section 71 of the PGPA Act requires, in the context of achieving the Government's policy objective to establish a facility, that the Minister be satisfied that the expenditure required to establish the facility and pay reasonable compensation under section 35 or 36 of the NRWM Act would be a 'proper[13] use of relevant money'. This report does not provide an analysis of that PGPA Act requirement as such.
- As the NRWM Act does not specify any particular agreement making process or legislative framework for the provision of compensation by agreement under section 35 or 36, the department has sought advice from the Australian Government Solicitor (AGS) on the concepts and definitions relating to these processes.

s 42 [redacted]

[13] Proper is defined in section 8 of the PGPA Act as 'efficient, effective, economical and ethical'.

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Liabilities triggered by acquisition of a site for the facility

When a declaration under section 14(2) of the NRWM Act takes effect, all rights or interested specified in the declaration will be acquired by the Commonwealth, or extinguished and freed and discharged from all other rights and interests. The Commonwealth will also be liable under section 35 to pay a reasonable amount of compensation to a person whose right or interest has been acquired, extinguished or otherwise affected. s 42 [redacted]

s 42 [redacted]

[redacted]

Landowners (and associated rights or interests)

The department has obtained independent land valuations for each of the proposed acquisition parcels (attachments V, W and X). The department has attempted to negotiate an 'in-principle' 'reasonable compensation' amount with the nominators of Napandee and Wallerberdina, prior to site selection. As set out in the site assessment findings for criterion 3, s 42 [redacted] (see criterion 3 discussion, p. 90).

s 42 [redacted]

[redacted]

—THIS SECTION IS SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE—

s 42 [redacted]

The department also proposes to directly negotiate with other independent third parties that have known interests in the approved sites (e.g. mortgagees), to reach agreement about compensation for those interests.

Table 19: The department's assessment of the risk that landowner compensation would not result in a fit-for-purpose facility

	Lyndhurst	Napandee	Wallerberdina
Risk rating			
Comment	If an amount of 'reasonable compensation' cannot be agreed by the Commonwealth's delegate and the affected person/s, the NRWM Act provides that the Federal Court of Australia may determine the amount. Ts 42 [redacted]		
	No claim received and negotiations have not commenced. s 42/ s 47F [redacted]	Latest claim received: [redacted] Negotiations are ongoing and the department considers an amount of in-principle 'reasonable compensation' will be agreed. The land valuation underlying the claim amount is consistent with the independent land valuation obtained by the department. The claim is less than the amount set aside in contingency reserve for site acquisition.	Revised claim received: [redacted]. Negotiations are ongoing. The revised claim amount exceeds the amount set aside in contingency reserve for site acquisition. The land valuation underlying the claim amount is not consistent with the independent advice obtained by the department to date. The department has requested further independent advice from the landowners to substantiate their position.

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Mining or exploration interests (non-government)

The department has obtained valuations for the Exploration Licence over the proposed acquisition parcel at Wallerberdina (see attachment Y). These rights would be acquired by the Commonwealth at declaration. The value estimates are minimal and the rights holders, as listed in the table below, have yet to be approached about compensation.

Table 20: The department's assessment of the risk that mining or exploration compensation would not result in a fit-for-purpose facility.

	Lyndhurst	Napandee	Wallerberdina
Risk rating			
Comment	If an amount of 'reasonable compensation' cannot be agreed by the Commonwealth's delegate and the affected person/s, the NRWM Act provides that the Federal Court of Australia may determine the amount. s 42 [redacted]		
	No mining or exploration licences identified and there are no identified costs.	No mining or exploration licences identified and there are no identified costs.	Geothermal Exploration Licence No 572 held by Torrens Energy (SA) Pty Ltd. Torrens Energy (SA) Pty Ltd have not made a claim. Commonwealth valuation $0 (zero) at March 2019 (see valuation at attachment Y) Petroleum Exploration Licence Application[14] No 631 held by NAVGAS Pty Ltd Exploration Licence Application No 2019/00113 held by Strikeline Resources Pty Ltd

[redacted]

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South Australian Government rights or interests

s 42 [redacted]

The department has engaged with South Australian Government officials since 2016 on a range of issues. s 42 [redacted] Due diligence work indicates the below rights or interests may be affected and trigger compensation liabilities. It is possible that other rights or interests exist or are asserted by the State (see attachment U).

Table 21: the department's assessment of the risk that South Australian Government rights or interests compensation would not result in a fit-for-purpose facility

	Lyndhurst	Napandee	Wallerberdina
Risk rating			
Comment	If an amount of 'reasonable compensation' cannot be agreed by the Commonwealth's delegate and the affected person/s, the NRWM Act provides that the Federal Court of Australia may determine the amount. s 42 [redacted] South Australian Government is yet to confirm its rights or interests.		
	The State has the property in minerals, and petroleum and other regulated substances (as defined in the *Mining Act 1971* (SA) and the Petroleum and Geothermal Energy Act, respectively) in the site.	The State has the property in minerals, and petroleum and other regulated substances (as defined in the Mining Act and the Petroleum and Geothermal Energy Act, respectively) in the site.	The State is the Crown lessor under Perpetual Crown Lease Register Book Volume 1215 Folio 128. The State has the property in minerals, and petroleum and other regulated substances (as defined in the Mining Act and the Petroleum and Geothermal Energy Act, respectively) in the site.

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Other rights or interests

Table 22: The department's assessment of the risk that other rights or interests compensation would not result in a fit-for-purpose facility

	Lyndhurst	Napandee	Wallerberdina
Risk rating			
Comment	s 42 [redacted] If an amount of 'reasonable compensation' cannot be agreed by the Commonwealth's delegate and the affected person/s, the NRWM Act provides that the Federal Court of Australia may determine the amount. s 42 [redacted]		

Liabilities triggered by the operation of the NRWM Act

The Commonwealth's liability to pay a reasonable amount of compensation under section 36 of the NRWM Act can be triggered by the operation of any of the provisions of the Act.

s 42 [redacted]

Where this amounts to an 'acquisition of property' for the purposes of section 51(xxxi) of the Constitution otherwise than on 'just terms', the Commonwealth will be required to pay a reasonable amount of compensation to the person under section 36 of the NRWM Act.

The amount of compensation that may be paid under section 36 is to be determined, in the first instance, by agreement between the department's delegate and the affected person/s.

s 42 [redacted]

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s 42 [redacted]

The Commonwealth may already be liable to pay compensation under this section.

Table 23: The department's assessment of the risk that liabilities triggered by the operation of the NRWM Act would not result in a fit-for-purpose facility

	Lyndhurst	Napandee	Wallerberdina
Risk rating			
Comment	s 42 [redacted] If an amount of 'reasonable compensation' cannot be agreed by the Commonwealth's delegate and the affected person/s, the NRWM Act provides that the Federal Court of Australia may determine the amount. s 42 [redacted]		

Other liabilities

There are complexities which may raise additional liabilities for the Commonwealth under the NRWM Act or the LAA.

Table 24: The department's assessment of the risk that other liabilities compensation would not result in a fit-for-purpose facility

	Lyndhurst	Napandee	Wallerberdina
Risk rating			
Comment	If an amount of 'reasonable compensation' cannot be agreed by the Commonwealth's delegate and the affected person/s, the NRWM Act provides that the Federal Court of Australia may determine the amount. s 42 [redacted]		

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Discussion - primary road access	None identified	None identified	Significant additional acquisition of rights or interests in land (both on and off the approved site) would likely be required to establish primary road access. Further work is required to establish the route because of inconsistencies between the actual and titled road (see criterion 3, additional land or property acquisitions (p. 85). Construction costs associated with this road have been estimated in the facility costings (p. 61).
Discussion - secondary road access	Minor additional acquisition of approved land may be required for all-weather road access (see criterion 3, additional land or property acquisitions p. 85). No construction costs associated with this road have been included in the facility costings, as there is a low likelihood it would be required by the regulator.	None identified	High likelihood that significant additional acquisition of rights or interests in land (approved or not) would be required. Further work is required to establish the cost of acquisition (see facility cost estimates, p. 61 and criterion 3, additional land or property acquisitions, p. 85). Construction costs associated with this road have been estimated in the facility costings (p. 61).
Discussion - additional land acquisition to support infrastructure	Additional acquisition of non-approved land may be required to support drainage works to address ponding at the site (see criterion 3, additional land or property acquisitions p. 85). The costs of acquiring this land have not been determined or included in the facility costings.	None identified	None identified

Site suitability criterion 3

Other matters relevant to the suitability of the site for the establishment and operation of the facility.

The object of the NRWM Act (section 3) suggests a broad interpretation can be applied when identifying factors relevant to selecting a site on which to establish and operate a facility. The facility will have a presence in the local area over hundreds of years across the pre-operational, operational and post operational phases. Beyond the consideration of regulatory approvals, costs and community sentiment as examined in criterion 1, 2 and 4, criterion 3 considers other matters that could potentially impact the suitability of each site across the lifecycle of the facility. This includes the consideration of the possible practical, policy, legal and stakeholder risks associated with the program of discrete tasks necessary to establish and operate a facility on each site to safely and securely manage radioactive waste. This criterion, where necessary, considers the suitability of each site at pre-operational, operational and post-operational phases. The key phases of facility development are:

- pre-operational (regulatory approvals, site preparation and construction—10 years)
- operational (receiving waste and environmental monitoring—100 years)
- post-operational (decommissioning and long term monitoring—300 years).

The criterion considers practical, legal and stakeholder management perspectives for:

- Aboriginal cultural heritage and Native Title
- transport and road use
- noise, dust, visual and other disturbance
- security
- utilities supply
- future land use and activities
- additional land or property acquisitions
- environment
- socio-economic factors
- community relationships and stakeholder management.

These factors are assessed comparatively for each site.

This criterion assessment is based on site information available at the time of writing. This criterion assessment does not present an exhaustive list of potential influencing factors, and should be considered independent of the site assessments conducted under criteria 1, 2 and 4. The assessment of the risks for this criterion is generally conservative, to account for the uncertainty in available information.

Assessment approach

This assessment details the department's evaluation of the risks for the approved sites in the context of 'other matters' (apart from criteria 1, 2 and 4) that could potentially impact the suitability of the site for facility establishment, operation and decommissioning. The assessment provides a basis for broad consideration of the factors relevant to the safe and secure management of radioactive waste over the full span of the facility's development, in relation to each of the approved sites.

The factors used to assess this criterion were identified by the department based on a review of the preliminary assessments undertaken for the other site selection criteria and the risk assessments related to the National Radioactive Waste Management Program. The department's risk management framework was used to make the assessment of factors against the criterion, undertaken by the department (attachment J). The assessment of the probability of the occurrence/recurrence of certain risk events was made in the knowledge of the historical and future projections made in the other criterion assessments, other risk assessment work undertaken for the NRWM program, and with reference to the facility phases.

This assessment considers whether a particular factor or characteristic could lead to an impact on the site's suitability. A risk rating is determined for each factor identified in the assessment, based on risk *likelihood* and *consequence*. For the risk assessment conducted, 'likelihood' is the department's assessment of the probability that particular risk events associated with the factor will impact the establishment, operation and decommissioning of the facility (for example, the discovery of new heritage sites). The 'consequence' for a factor indicates the level of potential severity of the impact should it occur (for example, the level of public or stakeholder concern about risks to Aboriginal cultural heritage and possible legal action). The assessment of likelihood and consequences takes into account any mitigation measures that are planned or recommended.

The department's risk management framework risk determination matrix was used to evaluate the likelihood of risk (refer to table 25). For consequence, the department's matrix descriptions (from insignificant to severe) were used, and consequence is described in terms of the potential impacts on the establishment, operation and decommissioning of the facility. The department's risk determination matrix was then used to combine likelihood and consequence to determine a final risk rating, from low to very high.

Table 25: The d*epartment's risk determination matrix, combining likelihood and consequence levels to determine a final risk ratings*

Likelihood Rating	Consequence Ratings				
	Insignificant	Minimal	Moderate	Substantial	Severe
Almost Certain	Minor	Medium	High	Very High	Very High
Likely	Minor	Medium	Medium	High	Very High
Possible	Low	Minor	Medium	High	Very High
Unlikely	Low	Minor	Minor	Medium	High
Rare	Low	Low	Minor	Medium	High

A relatively higher risk rating generally means that additional mitigations, beyond those identified, may be required to address the risks, rather than that the site would be unsuitable. A higher risk rating indicates that there are concerns or questions based on the findings or information available at the present time, and that additional information is required to clarify site or broader operational characteristics, impacts or mitigation strategies. It is anticipated that the pre-operational phase draws much of the apparent risk as this is when there is the most potential for disruption, and creates the most interaction with regulators and the community.

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Aboriginal cultural heritage and Native Title

Aboriginal cultural heritage includes places and objects that are of cultural significance to Aboriginal people. It can comprise both physical and non-physical elements. Physical examples include stone tools, art sites and burial grounds. Non-physical elements often relate to the connection that Aboriginal people have with the land and with each other. There is Commonwealth and state and territory recognition and protection of Aboriginal cultural heritage.

The Barngarla and Gawler Ranges Peoples are the Traditional Owners of land in the vicinity of the Lyndhurst and Napandee sites and the Adnyamathanha People of the land near Wallerberdina. Native Title has been extinguished over the approved site, although the Barngarla and Adnyamathanha Peoples hold Native Title in surrounding land near Lyndhurst and Napandee, and Wallerberdina sites, respectively. Traditional Owners have been consulted in relation to the assessment of Aboriginal cultural heritage values (attachments Q and R). The relevant Aboriginal organisations with respect to Traditional Owner groups are:

For Lyndhurst and Napandee

- Barngarla People
  - Barngarla Determination Aboriginal Corporation (BDAC)
- Gawler Ranges People
  - Gawler Ranges Aboriginal Corporation (GRAC)[15]

For Wallerberdina

- Adnyamathanha People
  - Adnyamathanha Traditional Lands Association (ATLA)
  - Viliwarinha Yura Aboriginal Corporation (VYAC)[16]

For any site selected, active management of Aboriginal cultural heritage and Native Title issues will be required. The specialist Aboriginal cultural heritage studies conducted for the project to date (attachments Q and R) recommended that further surveys of Aboriginal cultural heritage be undertaken, as well as the preparation of an Aboriginal cultural heritage management plan[17]. It is anticipated an Aboriginal cultural heritage assessment will form part of the environmental assessment process required under the EPBC Act.

While criterion 1 considers Aboriginal cultural heritage in relation to the EPBC Act, there are other activities necessary to the establishment or operation of the facility, beyond gaining EPBC regulatory approval, where it is important to consider Aboriginal cultural heritage. Activities such as road development or implementation of the required environmental monitoring program to regulator specifications may take place during various operational phases of the facility and may occur outside of, as well as within, the site acquired for a facility. There is the potential for these activities to intersect with nearby Native Title rights and interests and invoke procedural requirements under the *Native Title Act 1993*, and for the discovery of as-yet-unregistered Aboriginal cultural heritage to be discovered during related works.

s 42 [redacted] If or when further Aboriginal cultural heritage sites or objects are discovered, consideration would need to be given to Aboriginal cultural sensitivities, the potential for legal challenges, and possible impacts to the development and operation of the facility. The severity of impacts will depend on: the proximity and significance of the relevant cultural heritage, the technical requirements of the activity, and the effectiveness of engagement activities to understand and manage concerns of relevant stakeholders.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Medium**	**Medium**	**Medium**
Comment on risk and mitigation	There is a medium risk that Aboriginal cultural heritage and Native Title will give rise to legal challenges and public criticism. The Barngarla Determination Aboriginal Corporation is opposed to the facility so it may be difficult to complete the anticipated comprehensive Aboriginal cultural heritage assessment and management work for Lyndhurst and Napandee (in a way that meets stakeholder expectations) and ongoing management of cultural heritage issues will be required. This may be resource-intensive with respect to the management of stakeholders and any legal issues that might arise and cause delays, especially in the pre-operational phase.		There is a medium risk that Aboriginal cultural heritage and Native Title will give rise to legal challenges and public criticism. The known significant Aboriginal cultural heritage values for the approved site and its surrounds (including Hookina Creek) will create legal and public perception risks. The Adnyamathanha Traditional Lands Association is opposed to the facility, which may create difficulties in completing the required comprehensive Aboriginal cultural heritage assessment and ongoing management of cultural heritage issues. This may be resource-intensive with respect to the management of stakeholders and any legal issues that might arise and cause delays, especially in the pre-operational phase.

[15] The registered Native Title body corporate (RNTBC) for the Gawler Ranges People, the Gawler Ranges Aboriginal Corporation (GRAC), has written to the department indicating that it does not wish to be further involved in site selection activities, deferring to BDAC which is the RNTBC for the Barngarla People, as Traditional Owners of lands in the vicinity of the Lyndhurst and Napandee sites.
[16] The VYAC is not a Native Title representative body but was established to manage traditional lands and holds perpetual leases in Yappala pastoral station near Wallerberdina. Yappala Station is also an Indigenous Protected Area managed on behalf of the Adnyamathanha People by VYAC.
[17] An Aboriginal cultural heritage management plan is a standard outcome of an Aboriginal cultural heritage assessment undertaken on behalf of development proponents to assist with ongoing management of cultural heritage issues, including assisting in meeting any legislative obligation for the protection of cultural heritage.

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	Lyndhurst	Napandee	Wallerberdina
	These risks will be managed through the establishment of a heritage working group, dedicated funding ($3m) to assist in implementation of an Aboriginal Cultural Heritage Management Plan, the employment of cultural heritage monitors, and undertaking of comprehensive archaeological investigation, consultation and site visits with the relevant Traditional Owners		These risks will be managed through the establishment of a heritage working group, dedicated funding ($3m) to assist in implementation of an Aboriginal Cultural Heritage Management Plan, the employment of cultural heritage monitors, and undertaking of comprehensive archaeological investigation, consultation and site visits with the relevant Traditional Owners
s 42 [redacted]	s 42 [redacted]		
At the approved site	Native Title has been extinguished over the approved sites at Lyndhurst and Napandee. The South Australian Register of Aboriginal Sites and Objects has no record of Aboriginal cultural heritage at either Lyndhurst or Napandee, although a detailed assessment of Aboriginal cultural heritage values has not been completed. Although the sites have been farmed for many years, the possibility that non-registered or as yet identified Aboriginal cultural heritage exists at either site cannot be excluded at this time, and may be located during future EPBC assessment work, other 'heritage clearance' or assessment work during land development, including in connection with any applications under the ATSHIP Act.		Native Title has been extinguished over the approved site at Wallerberdina. The South Australian Register of Aboriginal Sites and Objects lists a songline and associated archaeological site which partially overlaps the boundary of the approved site at Wallerberdina, several kilometres from the proposed acquisition parcel. No other areas have been recorded on the South Australian Register of Aboriginal Sites and Objects within the approved site, although certain landform features within the approved site have been assessed in the preliminary Aboriginal cultural heritage assessment as having high archaeological potential, especially to the east and south towards Hookina Creek. Hookina Creek itself has broad cultural significance (attachment R). The preliminary assessment involving relevant Traditional Owners identified areas with high archaeological potential and cultural significance within and close to the boundaries of the approved site, but outside of the proposed acquisition parcel (attachment R). Aboriginal sites may be located during future EPBC assessment work, other 'heritage clearance' work or further assessments during land development, including in connection with any applications under the ATSHIP Act.
Within 20km of the approved site	Native Title in surrounding land is held by both the Barngarla People and the Gawler Ranges People. The Barngarla Determination Aboriginal Corporation has expressed ongoing opposition to the facility. The South Australian Register of Aboriginal Sites and Objects lists one Aboriginal site located within 20km of the approved site. Unregistered, as yet unidentified Aboriginal cultural heritage sites may exist around Lyndhurst, and as above, may be located during future EPBC assessment/heritage clearance work. Native Title and Aboriginal cultural heritage areas surrounding the site may intersect with activities such as offsite environmental monitoring. This is further discussed at 'Additional land or property acquisitions', below.	Native Title in surrounding land is held by the Barngarla People. The Barngarla Determination Aboriginal Corporation has expressed ongoing opposition to the facility. The South Australian Register of Aboriginal Sites and Objects has no record of Aboriginal sites. Unregistered, as yet unidentified Aboriginal cultural heritage sites may exist around Napandee, and may be located during future EPBC assessment/heritage clearance work. Native Title and Aboriginal cultural heritage areas surrounding the site may intersect with activities such as offsite environmental monitoring. This is further discussed at 'Additional land or property acquisitions', below.	Native Title in surrounding land is held by the Adnyamathanha People. ATLA has expressed ongoing opposition to the facility. The VYAC has pastoral land holdings neighbouring the approved site at Wallerberdina. The South Australian Register of Aboriginal Sites and Objects contains several records of Aboriginal sites, including Hookina Creek which is 2.5km south of the proposed acquisition parcel and which runs along the boundary of the approved site. In addition to managing the sensitivities regarding known Aboriginal cultural heritage sites in the vicinity of Wallerberdina, non-registered, as yet unidentified Aboriginal cultural heritage sites may exist around Wallerberdina, and may be located during future EPBC assessment/heritage clearance work. If Hookina Creek is an important location for environmental monitoring, further engagement with the Aboriginal community would be required to understand the cultural heritage implications of conducting activities at this location. Native Title and the significant number of Aboriginal heritage areas (and VYAC land holdings) surrounding the site may intersect with activities such as offsite environmental monitoring. This is further discussed at 'Additional land or property acquisitions', below.

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Transport and road use

During facility construction and operation, building materials, people and radioactive waste will be transported to and from the site along predetermined transport routes, which are yet to be developed. Criterion 1 examines the regulatory requirements to ensure adequate site access and the safe transport of radioactive material in Australia, in addition to potential physical impacts on the environment due to road upgrades.

Another factor that should be considered when making a decision to select a site for the facility is the concerns the public may have about the transport of radioactive waste through their communities. In the operational phase, a route may pass through a number of communities and townships, depending on where the waste originates. It is anticipated there will be some minor disruption to other road users. This assessment points to potential stakeholders sensitivities that will need to be managed, especially during the pre-operational phases.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Minor**	**Minor**	**Minor**
Comment on risk and mitigation	There is a minor risk that transport and road use for the establishment and operation of the facility will have an impact on the host and nearby communities due to the anticipated high volume of road use, road works and maintenance during the four year construction phase. This will be mitigated by regular engagement and consultation with the affected communities. There is a minor risk that transport and road use for the operation of the facility will have an ongoing impact on the host community and members of the public more generally along transport routes due to the likely use of heavy vehicles. Increased road usage and likely high levels of uncertainty about the transportation of radioactive waste material within Australia. This will be mitigated by regular engagement and consultation with the affected communities and information sharing strategies.		
Discussion	Transportation vehicles would use local highways and roads and may be oversized. Heavy vehicles and increased road usage would cause increased wearing of road surfaces. During construction periods, it is anticipated that road usage in the facility locality will be even more frequent and there will be higher rates of road maintenance or upgrade work. Post site selection, the transport routes will be developed and there will be public consultation, including with people living along transport routes and provision of information about waste or radioactive material already transported in the community, the type of waste to be transported to the facility, the vehicle size and frequency of transports. This consultation will form an important part of the regulatory applications, demonstrating community engagement, under the EPBC and ARPANS approval processes (see criterion 1 pp. 24-59). Over time, it may be expected that local residents' concerns will lessen, especially as heavy vehicle movement decreases to the relatively low anticipated rate of two to four waste transport trucks per week and as residents become more accustomed to facility-related traffic Public education and consultation about traffic plans and the unlikeliness of impacts from accidents/loss of waste during transport, will be included in the post site selection community consultations and regulatory assessment work.		

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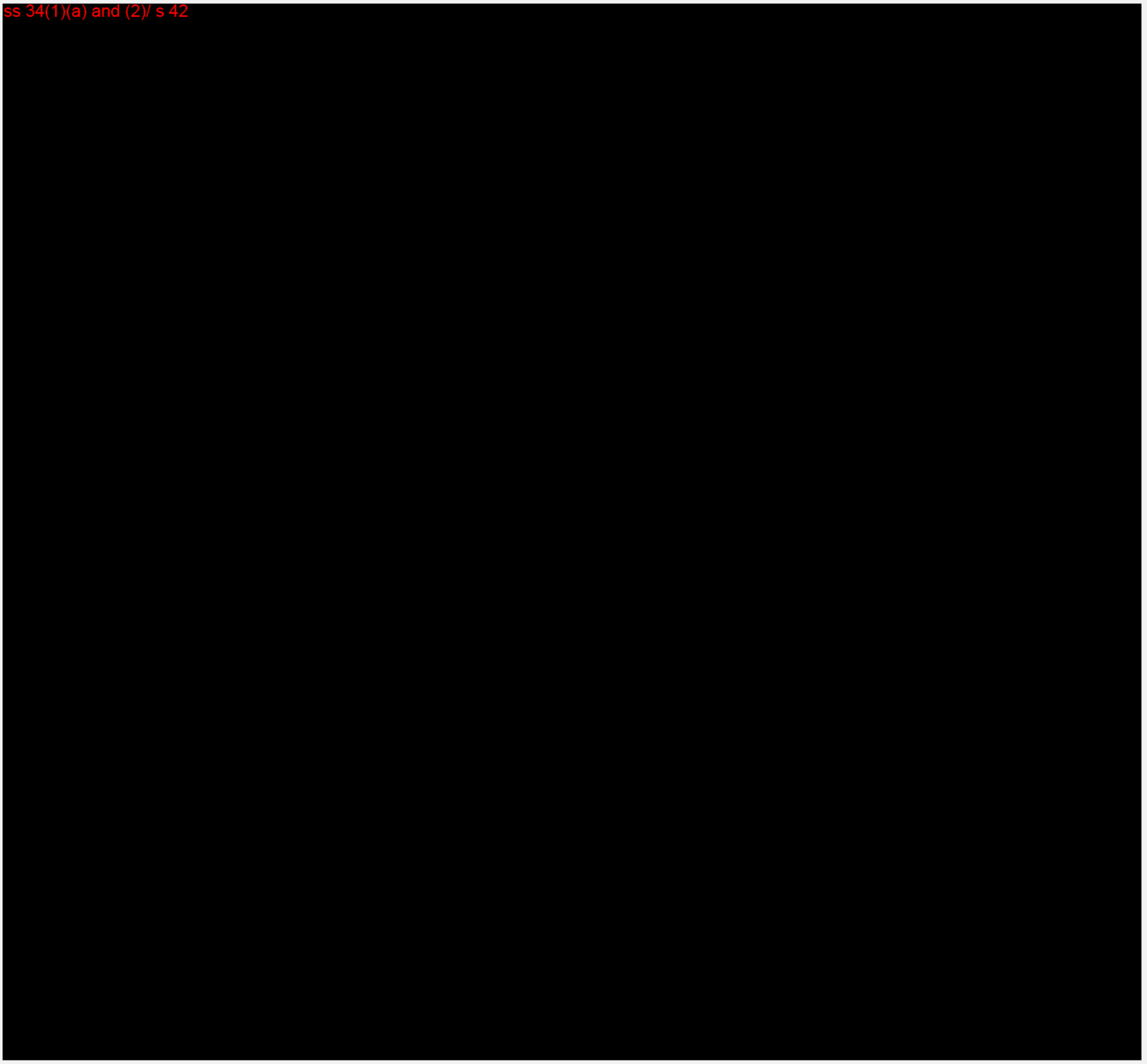
Noise, dust, visual and other disturbance

Construction activities, including enabling works and materials transport, and facility operation will cause some disturbance in areas surrounding the site, particularly during the pre-operational phase. While some impacts on local environmental amenity have been considered in relation to criterion 1 (such as landscape and visual amenity), considering the broad range of disturbance factors as a whole from the perspective of neighbours and the community is relevant to making a decision to select a site for the facility. These could include increased levels of noise, dust and visual impacts to the natural landscape (in addition to any direct traffic disruptions considered at 'Transport and road use').

Any potential noise and dust impacts would likely be transient and minor and mainly affect the property on which the site is located and neighbouring properties (and will be minimal post construction). The distances to surrounding properties are significant and it is not anticipated that facility structures will be within regular view of local residents. However, consultation will be required to determine the specific impacts to surrounding properties and beyond and any mitigation measures required.

	LYNDHURST	NAPANDEE	WALLERBERDINA
Risk rating	**Low**	**Low**	**Low**
Comment on risk and mitigation	There is a low risk that noise, dust, visual and other disturbance related to the establishment and operation of the facility will have an ongoing impact on the host and nearby communities. This will be mitigated by regular engagement and consultation with the affected communities.		
s 42 [redacted]	s 42 [redacted]		
Discussion	The surrounding landscapes are mostly natural, with few built structures. The area surrounding the site is primarily used for agricultural purposes. It is expected that there is a certain level of noise and dust on occasion from the current use of farming equipment. Any disturbances from works will be managed consistent with relevant environmental regulations and building codes, which will limit noise, dust and other disturbances. s 42 [redacted] Consultation with the community (especially with the landowners and neighbours) will be required to determine existing noise impacts and future noise and visual impacts of the facility during construction and operation. These consultations, and anticipated EPBC assessments (such as for visual impact) will inform plans for ongoing mitigation of any impacts, such as establishment of visual buffers if required or ongoing consultation protocols (as a minimum, consulting neighbours prior to commencement of any construction or enabling works).		

ss 34(1)(a) and (2)/ s 42



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Utilities supply

The facility will require reliable access to electricity, water and communications infrastructure. Any reliance on external providers to supply either these utilities, or the infrastructure necessary for their access, could be relevant to the suitability of a site.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Medium**	**Medium**	**Low**
Comment on risk and mitigation	s 42 [redacted] This may give rise to public criticism and the potential for delays during the pre-operational phase. s 42 [redacted] To mitigate these risks, the department will continue consulting with South Australian Government officials, which it has been doing since 2016, on progressing a range of key issues for the project s 42 [redacted]		There is a low risk that utilities supply will have an impact on the scheduling of works at Wallerberdina. The site will be self-contained with respect to water supply, and will be able to access power and communications on a normal commercial basis.
s 42 [redacted]	s 42 [redacted]		
Discussion – water supply	It is anticipated that water for the facility at the Kimba sites would be sourced from the Kimba town supply and new infrastructure would be required to provide water to the facility. SA Water is the sole provider of water and sewerage services in South Australia and is wholly owned by the South Australian Government. s 42 [redacted] SA Water sources almost 50% of its supply from the Murray-Darling Basin system. Water management plans are in place to manage the critical water shortage in the Murray-Darling, which prioritise critical human needs, including drinking and household water, before other water uses. Water supplied by SA Water may be subject to fluctuating supply and/or cost. The water consumption requirements for the facility are yet to be confirmed, pending the regulators confirmation of the need to have water-based firefighting equipment in the waste storage building (current plans are not to have this). Stakeholder sensitivities around water usage from the Murray-Darling Basin will need to be managed.	The closest water supply, about 37km away, is too far away to supply to the site. It is anticipated that groundwater will be drawn from an onsite bore and treated with an onsite desalination plant to supply potable water. ss 34(1)(a) and (2) [redacted]
Discussion – electricity	The closest electricity supply line, about 50km away, is too far away to provide power. It is anticipated that power would be supplied to the facility via an on-site micro-grid and back-up diesel generators. ss 34(1)(a) and (2) [redacted]	It is anticipated that power would be supplied to the facility via existing ElectraNet infrastructure that is located alongside the site, and back-up diesel generators. It is unlikely that providers, including electricity retailers, would set higher prices than for other users because they are bound by regulations preventing this.
Discussion - communications	Primary connection will be via a direct buried fibre optic cable connected to the local exchanges.	

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Future land use and activities at and around the site

Security and safety requirements preventing people from moving onto or disturbing the site has the potential to impact the use of the site and surrounding land. There is also some possibility that the presence of the facility could impede development approvals on surrounding land. This could place minor future restrictions or constraints on activities that the land in the vicinity of the sites could otherwise have been used for (for example, the location or expansion of local aerodromes near the approved sites). This refers to factors beyond any obvious or necessary extinguishment of current rights and interest that give rise to compensatory liabilities incurred under sections 35 and 36 (which are considered at criterion 2, costs), but nevertheless are a relevant consideration in making a site selection.

	LYNDHURST	NAPANDEE	WALLERBERDINA
Risk rating	**Low**	**Low**	**Low**
Comment on risk and mitigation	There is a low risk that future land use activities will be significantly impeded. It is very likely that only minor allowances for the facility would be required in the rare event that a future planned activity is affected (such as mining and placement of water bores).		
Discussion – mining	No mining tenements exist on the approved site or on the Lyndhurst property more broadly. The nearest mining interest is around 3km east of Lyndhurst. Future applications for mining tenements under the Mining Act located at or near the site would likely consider potential impacts on the facility (including its extended activities, such as the environmental monitoring). This may lead to restrictions on the granting of any mining tenements near the site in the future.	No mining tenements exist on the approved site or on the Napandee property more broadly. The next nearest mining interest is around 6km east of Napandee. Future applications for mining tenements under the Mining Act located at or near the site would likely consider potential impacts on the facility (including its extended activities, such as environmental monitoring). This may lead to restrictions on the granting of any mining tenements near the site in the future.	The entire Wallerberdina Station property, including the approved site, is subject to three petroleum exploration licence applications and a geothermal exploration licence. The next nearest mining interest is around 3km east of Wallerberdina. Future applications for mining tenements under the Mining Act located at or near the site would likely consider potential impacts on the facility (including its extended activities, such as environmental monitoring). This may lead to restrictions on the granting of any mining tenements near the site in the future.
Discussion – water bores	Planning controls for the site will include restrictions on future installation of water bores in close proximity to the site, although groundwater was found to be of very limited beneficial use due to its high salinity and low yield. Bore installation restrictions are unlikely to impede foreseeable future groundwater use.		Planning controls for the site would include restrictions on future installation of water bores in close proximity to the site. The groundwater was found to be potentially usable for a range of uses such as stock watering, irrigation or domestic use. Bore installation restrictions could impede future groundwater use in proximity to the site.
Discussion - aerodromes	Aerodromes in the vicinity of Lyndhurst are used by small aircraft very infrequently. Lyndhurst is closer to a flight path (8km from the Kimba aerodrome) than other sites, although the location for the facility at the southern end of the approved site avoids the flight path. Further assessment of existing aircraft flight patterns near the site may be required at the next stage of the assessment. Over time, should the Kimba Aerodrome be expanded to accommodate larger aircraft, an extended flight path exclusion zone may extend over the approved site, but is not anticipated to extend to the site of the facility.	Aerodromes in the vicinity of Napandee are used by small aircraft very infrequently. The Kimba Aerodrome is located approximately 26.5km to the east of the site. Aircraft approach and take-off movements would unlikely be aligned towards the site. It is not anticipated that the site would be located within a major flight path area in the future.	Aerodromes are used by small aircraft in the vicinity of Wallerberdina very infrequently. The Hawker Aerodrome is the main airstrip in the region and is located approximately 39km south-east the site via existing road networks. The Hawker runway is orientated north-south, so aircraft approach and take-off movements would unlikely be aligned towards the site. It is not anticipated that the site would be located within a major flight path area in the future

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Additional land or property acquisitions

A declaration made under section 14(2) of the NRWM Act will result in acquisition of a defined parcel of land on which the facility will be established and operated. Regardless of the site selected, further acquisitions of land or property (including proprietary rights) will likely be required to support the operation of the facility. Certain activities by the Commonwealth on land outside the facility site are authorised under the NRWM Act s 42 [redacted]

That is, under section 36, where the operation of the NRWM Act would result in an acquisition of property from a person other than on 'just terms', the NRWM Act requires the Commonwealth to pay a 'reasonable amount of compensation' to the person/s (see criterion 2 for discussion of the costs associated with these acquisitions). Beyond cost, the extent to which further acquisitions are necessary, and how the rights or interests of others are limited by these acquisitions, are themselves relevant when considering the suitability of each site.

Land acquisition for road access, where needed, is expected to occur during the pre-operational phase. Section 14(4) of the NRWM Act permits the Minister to make a declaration that specified rights and interests in land are required for the purposes of providing all weather road access to the site (with the effect of acquiring those rights and interests). The Commonwealth could also seek to acquire land under the LAA for the purposes of constructing roads. Land acquisition for carrying out infrastructure works to support the construction and operation of the facility would occur primarily during the pre-operational phase and the Commonwealth could acquire this land under the LAA. Post-acquisition of a site, detailed technical assessments and consultation with stakeholders will determine the likely locations of any additional acquisitions that may be required to support facility operations.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Minor**	**Minor**	**High**
Comment on risk and mitigation	s 42 [redacted]	[redacted]	[redacted]
Discussion - Acquisition for primary road access	Primary road access to the facility is anticipated to be via Bindawalla Gate Road which borders the southern end of the proposed acquisition parcel at Lyndhurst. No further acquisition is anticipated in order to provide primary access to the facility.	Primary road access to the facility is anticipated to be via Tola Road which borders the southern end of the proposed acquisition parcel at Napandee. No further acquisition is anticipated in order to provide primary access to the facility.	Primary road access to the facility would likely require further acquisitions of approved land and other land between the proposed acquisition parcel and the Outback Highway. While the proposed acquisition parcel was selected in part because of the proximity to Lake Torrens Homestead Road, recent cadastral surveys show that the physical road alignment deviates significantly from the road reserve boundaries. Further survey works are required to inform a decision on a preferred primary access route, determine the extent to which the route would encroach on private land and determine who owns that land.
Discussion - Acquisition for secondary road access	Secondary (emergency) road access to the facility may be	Secondary (emergency) road access to the facility may be	Secondary (emergency) road access to the facility may be required by the regulator, ARPANSA.

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	Lyndhurst	Napandee	Wallerberdina
	required by the regulator, ARPANSA. Lake Giles Road, bordering the approved site to the north, could provide this secondary access point. As the proposed acquisition parcel for the facility is located in the south-west corner of the approved site, further acquisition (fee simple or easements) of approved land is anticipated. Further survey works would be required to inform a decision on the exact size and location of the secondary access route. Work may be required to build and maintain a road or track and to install/maintain agricultural fencing and gates to support the access easement.	required by the regulator, ARPANSA. Larwood Road borders the western end of the proposed acquisition parcel at Napandee and could provide this secondary access point. No further acquisition is anticipated in order to provide secondary access to the facility.	To provide this secondary access point, it is anticipated a new road would be constructed parallel to the existing disused Cotabena Railway, and intersect with the Outback Highway, around 48km from the facility. This would necessitate acquisition (fee simple or easements) of a significant amount of approved land and other land. The road would be situated further away from Hookina Creek than the site itself and flooding risk would be reduced compared to the primary access route. Further survey works would be required to inform a decision on the exact secondary access route, determine the extent to which the route would encroach on private land and determine who owns that land.
Discussion - Acquisition to support infrastructure works	To remove excess water from the site at Lyndhurst, drainage works on an adjoining property may be required (this is further discussed in the regulatory risk assessment at criterion 1). Some form of acquisition (fee simple or easement) is anticipated to support these works. s 42 [redacted]	No additional acquisitions to support infrastructure works have been identified at this time.	No additional acquisitions to support infrastructure works have been identified at this time.
s 42 [redacted]	[redacted]		[redacted]
Discussion - Aboriginal cultural heritage and Native Title	Aboriginal cultural heritage sites and Native Title rights or interests may occur in the vicinity of the approved sites, and particularly around Wallerberdina (for details, refer to 'Aboriginal cultural heritage and Native Title' section above). Where new roads, other infrastructure, monitoring, or another activity amounting to an 'acquisition of property', intersects with Aboriginal cultural heritage sites or land with Native Title, consultation with the relevant Traditional Owners will be undertaken when determining the appropriate course of action.		

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Environment

The facility will interact with the environment over hundreds of years across the pre-operational, operational and post operational phases. Beyond the consideration of environmental issues for gaining EPBC regulatory approval, as examined in criterion 1, the effects of the facility on the environment (practical consequences and associated management of relevant stakeholders) over the facility life-cycle should be considered when making a decision to select a site for the facility.

For example, requirements for the ongoing monitoring of the environment around the facility are yet to be specified. Regardless of where the facility is to be sited, monitoring activities are likely to include the creation of, and regular visits to, bores and short term or longitudinal flora or fauna studies etc. These activities are likely to take place outside and within, the site of the facility. s 42 [redacted] these activities may trigger, careful consideration of the practical consequences that arise and management of stakeholders including environmental groups, land owners and environmental authorities will be required to support these activities.

Other examples are considered below. See criterion 1, pp. 24-59 and summary of independent reports, pp. XVI-LII for detailed environmental information about each site.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Low**	**Low**	**Minor**
Comment on risk and mitigation	There is a low risk that future facility-related actions will give rise to public criticism and delays due to the need to consult about future/ongoing environmental regulatory requirements and manage stakeholders' environmental concerns about environmental monitoring, draw down on the water supply, flood management and road works. These risks would be mitigated by ongoing engagement and consultation with relevant authorities and the affected stakeholders.		There is a minor risk that future facility-related actions will give rise to public criticism and delays due to the need to consult about future/ongoing environmental regulatory requirements and manage stakeholders' environmental concerns about environmental monitoring, draw down on the water supply, flood management and road works. The risk, while minor, is greater than for Lyndhurst and Napandee due to the greater flooding risk and more extensive road works required at Wallerberdina. These risks would be mitigated by ongoing engagement and consultation with relevant authorities and the affected stakeholders.
Discussion - Environmental monitoring	Post-acquisition, further assessments will be required to inform the development of the facility safety case and indicate the number, type and location of environmental monitoring sites surrounding the selected site. Careful management of stakeholders including environmental groups, land owners and environmental authorities will be required to support environmental monitoring activities.		
Discussion - Water supply	The drawdown of potable water supplies from the Murray Darling Basin (or the perceived effect of this) may be a sensitive issue requiring careful management of stakeholders including the local community, the South Australian Government and other users of water resources. Water drawdown is likely to be a particular concern during the construction phase when demand for water would be greatest (see 'Utilities supply' section).		The drawdown and desalination of water from groundwater aquifer (or the perceived effect of this) may require careful management of stakeholders include the local farming community, relevant Traditional Owners and other users of this resource (see 'Utilities supply' section).
Discussion - Surface water/flooding	There is some risk of significant inundation, with further modelling required to quantify the potential for flooding and the extent of mitigation work that would be required (high regulatory risk). Further consultation with the community would be required to inform a decision on the preferred approach to reusing or releasing rainwater and stormwater captured at the site.	There is potential for on-site localised flash flooding, but with reduced risk of inundation due to higher elevation (medium regulatory risk). Further consultation with the community would be required to inform a decision on the preferred approach to reusing or releasing rainwater and stormwater captured at the site.	There is a risk of significant inundation from both localised and regional flooding (very high regulatory risk). Even with planned mitigation, it would be difficult to maintain emergency access during all flooding events. Given climate change predictions for more intense rainfall events (as identified in the technical assessment work summarised in the criterion 1 assessment, from p. 24), it may be difficult to demonstrate that the proposed mitigation measures will suffice over the long term (400 years). Further consultation with the community would be required to inform a decision on the preferred approach to reusing or releasing rainwater and stormwater captured at the site.
Discussion - Road access and the environment	Further acquisitions for secondary road access to the site at Lyndhurst may be required (see 'Additional land or property acquisition') and this activity may raise additional environmental considerations.	No additional acquisitions for primary or secondary road access to the site at Napandee are anticipated. Upgrades of existing roads may raise minor additional environmental considerations.	Further acquisitions for primary and secondary road access to the site at Wallerberdina may be required (see 'Additional land or property acquisition') and this activity may raise additional environmental considerations.

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Socio-economic

The facility will be an important part of the local economy and community support and participation will assist in its establishment, operation and long term sustainability. Therefore, consideration of the potential impact on the host community and its interaction with the facility (benefits and challenges), is relevant to making a decision about site selection. Independent specialist socio-economic (attachment S) and economic (attachment T) impact assessments were completed for both potential host communities, which provide the sources of information for this assessment. In the case of Lyndhurst and Napandee this refers to the community centred on the Kimba District Council area, including the township of Kimba, and for Wallerberdina, the Flinders Ranges District Council area, including Hawker (the closest town to the site). The analysis assumed a capital cost for the facility (excluding enabling works) of $325 million, spread over 2021–24. This represents an early estimate by the department of the likely cost of the facility, with estimated impacts likely to be similarly understated in the analysis[18] (see attachment T).

Benefits

The host community of the selected site will benefit from the significant new industry. Based on the early conservative estimated capital costs for the facility, which were about half of current forecast costs, it is estimated that in the first year of initial enabling works, there will be approximately 47 full time equivalent (FTE) jobs, and that construction FTEs will peak at approximately 183. During the construction phase, the host community would benefit from the direct employment of a small number of skilled and unskilled labourers on site and from consequent demand for local goods and services. The construction phase workforce will be followed by a minimum of 45 Full Time Equivalent (FTE) jobs over the long operational phase[19].

For the host community to realise the largest possible amount of benefit, it would need to draw on internal and external resources. During the four years immediately post-acquisition, up to the construction period, $8 million of grants provided through a Community Skills and Development Program will strengthen the economic and skills base within the host community and nearby communities. The funding will assist local workers, those looking for work, and local businesses to build their economic capacity, skills and resilience, and to help them respond competitively to opportunities from hosting the facility in early works, construction and delivery. Funding will also support the protection and promotion of local indigenous cultural, heritage and business development.

A $20 million NRWMF Community Fund will be established to deliver benefits for the community and support long-term infrastructure and development priorities once the facility is fully licenced and operational. The mechanics of how the fund will be delivered to the community is in development but will involve engagement with the local community. The fund could contribute to a range of priorities, including sustainable health services, agriculture research and development, enhancements to local critical infrastructure, and further development of the Indigenous economy in the region.

Additionally, up to $3 million from the Government's Indigenous Advancement Strategy (IAS) is being provided to promote economic opportunities for the local Aboriginal community, including a focus on strengthening Indigenous skills training and employment opportunities in the construction and operation phases of the facility lifecycle including in cultural heritage protection.

Challenges

It is intended that the community will supply part of the facility's workforce. This will require ongoing training of local workers to provide the necessary skills and capabilities required for safe and efficient construction and operation of the facility. Some positions will require a high level of experience and training while others will be more general services roles, which will be more immediately accessible to the local workforce.

The host community could use the 18 to 24 month pre-construction licencing and permitting phase to plan for how it can best service a construction workforce with goods and services over a 3 to 4 year 'boom' period and leverage this opportunity to create and grow new and emerging industries. In doing so, it will provide medium to long term economic opportunities for the community. The host community will also have a 24 to 36 month opportunity to engage with the Australian Government to understand the operational planning and to establish relationships with training providers to upskill local workers.

A large proportion of construction workers and contractors will most likely be sourced from outside the community and s 47C [redacted]. It is intended that fly-in-fly-out (FIFO) arrangements will be minimised where possible, meaning most non-local workers (and their families) will move into the host community during construction and operation stages.

An increased population would place more demand on local accommodation and services, including medical services and schools. The availability of good quality services and affordable accommodation will be important to attract non-locals to work at the facility. Competitive remuneration packages will also be important to incentivise workers to move to a remote area or to work at the facility. Consultations with the host community will further determine community expectations about work opportunities for local residents and identify needs for expanding the

[18] However it is important to note that this does not affect the comparison of the relative economic impact between nominated sites as the same cost estimate was modelled for each of the locations

[19] At the 'mature' operating stage (after pre-operations and commissioning), the minimum staffing level is assessed as being a minimum 45 staff (of which a minimum of 33 would be present at any one time), and a maximum of 61 staff (of which 42 would be present at any one time).

provision of local services and establish arrangements for ongoing monitoring, reporting and evaluation between the government and community.

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Low**	**Low**	**Low**
Comment on risk and mitigation	There is a low risk that there would be ongoing negative socio-economic impacts resulting from the facility due to the host community being unable to benefit from the projected economic benefits. Building on existing community engagement and support activities (see 'Community relationships and stakeholder management' for details), there will be regular engagement and consultation with the host community about the economic and social opportunities for local residents. This consultation will inform the development of a community benefits package and ongoing monitoring of its implementation, which is aimed at ensuring the community benefits of the project are realised and any challenges mitigated.		
Discussion - Local economic base	The Kimba district has a population of 1,100 people, including approximately 650 people who reside within the Kimba township. Over the past decade, several years of variable rainfall have affected overall yield figures from local agricultural production. The agriculture sector employs almost 50% of workers in the Kimba region (as of 2016 ABS Census). The workforce in the agriculture industry has declined in recent times, attributed to improved farming techniques, the use of larger and more efficient machinery and the consolidation of smaller farms. Flow-on economic effects have led to the closure of some local businesses, including in the retail sector. Residents who are unable to find employment in Kimba and the surrounding area tend to move, pursuing opportunities elsewhere. The decline in population and fluctuations in agricultural yield have contributed to a depressed real estate market, which is an indicator of socioeconomic stress. The average cost of house rental in the town in Kimba is $120 per week. More than 25% of housing in Kimba is presently vacant. The value of residential housing (non-farm) in Kimba has fallen by 30-40% in the past five years. Given the declining workforce in Kimba, it may be challenging to attract and retain a permanent operations-phase workforce.	The township of Hawker has a population of 341 people and is located in the Flinders Ranges local government area (LGA) in South Australia (total population around 1,700 people). Hawker is a small agricultural district with an ageing population and heavy reliance on agriculture (broadacre grazing) and a seasonal tourism sector. In the broader Flinders Ranges region, the agriculture sector employs just over 10% of workers (as of 2016 ABS Census). The labour market of Flinders Ranges Council exhibits low participation rates compared with the broader South Australian region and high levels of unemployment. Hawker is experiencing a long term decline in its population and workforce, as is the Flinders Ranges LGA in general, with a slow exodus to the larger centres such as Port Augusta, just to the south of the council boundary. The lack of employment diversification has diminished Hawker's resilience to outside challenges, such as drought or other long term trends such as corporatisation of agriculture and consolidation of farms. The long term population decline in Hawker is illustrated by the high proportion of unoccupied private dwellings at 34%. Hawker is a community facing long term economic challenges, with accompanying social implications.
Discussion - Facility impact	The small construction sector would be unlikely to immediately capture a significant share of the direct build effort. The facility offers an opportunity for the Kimba economy to diversify from its present heavy reliance on agriculture into sectors that are directly and indirectly supported by the facility. The facility is projected to increase both regional economic output and income by around 5% in 2030. The relatively lower impacts in Kimba reflect both a lower value of assumed construction activity and a larger economic base from which the facility is being assessed. In per capita terms, the positive economic impacts for Kimba are projected to be considerably higher than in the Flinders Ranges as the population base is smaller for Kimba.	Given the declining workforce in Hawker, it may be challenging to attract and retain a permanent operations-phase workforce. The small construction sector would be unlikely to immediately capture a significant share of the direct build effort. The development and operation of the facility represents an opportunity to further diversify and expand the employment opportunities in the Flinders Ranges region. The employment opportunities are currently more diverse than in Kimba. The facility is projected to increase both regional economic output and income by around 8% (compared to reference case levels) in 2030.

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Community relationships and ongoing stakeholder management

A constructive relationship with the communities around the approved sites and other relevant stakeholders will be integral to ensuring the successful establishment and operation of the facility and therefore is an important factor to consider when making the site selection. There has been significant community participation including through consultative committees, economic working groups, site characterisation activities, community events and through open communication channels. There has also been targeted engagement with other special interest groups, including landowners, neighbours, businesses and groups representing local Indigenous interests. Goodwill towards the department's efforts has been built up in the communities over time and community members have actively engaged with the process. However, within the communities there are groups that support and groups that oppose the facility. Strong opposition to the facility from some community members and advocacy groups (including those outside the local community) will remain. These sensitivities must be recognised within both the Kimba and Wallerberdina communities as part of ongoing community engagement. It is anticipated that opposition to the facility will continue after the site selection (regardless of the outcome of the site selection process).

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Very high**	**Medium**	**Medium**
Comment on risk and mitigation	s 42 [redacted]	[redacted]	[redacted]
	The significant engagement work undertaken with communities and other stakeholders during the nomination and site selection phases will be able to be built upon to minimise risks associated with managing relationships with relevant stakeholders. This ongoing engagement will draw on a substantial body of due diligence work and legal advice that has informed site selection decisions and stakeholder consultations to date. Transition strategies will also be implemented in the host and non-hosting communities to support them to adjust to the post site selection phase.		
s 42/ s 47F [redacted]	[redacted]	[redacted]	N/A

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	Lyndhurst	Napandee	Wallerberdina
	s 42 [redacted]		
	s 42 [redacted]		
Discussion - Community and stakeholder groups in general	Within the community selected to host the facility, dialogue will continue to ensure that the entire community, including opposing groups, may work together to transition effectively to support the establishment of the facility. A Regional Consultative Committee will be established in the host community to promote communication among the community, the facility operator and the Australian Government. A community development package and NRWMF Community Fund will be rolled out in the community hosting the facility. The community that is not selected to host the facility will have also made significant investments to participate in the engagement process and this should be recognised. Recommendations for transition strategies are being considered for both communities following a proposal to declare a site. The ongoing risk of legal challenge has the potential to delay pre-operational approvals and site preparation, and delay construction. An effective stakeholder engagement strategy is required to manage this risk and avoid delays and associated costs.		
Discussion - Landowners	For Lyndhurst, due diligence work has identified an issue with the validity of the relevant family trust. It is unclear which person/s legally control the trust and who may negotiate compensation on behalf of the trust. Additionally, the family is not united in supporting the facility (this issue is also considered in criterion 2, compensation, p. 66)	The department has commenced negotiations with the landowners on compensation for land acquisition under the NRWM Act (further details in criterion 2, compensation, p. 66). At this stage there is a clear alignment between the landowner's expectations for compensation and the department's valuation estimates.	The department has commenced negotiations with the landowners on compensation for land acquisition under the NRWM Act (further details in criterion 2, compensation, p. 66). At this stage there is a disparity between the landowner's expectations for compensation and the department's valuation estimates. This is not yet resolved.
Discussion - Aboriginal cultural heritage	There are ongoing Aboriginal cultural heritage assessment, consultations and management work required for the site chosen (further details are in the Aboriginal cultural heritage and Native Title section of this assessment, p. 78 and the Aboriginal cultural heritage information summary, p. LIII). The department has engaged in substantial consultation activities with Indigenous groups associated with the approved sites to inform them about the facility and to undertake Aboriginal cultural heritage assessment work. It will be important to maintain and build on these relationships as a basis for the ongoing work required in relation to Aboriginal cultural heritage.		
	Collaboration may be difficult to achieve in some circumstances, due to active opposition to the facility from the BDAC, including a Federal Court challenge to the planned 2018 community ballot for Kimba by BDAC (the Federal Court rejected this challenge, but it has been appealed by BDAC).		Collaboration may be difficult to achieve in some circumstances, due to active opposition to the facility from ATLA.
Discussion - South Australian Government	The department has been engaging with South Australian Government officials since 2016 on progressing a range of key issues for the project including the South Australian Government's rights or interest in the approved sites (further details at criterion 2, compensation, p. 66), the proposed land titling processes and s 42 [redacted] The department's ongoing consultation with the South Australian Government suggests it may support the facility if community support to host the facility can be established. Further clarity on this point may be achieved after the community ballots are finalised. The establishment of the facility would occur over the next 8-10 years, over which time there will likely be changes in governments at the Commonwealth and State levels. This may impact on the extent of assistance that is provided at various points in the establishment and operational phases.		The department has been engaging with South Australian Government officials since 2016 on progressing a range of key issues for the project including the South Australian Government's rights or interest in the approved sites (further details at criterion 2, compensation, p. 66), s 42 [redacted] The department's ongoing consultation with the South Australian Government suggests it may support the facility if community support to host the facility can be established. Further clarity on this point may be achieved after the community ballots are finalised. The establishment of the facility would occur over the next 8-10 years, over which time there will likely be changes in governments at the Commonwealth and State levels This may impact on the extent of assistance that is provided at various points in the establishment and operational phases.

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Legislative override provisions of the NRWM Act

The operation of the NRWM Act post site selection override provisions (sections 24 and 25), introduces complexity into the ongoing regulation of activities related to the facility's establishment and operation. This needs to be taken into account in planning to minimise possible disruptions to the establishment and operation of the facility. Disruption could occur due to the failure to manage the regulatory process efficiently, including consultations with regulatory stakeholders, such as Parliament, the South Australian Government and public advocacy groups. As such, the impact of the legislative override, is a relevant factor to consider when making a site selection.

There are a number of state and territory prohibition acts in place that prohibit the construction and operation of radioactive waste facilities or regulate activities related to radioactive waste. These state and territory prohibition and other acts will have no effect to the extent that they would regulate, hinder or prevent activities authorised under section 23 of the NRWM Act, including activities are necessary for, or incidental to the establishment or operation of the facility, and certain transport activities (s 24). However, where the state and territory laws do not 'regulate, hinder or prevent' such activities, they will apply. s 42 [redacted]

Commonwealth laws that would regulate, hinder or prevent activities authorised by s 23, including activities that are necessary for, or incidental to the establishment or operation of the facility, and certain transport activities may also be overridden, where they have been prescribed in regulations made for the purposes of section 25 of the NRWM Act. The NRWM Act provides that the EPBC Act, ARPANS Act and Safeguards Act cannot be overridden. Currently, there are no regulations prescribing Commonwealth laws to be overridden. s 42 [redacted]

For more detailed explanation of how sections 24 and 25 provisions operate, refer to criterion 1, future regulatory considerations (p. 58).

	Lyndhurst	Napandee	Wallerberdina
Risk rating	**Minor**	**Minor**	**Minor**
Comment on risk and mitigation	s 42 [redacted] The scope of potential laws to be overridden or allowed is yet to be determined and while there is a mechanism to manage this activity, giving effect to these changes will require Commonwealth Parliamentary scrutiny which could be affected by public opinion. This may have an impact on the ongoing management of stakeholders that have an interest in any laws that are identified for override or allowing them to come into effect. Stakeholders are likely to include Commonwealth and state and territory governments and parliaments, Traditional Owners, community members and members of the public along transport routes. To minimise the risk in this area, a legislative mapping exercise and stakeholder sensitivity analysis will be undertaken to inform a strategy for making any necessary regulations and consulting with stakeholders as required.		
s 42 [redacted]	[redacted]		
Discussion	Detailed mapping of the interaction between the NRWM Act and state and territory and Commonwealth laws will help ensure any impacts on activities required to establish and operate the facility are adequately taken into account in planning. In particular: • from the suite relevant of state and territory laws, identifying laws that may need to be prescribed under the NRWM Act (section 24), either to ensure they are overridden, or to allow them to have effect. • from the suite of Commonwealth laws, identify ones that may need to be prescribed under the NRWM Act (s 25) so that they are overridden. The prescription of laws relevant to the override provisions of the NWRM Act will be subject to Commonwealth Parliamentary scrutiny.		

Additional resources

Glossary

TERM	DESCRIPTION
A	
Absorbed dose	The fundamental dosimetric quantity. Absorbed dose is a measure of the energy deposited in matter by ionizing radiation per unit mass. It is equal to the energy deposited per unit mass of medium, and so has the unit J/kg, with adopted name of gray (Gy) where 1Gy = 1J/kg.
Active drainage	Liquid that has percolated through the disposal vault or drainage from any active area (such as an active processing area or an active laboratory) and is potentially radioactive, normally collected in an active drainage system and then monitored and or treated.
Activity	The average number of spontaneous nuclear transformations of a radionuclide occurring in unit time. The International System of Units (SI) unit of activity is the Becquerel (Bq) which is equal to one nuclear transformation per second.
Activity concentration	The concentration of a radioactive substance in any particular material expressed in terms of the activity in Becquerel per unit mass (or volume) of the material.
Alluvial fan	A triangle-shaped water-transported deposit of gravel, sand, and even smaller pieces of sediment, such as silt. Alluvial fans typically form where there is a rapid change in slope from a high to low gradient. Sediments are deposited as they spread out on a flat plain after flowing down a slope.
Ambient radioactivity	Refers to natural background radiation levels at and around a site.
Approved site (or approved land)	Land which was voluntarily nominated and approved under the processes specified in the NRWM Act. There are three approved sites under consideration as the site for the facility, at Lyndhurst, Napandee and Wallerberdina.
Annual Exceedance Probability (AEP)	Refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. The AEP can also be expressed as a frequency of occurrence, for example, 1 in 2000 is equivalent to 0.05%.
Aquifer	An underground zone of rock or sediment containing a body of water.

As Low As Reasonably Achievable (ALARA), similar to ALARP (as low as reasonably practicable)	A mindset or approach used to achieve low radiation doses to individuals and to limit the number of people exposed to radiation, economic and social factors being taken into account. This generally employs the use of best available techniques and practices.
Attenuation (soil)	Also termed natural attenuation, is a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These in situ processes include: biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants.
Avulsion	An abrupt change in the river course or the rapid abandonment of a river channel and the formation of a new river channel.
B	
Baseline (radiological baseline)	Assessment of the current radiological characteristics of the site to establish a baseline from which to measure or detect future environmental impacts, and to inform a safety case. Determining baseline radiological levels is also important to ensure that the radiation levels at the sites are within normal ranges and that a facility could be operated within the ARPANSA requirements for worker safety.
Biosphere	That part of the environment normally inhabited by living organisms. In practice, the biosphere is not usually defined with great precision, but is generally taken to include the atmosphere and the Earth's surface, including the soil, surface water bodies, seas and oceans and their sediments. There is no generally accepted definition of the depth below the surface at which soil or sediment ceases to be part of the biosphere, but this might typically be taken to be the depth affected by basic human actions, particularly farming.
Becquerel (Bq)	Unit of radioactivity in the International System of Units. The Becquerel (Bq) is equal to one nuclear transformation per second.
Bund or levee	A flood wall or embankment built to prevent water inundation of a site or facility from flooding.
C	
Capping	The engineered layers of materials that will cover a vault complex after it is filled and closed with a concrete lid. The physical properties and expected performance of these layers will be used in the post closure safety case.
Capital costs (baseline)	The least expensive option, of the approved sites, for Government to deliver the facility.

Capital cost differential	The variance in capital cost, compared to baseline, of establishing the facility at a specific site.
Closure (of disposal facility)	The administrative and technical actions required to put a disposal facility in its intended final state on completion of waste disposal.
Commonwealth	Refer to Government.
Contact dose	The radiation rate at the surface of a waste package.
Containment	Methods or physical structures designed to prevent the dispersion of radioactive substances.
Corrosive materials	A corrosive substance or material is one that will damage or destroy other substances with which it comes into contact by means of a chemical reaction.
D	
Decommissioning	Administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a facility (except for a repository which is closed and not decommissioned). Decommissioning implies that no further use of the facility (or part thereof) for its existing purpose is foreseen.
Defence-in-depth	The application of more than a single protective measure, such as barriers, controls, monitoring devices, protective equipment and emergency response measures for a given safety objective, such that the objective is achieved even if one or more of the protective measures fails.
Design life	The period after completion of an engineered disposal structure during which the structure and all its components are expected to perform in accordance with the design objectives.
Disposal	The placement of radioactive waste in a structure and in a manner such that there is no intention of retrieval.
Disposal facility	The land, buildings and equipment which are intended to be used for the disposal of radioactive waste.
Differentiator (or criterion differentiator)	An aspect of a site which when evaluated has a significant or different performance level compared to other sites.
Drainage line/path	Indicates the direction of water flow after rainfall throughout the site.

Dose	A measure of the energy deposited by radiation in a substance. A generic term that may mean absorbed dose, equivalent dose or effective dose depending on context. Here, it generally refers to equivalent dose (which relates the absorbed dose in human tissue to the effective biological damage of the radiation), measured in Sieverts.
Dose limit	The dose limit represents the upper bound of acceptable additional dose (above natural background and elective doses, such as for medical imaging) for an individual worker or member of the public and is normally the legal limit.
Dose rate	The dose of ionizing radiation delivered per unit of time (measured in Sv per time unit).
E	
Enabling works	The preliminary constructed works required for the facility to be constructed. This may include the provision of infrastructure such as roads, water supply, power and communications.
Engineered barrier	A feature made or altered by humans which delays or prevents radionuclide migration from the waste or the storage/disposal structure into its surroundings; it may include the waste package and/or part of the storage/disposal structure.
Environmental management plan	A document which sets out a system of management based on social, economic and environmental aims within which the decision-making process takes place.
Erosion	A process by which the disposal vaults might be damaged in the long term by the actions of wind, water and/or ice.
F	
Facility	Means the facility referred to in the NRWM Act, for the management of controlled material generated, possess or controlled by the Commonwealth or a Commonwealth entity.
Fluvial	Processes that are associated with rivers and streams and the deposits and landforms created by them.
Foundation (or vault foundation)	The primary load-bearing part of a vault structure, normally below ground level.
G	
Geotechnical	Relates to the application of technology to engineering problems caused by geological factors.

Government	The government of the Commonwealth of Australia or of a state or territory of the Commonwealth.
Graded approach	A system of control, such as a regulatory system or a safety system, a process or method in which the stringency of the control measures and conditions to be applied is commensurate, to the extent practicable, with the likelihood and possible consequences of, and the level of risk associated with, a loss of control.
Ground truth	Refers to information provided by direct observation.
Groundwater	Water held in soil or within pores and fractures in rock beneath Earth's surface.
H	
Hydrology	Encompasses the study of water on the Earth's surface and beneath the surface of the Earth, the occurrence and movement of water, the physical and chemical properties of water, and its relationship with the living and material components of the environment.
Hydrological modelling	The characterisation of real hydrologic features and system using small-scale physical models, mathematical analogues, and computer simulations.
I	
Institutional control	Control of a radioactive waste site by an authority or institution designated under the laws of a State. This control may be active (monitoring, surveillance, remedial work) or passive (land use control) and may be a factor in the design of a facility (e.g. a near surface disposal facility). A period of institutional control follows cessation of operations and site closure. A period of 200-300 years is generally attributed to the Institutional control period: considered as a reasonable period to assume for continued organized human institutions/existence of a State.
Intermediate Level Waste (ILW)	Waste that, because of its content, particularly of long-lived radionuclides, requires a greater degree of containment and isolation than that provided by near surface disposal. However, ILW needs little or no provision for heat dissipation during its storage and disposal. Intermediate level waste may contain long lived radionuclides, in particular alpha emitting radionuclides, which will not decay to an activity concentration acceptable for near surface disposal during the time for which institutional controls can be relied upon. Therefore, waste in this class requires disposal at greater depths, in the order of tens of metres to a few hundred metres.

International Atomic Energy Agency (IAEA)	World's centre for cooperation in the nuclear field, promoting the safe, secure and peaceful use of nuclear technology.
International best practice	Codes, standards, recommendations and guides that are produced by the international organisations listed below. 1. United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) 2. International Atomic Energy Agency (IAEA) 3. World Health Organisation (WHO) 4. International Commission on Radiological Protection (ICRP) 5. International Commission on Non-Ionizing Radiation Protection (ICNRP) 6. Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD). NB The *Australian Radiation Protection and Nuclear Safety Act 1998* (the ARPANS Act) states that the CEO of ARPANSA must take into account international best practice in relation to radiation protection and nuclear safety when making licensing decisions. Although the ARPANS Act does not define the term 'international best practice', the CEO has taken it into account by, among other things, the codes, standards, recommendations and guides produced by the above organisations.
Intrusion	The process by which living organisms, including humans, may come in contact with disposed or stored waste. For example, burrowing animals might be able to damage the protective layers and access the radioactive waste.
Ionising radiation	For the purposes of radiation protection, radiation capable of producing ion pairs in biological material(s).
Isolation	Containment of radioactive waste to ensure separation from the environment.
J	
K	
Kaolin	Rock that is rich in kaolinite, a clay mineral.
L	

Levee or bund	A flood wall or embankment built to prevent water inundation of a site or facility from flooding.
Long-lived radionuclides	Radionuclides with half-life greater than 31 years.
Long term safety	Facility safety including the post-closure phase.
Low Level Waste (LLW)	Waste that is above exemption levels, but with limited amounts of long-lived radionuclides. Such waste requires robust isolation and containment for periods of up to a few hundred years and is suitable for disposal in engineered surface facilities. This class covers a very broad range of waste. Low Level waste may include: • short lived radionuclides at higher activity concentration levels, and • long lived radionuclides, but only at relatively low activity concentration.
M	
Marl (or marl clay)	A calcium carbonate-rich mud (sediment) which contains variable amounts of clays and silt.
Mitigation	Measures taken to reduce the severity or seriousness of an identified hazard. The aim of mitigations may be to decrease or eliminate the impact on society and environment.
N	
Non-active drainage	General drainage for surface and groundwater that will not come in contact with radioactive materials.
Nuclear material	See Safeguards Material.
O	
Optimisation (of radiation protection and safety)	The process of determining what level of protection and safety makes exposures, and the probability and magnitude of potential exposures, 'as low as reasonably achievable, economic and social factors being taken into account' (ALARA), as required by the International Commission on Radiological Protection System of Radiological Protection.
Overland flow	Water which has fallen as rain a distance away from a site and then flows over the surface of the land to the site.

P	
Package	The product of conditioning and placement in an approved container. A waste package is the combination of the waste form, any container(s) and internal barriers (e.g. absorbing materials and liner), as prepared in accordance with requirements for handling and storage or disposal.
Peak (ground) acceleration	Measure of the maximum ground shaking that occurs at a location during an earthquake.
Probable Maximum Flood event (PMF)	The largest flood that could conceivably be expected to occur at a location, usually estimated from probable maximum precipitation. It defines the maximum extent of flood prone land, that is, the floodplain.
Proposed acquisition parcel	Approximately 160ha of the approved site, which would be acquired as the site for the facility if a declaration is made under section 14(2) of the NRWM Act.
Q	
R	
Radiation	See ionising radiation.
Radioactive	Exhibiting radioactivity; emitting or relating to the emission of ionising radiation or particles.
Radioactive waste	Waste that contains or is contaminated with radioactive substances and has an activity or activity concentration higher than the level for clearance from regulatory requirements, and for which no further use in Australia is envisaged.
Radionuclides	An unstable nuclide that emits ionising radiation. A nuclide is a species of atom characterised by the number of protons and neutrons and, in some cases, by the energy state of the nucleus.
Raft slab	A type of building foundation. Reinforced concrete slab that rests on the ground and extends over the entire footprint of the building structure.
Receptor	When undertaking environmental or radiological impact assessment modelling, a receptor is chosen as part of the source-pathway-receptor approach to evaluating potential impacts. The source is where the pollution/hazardous material or radiation came from. The pathway is how that material or radiation can travel through the environment. The

	receptor is the human or environment which could be impacted by the transport of that material, hazard or radiation.
Residual risk	Residual risk is the risk remaining after risk treatment (mitigation measures).
RESRAD-OFFSITE	A computer code modelling tool used to assess radiation exposures of a human receptor located on top of or at some distance from soils contaminated with radioactive materials.
Risk, contingent	Risk estimates that make allowance for the unknown risks associated with a project. Generally reduce as better quality information becomes available and some risks have passed or been overcome.
Risk, inherent	Inherent risks are those that exist based on the general characteristics of the project.
S	
Safeguards	Describes the system of inspection and verification of the peaceful uses of nuclear materials as part of the Nuclear Non-Proliferation Treaty (NPT), supervised by the International Atomic Energy Agency.
Safeguards material	Any uranium, thorium or plutonium held in Australia under ASNO permits, or otherwise subject to the *Nuclear Non-Proliferation (Safeguards) Act 1987* (Cth) (Safeguards Act), with limited exceptions as described in the Nuclear Non-Proliferation (Safeguards) Regulations 1987[20].
Safety Case	The safety case is the collection of scientific, technical, administrative and managerial arguments and evidence in support of the safety of a disposal or storage facility. The Safety Case includes the safety case context; safety strategy; system description; safety assessment; limits, controls and conditions; integration of safety arguments; management of uncertainty and iteration and design optimisation.
Seismic	Effects due to shaking of the land (often associated with earthquakes).
Short-lived radionuclides	Radionuclides with half-life less than 31 years.
Sievert (Sv)	Unit of ionising radiation dose in the International System of Units.
Site characterisation	Desktop and field-based investigations of aspects of a site which can be used to assess its suitability.

[20] The definition of 'nuclear material' for the purposes of IAEA safeguards does not apply to ores and ore residues.

Site suitability criteria	Site suitability criteria have been developed to enable a suitability assessment to support a decision about site selection. The legislatively-driven criteria (1, 2 and 3) are centred on the regulatory, cost and other relevant considerations of selecting a site for a radioactive waste management facility and of establishing and operating such a facility on the selected site to ensure that radioactive waste generated, possessed or controlled by the Commonwealth or a Commonwealth entity is safely and securely managed. The additional criterion 4, is driven by a commitment by successive ministers that the facility will be established in a community where there is broad community support.
Sorption	Absorption and adsorption considered as a single process (physical and chemical), by which one substance becomes attached to another.
Solar exposure (diffuse)	The total amount of solar energy falling on a horizontal surface from all parts of the sky apart from the direct sun. Different to global solar exposure which is the total amount of solar energy falling on a horizontal. Diffuse solar exposure is always less than or equal to the global exposure for the same period.
Storage	The emplacement of waste in a facility with the intent and in a manner such that it is being temporarily stored, and later can be retrieved.
Structural design life	The period over which a structure is expected to continue to perform its basic functions and beyond its intended operational life, even at a reduced level. It is also a measure of the useful life of a disposal structure.
Surface disposal	The disposal of radioactive waste in structures located above the natural ground surface and covered by layer(s) of natural and/or manufactured materials.
Surface engineered disposal facility	A disposal facility that is an engineered structure comprising vaults and cells that is located on a founding horizon at the surface.
T	
Traditional Owners	For the purposes of this report, this refers to Native Title holders near the: Lyndhurst site (the Barngarla People and the Gawler Ranges People), the Napandee site (the Barngarla People) and the Wallerberdina site (the Adnyamathanha People). The relevant registered Native Title bodies corporate (RNTBC) are the Barngarla Determination Aboriginal Corporation (BDAC), Gawler Ranges Aboriginal Corporation (GRAC) and the Adnyamathanha Traditional Lands Association (ATLA). Another relevant Traditional Owner organisation is the Viliwarinha Yura Aboriginal Corporation (VYAC), which was established to manage traditional lands on behalf of the Adnyamathanha People.

U	
V	
Vault	A large engineered concrete disposal structure into which LLW waste packages are placed for disposal.
Vault complex	At the facility a group of approximately six (6) vaults used for disposal of LLW waste packages.
Volcanism	Various processes and phenomena associated with the surficial discharge of molten rock (magma), pyroclastic fragments, or hot water and steam.
W	
Waste Acceptance Criteria (WAC)	Quantitative and qualitative criteria specified by the facility operator and approved by the regulator, for radioactive waste to be accepted by the operator of a repository for disposal or storage.
Waste conditioning	Treatment operations that produce a stable waste form that together with the waste container/s, provides a waste package that is suitable for handling and storage and/or disposal. Conditioning may include the conversion of the waste to a solid waste form and enclosure of the waste in one or more containers. For waste transport, an additional overpack (an extra container) may be required until the waste is disposed or stored at the facility.
Waste package	The product of conditioning and placement in an approved container. A waste package is the combination of the waste form, any container(s) and internal barriers (e.g. absorbing materials and liner), as prepared in accordance with requirements for handling and storage or disposal.

Abbreviations

AECOM	AECOM Australia Pty Ltd
AEP	Annual Exceedance Probability
ACHA	Aboriginal Cultural Heritage Assessment
ANSTO	Australian Nuclear Science and Technology Organisation
ARPANS Act	*Australian Radiation Protection and Nuclear Safety Act 1998* (Cth)
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASNO	Australian Safeguards and Non-Proliferation Office
ATLA	Adnyamathanha Traditional Lands Association
ATSIHP Act	*Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth)
BDAC	Barngarla Determination Aboriginal Corporation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CBP	Community Benefits Programme
CSM	Conceptual Site Model
DBC	Detailed Business Case
DEM	Digital Elevation Model
DIIS	Department of Industry, Innovation and Science
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
FRC	Flinders Ranges Council
FTE	Full Time Employment
GRAC	Gawler Ranges Aboriginal Corporation
GRN	Ground Radio Network
GRP	Gross Regional Product
HWG	Heritage Working Group
HLW	High level waste
IAEA	International Atomic Energy Agency
ICP	Institutional Control Period
ILW	Intermediate Level Waste
LAA	*Lands Acquisition Act 1989* (Cth)
LLW	Low Level Waste

LYN	Lyndhurst site, near Kimba
Mining Act	*Mining Act 1971* (SA)
NAP	Napandee site, near Kimba
NVP	Newer Volcanics Province
NPW Act	*National Parks and Wildlife Act 1972 (SA)*
NRWMF	National Radioactive Waste Management Facility (the facility)
NRWM Act	*National Radioactive Waste Management Act 2012* (Cth)
ORIMA	Orima Research Pty Ltd
OCA	Outback Communities Authority
PGPA Act	*Public Governance, Performance and Accountability Act 2013* (Cth)
PMF	Probable Maximum Flood event
Prohibition Act	*Nuclear Waste Storage Facility (Prohibition) Act 2000* (SA)
RPS	RPS Group (global professional services firm)
SA	South Australia
Safeguards Act	*Nuclear Non-Proliferation (Safeguards) Act 1987* (Cth)
STEM	Science, Technology, Engineering and Mathematics
VHF	Very High Frequency
VYAC	Viliwarinha Yura Aboriginal Corporation
VSAT	Very Small Aperture Terminal
WAC	Waste Acceptance Criteria
WBD	Wallerberdina site, near Hawker, Flinders Ranges

Summaries of independent reports

During the site selection phase, the department commissioned independent reports covering a wide range of material including site physical characteristics, enabling infrastructure, Aboriginal cultural heritage and socio-economic impact to the communities.

The site suitability assessments against site selection criteria 1, 2 and 3 draw on the information in the independent reports and for ease of reference, a summary of each independent report is included below. Each summary identifies:

- the name and author of the independent report
- the reason for gathering information about the topic
- the preferred site characteristics
- the work completed to date
- limitations of the data
- site, community and district-specific information.

Each summary has been prepared by the department and reviewed by the independent report author. The unabridged independent reports are attached (see list at p. LXVI).

Site physical characteristics

The following information summaries of the physical characteristics of the sites are based on preliminary studies conducted by AECOM, which were reported in the 2018 Site Characterisation Technical Reports and 2019 Technical addendums (see full reports at attachments K, L and M).

AECOM site definitions

- Nominated site: the site approved under the NRWM Act.
- 100 hectare site: the original indicative location for the facility selected for the studies to be undertaken.
  - The preliminary data collected to date (February to November 2018) is based on the 100 hectares identified in 2018 for the AECOM site assessment work.
- Revised site: the current portion of the nominated site (approximately 160 hectares) identified as the indicative location for the facility.
  - AECOM undertook further site assessment studies (from April to October 2019) to confirm the information gathered for the original 100 hectare sites were still applicable to the larger footprint of the approximately 160 hectare sites now chosen on each of the nominated sites.

Flora and fauna

Reason for gathering information:

To characterise flora and fauna present on and adjacent to the nominated site, identify any threatened ecological communities or threatened species21 and their supporting habitats which could preclude use of the nominated site for the proposed facility.

The EPBC Act, *Native Vegetation Act 1991* (SA) and the *National Parks and Wildlife Act 1972* (SA) (NPW Act) informed the assessments undertaken by AECOM.

Preferred site characteristics:

Absence of Commonwealth and South Australian-listed (state-listed) threatened species and supporting habitat, and limited requirement for vegetation clearance.

Work completed to date:

- Desktop assessment, including searches of federal and state databases, undertaken in February 2018 that included the site and a 10 kilometre radius area around the site.
- On-site field work assessment, including a preliminary field survey, undertaken in April 2018 to verify the desktop assessment and gather additional data. The field survey covered the 100ha area and approximately 1km surrounding the site.
- Additional targeted surveys were conducted in September 2018 (spring) focussed on assessing the presence/absence of Commonwealth and state-listed threatened species on the nominated sites and their surrounds. These surveys including the site, the nominated property, its immediate surrounds and in some cases a few locations adjacent to the local access roads

Limitations of the data:

A lack of rainfall at Wallerberdina limited the assessment of shrub diversity and composition. Assessment following further significant rainfall events at Wallerberdina will be required to be able to address this data gap and record any ephemeral flora species.
Further field surveys will be required to determine the presence and extent or likelihood of occurrence and significance of any potential impacts on the listed species.

[21] Commonwealth-listed threatened species include those categorised under the EPBC Act as extinct, extinct in the wild, critically endangered, endangered, vulnerable, and conservation dependent. State-listed threatened species include those categorised under the NPW Act as extinct, critically endangered, endangered, vulnerable and rare (near threatened) species.

Lyndhurst

- Minimal clearance of native vegetation will be required given the site has been used for cropping and only 7 per cent of the site contains native vegetation.
- No Commonwealth-listed threatened ecological communities are present within the nominated site or its surrounds.
- There is an area of high quality mallee scrub located approximately 1.5 kilometre north north-west of the site that is protected under a heritage agreement (between the land owner and the South Australian Government).
- The habitat within the site is unlikely to provide important habitat for Commonwealth or state-listed threatened flora and fauna species as the vegetation is fragmented.
- No Commonwealth-listed threatened fauna species were recorded within the site or are considered likely to occur (other than passing through the landscape). The Malleefowl, a Commonwealth-listed vulnerable species, has been identified as a possible species that may occur in the area surrounding the nominated site. There is evidence of the Malleefowl in the area surrounding the nominated the site, although the likelihood of its occurrence on the site is considered low. Further targeted surveys will be required to determine the likelihood of occurrence and significance of any potential impacts.
- No flora and fauna constraints were identified that would preclude the future development of the facility at the nominated site. This is based on the absence of any identified Commonwealth-listed threatened ecological communities on the nominated site and surrounds, no records of Commonwealth listed species present within the nominated site (or significant habitat to support such species).

Napandee

- Minimal clearance of native vegetation will be required given the site has been used for cropping and less than 5 per cent of the site contains native vegetation.
- No Commonwealth-listed threatened ecological communities are present within the nominated site or its surrounds.
- One flora species listed as rare under the NPW Act, the Ridged Noon-flower, was recorded in vegetation in the south-west corner of the nominated site (which sits adjacent to roadside vegetation) and in adjacent roadside vegetation. Further long-term field surveys will be required to determine the likelihood of occurrence and the significance of any potential impacts on the listed species.
- No Commonwealth-listed threatened fauna species were recorded within the nominated site, or are considered likely to occur (other than passing through the landscape) given the lack of suitable habitat. The Malleefowl, a Commonwealth-listed vulnerable species, has been identified as a possible species that may occur in the area surrounding the nominated site. Further targeted surveys will be required to determine the likelihood of occurrence and significance of any potential impacts. The state-listed rare Scarlet-chested Parrot was observed in the area surrounding the site during survey however the species is only expected to be present on an occasional and opportunistic basis within the remnant vegetation in the south western portion of the site.

- No flora and fauna constraints were identified that would preclude the future development of the facility at the nominated site. This is based on the absence of any identified Commonwealth-listed threatened ecological communities on the nominated site and surrounds, and no Commonwealth listed species present within the nominated site (or significant habitat to support such species).

Wallerberdina

- The site is covered by open chenopod shrubland which will need to be cleared to enable development of the facility.
- No Commonwealth-listed threatened ecological communities are present within the nominated site or its surrounds.
- No Commonwealth or state-listed threatened species were recorded within the nominated site or are considered likely to occur given the lack of suitable habitat.
- There are two state-listed threatened species, the Desert Lime (flora, vulnerable) and Elegant Parrot (fauna, rare), that have been recorded in the broader area beyond a 10 kilometres radius around the site. There is no habitat present within the Wallerberdina site that is considered to be of importance for these species so the likelihood of occurrence is considered low.
- A lack of rainfall prior to surveys at Wallerberdina limited the assessment of shrub diversity and composition. Further surveys following significant rainfall events at Wallerberdina will be required to be able to address this data gap and record any ephemeral flora species that may be present. This is not considered a significant limitation due to the lack of identification of any expected annual species through desktop assessment.
- No flora and fauna constraints were identified that would preclude the future development of the facility at the nominated site. This is based on the absence of any identified Commonwealth-listed threatened ecological communities on the nominated site and surrounds, and absence of any listed species within the nominated site (or suitable habitat to support such species).

Conservation and special use areas

Reason for gathering information:

To identify any conservation or recreational parks in close proximity to the nominated site, and any Aboriginal cultural heritage or state and local-listed heritage sites which could preclude use of the site for the proposed facility. The NPW Act and *Heritage Places Act 1993* (SA) informed assessments undertaken by AECOM.

Preferred site characteristics:

Absence of parks (national parks, conservation parks, conservation reserves, recreational parks, wilderness protected areas and Native Vegetation Heritage Agreements) and Aboriginal or state and local heritage sites on or adjacent to the site.

Work completed to date:

Desktop assessment including review of registered parks and land uses.

Limitations of the data:

No known limitations.

Note:

A separate Aboriginal cultural heritage information summary (p. LIII) has been prepared based on two reports prepared by RPS: the *Kimba Aboriginal Heritage Desktop Assessment Report* and the *Wallerberdina Aboriginal Cultural Heritage Report*. The Aboriginal cultural heritage summary addresses Native Title considerations, potential archaeological sites and research, cultural practices, connection to Country and recommendations for continued Traditional Owner engagement.

Once a site has been acquired, a comprehensive archaeological investigation and consultation with the relevant Traditional Owners will be required to fully assess the cultural values that may be impacted and to develop an Aboriginal Cultural Heritage Management Plan.

Lyndhurst

- No identified registered Aboriginal heritage sites or state or local heritage sites are present on site or within a 10 kilometres radius of the site.
- Five areas of native vegetation conserved under heritage agreements are present within 5 kilometres of the site, including the area of mallee vegetation located around 1.5 kilometres north north-west of the site (see flora and fauna summary, p. XVII].
- Lake Gilles Conservation Park is located approximately 4 kilometres north to north-east from the site.
- Any future facility development on this site is unlikely to be restricted based on conservation or special use areas.

Napandee

- No identified registered Aboriginal heritage sites or state and local heritage sites within the site or within a 10 kilometre radius of the site.
- Pinkawillinie Conservation Park is 2 kilometres south of the site.
- Any future facility development on this site is unlikely to be restricted based on conservation or special use areas.

Wallerberdina

- No national or state conservation parks and reserves near the site or the nominated property.
- Twenty-six registered and three restricted Aboriginal heritage sites are located in the local area, but well separated from the site. For example, Hookina Spring and Hookina Waterhole are located around 8 and 12 kilometres respectively from the site, adjacent to Lake Torrens Road which is the designated local access road. Refer to the separate Aboriginal cultural heritage information summary (p. LIII) for further details.
- Any future facility development on this site is unlikely to be restricted based on conservation or special use areas.

Bushfire risks

Reason for gathering information:

To characterise the extent to which local bushfire risk is increased by vegetation/fuel hazard and other potential sources for ignition including: site slopes, bushfire weather frequency/severity, and the likelihood and nature of the bushfire impact.

Australian Standard (AS) 3959-2009 *Construction of buildings in bushfire-prone areas,* South Australian Government Department of Environment, Water and Natural Resources, 2012 *Overall Fuel Hazard Guide for South Australia*, informed assessments undertaken by AECOM.

Preferred site characteristics:

A combination of climatic conditions, fuel loadings, topography and ability to create buffers which minimises the risk and potential severity of bushfires and allows for sufficient setbacks/buffers to meet the Australian Standard for building in bushfire prone areas.

Work completed to date:

Desktop assessments including a review of the topography from LiDAR (Light Detection and Radar) data, mapped vegetation from desktop and field work, and weather and climatic conditions.

Limitations of the data:

Assessment of bushfire risk was carried out for the original 100 hectare site, completed without reference to site-specific facility designs and layouts, which will be considered post-site selection. The assessment of bushfire risk shall be updated for the revised site area for the selected site.

Lyndhurst

- An extensive area of Mallee woodland and shrubland vegetation is located 1.5 kilometres north of the revised current approximately 160 hectare site which is located south of the original 100 hectare site. Mallee woodland and shrubland are recognised as the most highly flammable and fire prone plant communities of all plant communities in semi-arid and arid zones. The site could be exposed to large, intense and fast moving fire from this area. The site is also surrounded by cropping land.
- The site vegetation includes cropping land and a few small areas of tree and shrub vegetation which are greater than one hectare in size.
- The nominated site is not unduly impacted by bushfire hazards, including fuel load from surrounding vegetation (including the large area of mallee woodland 1.5 kilometres north north-west of the site) and site vegetation, if appropriate low threat setbacks are established for development of the site.
- Bushfire risk will also be mitigated through detailed bushfire risk assessments of the site and proposed infrastructure with setbacks being determined based on asset vulnerability to bushfire attack, building design measures, and the level of provision of firefighting infrastructure.
- There is sufficient space to allow for necessary setbacks/buffers to meet the Australian Standard for building in bushfire prone areas.

Napandee

- The site and surrounding vegetation is predominantly cropping and grazing land. Tree and shrub vegetation is present along the road to the west of the site and in small patches on the site, however it is unlikely to sustain a wide fire front.
- The nominated site is not unduly impacted by bushfire hazards if setbacks/areas of cleared vegetation are established around assets, commensurate with asset vulnerability to bushfire attack, building design measures, and provision of firefighting infrastructure. There is sufficient space to allow for necessary setbacks/buffers to meet the Australian Standard for building in bushfire prone areas.

Wallerberdina

- The bushfire hazard at this site is low due to the benign topography and lower-hazard nature of the predominantly open shrubland vegetation on and around the site.
- Bushfire risk could be readily mitigated by implementing appropriate setbacks and buffer areas from vegetation and through building design measures.

Hydrology and flood risks

Reason for gathering information:

Assess the potential for localised flooding, episodic major flooding and/or the sudden change in landform (avulsion) from upstream catchments, both now and in the future as a result of climate change, which could impact safety, operations and site access without mitigation.

The International Atomic Energy Agency (IAEA) SSG-18 Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations (2011) and Australian Rainfall and Runoff (ARR): A Guide to Flood Estimation (Geoscience Australia, 2016), informed assessments undertaken by AECOM.

This information summary is relevant to the 'climatic conditions and climate change' (p. XXXVIII) and 'geology and hydrogeology, and soil, geochemistry and geotechnical considerations' (p. XXIX) information summaries.

Preferred site characteristics:

Minimal catchment areas and watercourses draining into the site, an absence of non-absorbing (hydrophobic) soils, high soil conductivity rates (indicator of soil health), and fewer lower intensity rainfall events.

Work completed to date:

A desktop assessment was completed, covering rainfall depth and intensity, topography (for example; watercourses, terrain elevation (from LiDAR surveys) and satellite and aerial photography) and available anecdotal flood information or previous flood studies.

The potential impacts associated with localised and catchment scale flooding were assessed through the development of a hydrological model for each site and the conduct of predictive flood modelling for events ranging from frequent to very rare in occurrence. The assessment considered not only potential for inundation of the site but also the potential for site access via local roads to be impacted during potential flooding events. The impact of climate change (in particular an increase in rainfall intensity during flood events) was assessed through flood modelling the 2090 predictions for comparison against model outputs under current conditions.

Limitations of the data:

Modelling at Wallerberdina was limited by a lack of available data for the 1955 and 2007 flood events limited calibration and verification of the hydrological and hydraulic models.

The predictive flood modelling is limited by the accuracy and uncertainty of the terrain, inflow and other data. Whilst terrain data has been captured for a large area surrounding the sites (LiDAR survey with vertical accuracy of 0.1m), the available terrain data (SRTM, vertical accuracy in metres) of the broader local and regional catchments that contribute to flood risk at the site or along local access routes is of much lower accuracy.

LiDAR data was captured along the entire route of local access roads from the highway to the Wallerberdina site. LiDAR data along the route of local access roads at the Napandee and Lyndhurst sites was captured in an area limited to small sections closer to the site and thus only lower accuracy terrain data (SRTM, vertical accuracy in metres) was used to conduct the flood modelling along most of the length of the local access routes. The flood modelling along the Napandee and Lyndhurst local access road therefore only provides an indication of the potential broad zones which might be subject to flooding but does not currently provide reliable data regarding the level of inundation.

The predictive flood modelling for the sites is based both on current site terrain information and estimated surface flow paths. Further flood modelling will need to be undertaken upon completion of a concept design for the facility on the selected site and design updates for any upgrades to local access roads.

The predictive flood modelling that incorporates climate change impacts includes predictions which extend to 2090, which does not extend across the entire assumed operational period of the facility of 100 years nor does it include the subsequent period required for post-closure monitoring.

Lyndhurst

- There are no creek lines (lines that usually flow) in the local area (within 10 kilometres of the site). Drainage lines (lines that can flow after rainfall) exist through the site. The topography of the site is undulating and forms areas of low-lying land that has the capacity to capture flood waters that enter the site.
- Flood modelling indicates significant flooding within sections of the site originating from the small local upstream catchment at the south-east of the site. Estimated depths of water reach a maximum of 3.6 metres (1 in 100 annual exceedance probability: AEP flood event) within a few hours of the storm event and is concentrated in the low-lying areas of the site where it will pond and slowly recede (via infiltration).
- Access to the site is expected to be impacted at several locations in more frequent 1 in 5 AEP flood events. Additional terrain data with high vertical accuracy (e.g. LiDAR survey) will needed to undertake flood modelling that provides more accurate predictions of flow paths and the depth of inundation at specific points along the local access roads.
- The site is not inundated by flooding from the extensive regional catchment floodplain to the north and north-west that conveys regional flood flows to Lake Gilles (4 kilometres to the north north-east) as the site is located on elevated ground compared to the surrounding floodplain.

Napandee

- There are no creek lines in the local area (within 10 kilometres of the site), however drainage lines exist in the vicinity of the nominated site, and local drainage paths exist through the site.
- A large regional catchment (upstream, approximately 150 square kilometres) drains past the south-western corner of the nominated site. The site is located on elevated ground compared to the catchment floodplain and is not inundated by such floodwaters.
- Flood modelling indicates that flooding on the site is contained within the localised drainage paths that exist in and surrounding the site. The predicted depth of flood water is up to 0.7 metre on the site during a 1 in 100 AEP flood event which occurs within a few hours of the storm event, receding in a similar timeframe after. Small amounts of ponding are indicated across the southern boundary of the site, along Tola Rd. The maximum depths of flood water reach 1 metre on the site in a probable maximum flood (PMF) flood event.

- Access to the site will be impacted at several locations along Tola Road at a 1 in 5 AEP flood event, where flood water is expected to recede shortly after the event. Additional terrain data with high vertical accuracy (e.g. LiDAR survey) will need to be undertaken to provide accurate predictions regarding the depth of inundation at specific points along the local access roads during flood events.

Wallerberdina

- Hookina Creek passes through and outside the southern edge of nominated site at Wallerberdina and passes within 2.5 kilometres of the site, with a tributary located 1.5 kilometres east of the site.
- Hydrological modelling indicates that the site is subject to shallow flooding from local catchments in smaller, localised flood events. Flood water that overtops the banks of Hookina Creek contributes to flood waters on the site during rarer flood events (greater than 1 in 200 AEP).
- The highest predicted depth of water produced from the smaller flood events from local catchments is up to 0.3 metre in a 1 in 100 AEP flood event, 0.5 metre at a 1 in 200 AEP flood event, and up to 2.5 metres in a PMF flood event. Maximum depths are expected within a few hours of the event and will recede within a day of the end of the event.
- Access to the site will be impacted at several locations including points at which the access road crosses Hookina Creek. Flood water is predicted to reach up to 3.8 metres depth along the access roads during more frequent 1 in 5 AEP flood events but recedes shortly thereafter.

Impact of nearby human activities and land use planning

Reason for gathering information:

Identifying existing and potential future land uses in proximity to the nominated site (sensitive land uses, extractive or hazardous activities) that may adversely impact on the site or be impacted by the establishment of the facility.

The IAEA Safety Requirements No. NS-R-3 (Rev. 1) *Site Evaluation for Nuclear Installations* (2016) and the *Kimba Council Development Plan* (consolidated 25 October 2012) informed assessments undertaken by AECOM.

Preferred site characteristics:

Minimal sensitive land uses such as residences and community facilities in close proximity to the nominated site, and suitable buffer distances from the nearest sensitive land uses.

No or minimal competing land uses (for example, mining tenements, hazardous facilities, and airfields) close to the nominated site which could adversely impact the safety or operations at the facility.

Work completed to date:

A desktop assessment was undertaken including a review of relevant publicly accessible databases, planning documents and property information.

Limitations of the data

The likelihood of development of adjacent mining tenements in some areas is unknown. Further review of flight paths, runway orientation and crash data is required.

Lyndhurst

- The nominated site is well separated from adversely affecting development and sensitive land uses.
- The surrounding land zoning, the physical characteristic of land within the locality, and the declining population trend, suggest the likelihood of development of any intensive residential or urban development in proximity of the site in the future would be low.
- There are a number of mineral tenements close to the site. If the tenements located off-site proceed to production, the associated activities may have the potential to impact the facility or its enabling infrastructure.
- The nominated site lies in the vicinity (8 kilometres) of the Kimba Aerodrome (Civil Aviation Safety Authority registered). The IAEA guidelines indicate any adverse impact of off-site installations should be evaluated and that a site should be considered less suitable where present or future activities could create significant release pathways between the waste and the biosphere. For an airport, this could arise via an accident or a security incident of a plane crashing into or near the facility area. Acquisition of the site by the Commonwealth would extinguish the tenements on the site.

Napandee

- The site is well separated from adversely affecting development and sensitive land uses.
- There are a number of mineral tenements close to the site. If the tenements located off-site proceed to production, the associated activities may have the potential to impact the facility or its enabling infrastructure.
- Acquisition of the site by the Commonwealth would extinguish the tenements on the site.

Wallerberdina

- The site is well separated from adversely affecting development and sensitive land uses.
- There are a number of mineral and geothermal tenements over and within close proximity to the site. If the tenements located off-site proceed to production, the associated activities may have the potential to impact the facility or its enabling infrastructure.
- Acquisition of the site by the Commonwealth would extinguish the tenements on the site.

Geology and hydrogeology, and soil, geochemistry and geotechnical considerations

Reason for gathering information:

Characterise the sub-surface environment to determine the following characteristics:

- the distribution and movement of groundwater (hydrogeological)
- the chemical composition and interactions (geochemical)
- the physical structure, strength and characteristics (geological and geotechnical).

These characteristics may have an impact on design and construction (in particular, foundations and disposal vault design), the cost of construction, the safety case or the strategy for providing utilities to the site.

Standards and guides, including AS 1726:2017 *Australian Standard Geotechnical Site Investigations*, AS 1289 series *Australian Standard Method of testing soils for engineering purposes*, AS/NZS 5667.1:1998 *Water quality — Sampling Guidance on the design of sampling programs, sampling techniques and preservation and handling of samples*, and the National Uniform Drillers Licensing Committee (NUDLC) *Minimum Construction Requirements for Water Bores in Australia Version 3* (February 2012) informed assessments undertaken by AECOM.

Preferred site characteristics:

- deep water table
- low potential for vertical or horizontal migration of water through underlying soil
- presence of subsurface material with properties that limit water flow
- limited or no groundwater users
- absence of geotechnical hazards such as the potential for slope instability and/or erosion, soil liquefaction, collapsing or expansive soils, subsidence due to ground features or long-term settlement
- subsurface conditions that will support an efficient foundation/footing design.

Work completed to date:

Desktop assessment including review of publicly available datasets, including the natural resource management setting for the site (such as potential groundwater use).

A drilling and test pitting programme was carried out in 2018. Boreholes were converted into groundwater bores. Soil and groundwater samples were collected and analysed by laboratories.

A subsequent test pitting and drilling program was completed in 2019 due to fill data gaps due to relocation of the Lyndhurst site to the south of the nominated property and a change in shape and increase in area of the Napandee site. The 2019 intrusive works included four new boreholes and four new test pits at Lyndhurst and one new borehole and two new test pits for Napandee.

No additional intrusive works were undertaken in 2019 on the revised Wallerberdina site. Subsurface data is yet to be obtained in the southern portion of the site (formed due to the increased site area).

Limitations of the data:

Investigations to date have been preliminary only and further drilling and testing will be required to further characterise the site to input into the design, safety case and environmental approvals.

A preliminary subsurface conceptual site model (CSM) was prepared for each of the sites which considers the site, local and regional setting, and the subsurface conditions which influence the fate and transport of a contaminant release, and the potential receptors that could be impacted.

Lyndhurst

- Groundwater in the water table aquifer was found to be present at depths generally exceeding 10 metres below ground surface. Groundwater is estimated to move very slowly beneath the site, and is expected, but yet to be confirmed, to discharge to salt lakes to the north and north-east of the site, which form part of the Lake Gilles complex.
- Groundwater was found to be of very limited beneficial use (for instance, cannot be drunk or used for irrigation) due to its high salinity and low yield. There are no known groundwater bores in the local area from which water is being abstracted for a beneficial use.
- Investigations suggest there is limited connectivity between the water table and deeper aquifers which would prevent transport of contaminants between these layers.
- The subsurface kaolin clays may limit the transport of radionuclides in the unlikely event of a subsurface release of waste material. Extent, thickness and continuity of clays is currently unknown.
- Preliminary soil testing indicates that geological hazards and foundation stability (such as slope instability or soil liquefaction) are unlikely to be present at the site.

Napandee

- Groundwater in the water table aquifer was found to be present at depths exceeding 24 metres below ground surface, which provides separation between the facility foundations and the water table in the unlikely event of a subsurface release of waste material (for instance, radionuclides).Groundwater is estimated to move very slowly beneath the site , and is expected, but yet to be confirmed, to discharge to salt lakes to the far west and north-west of the site at distances at least in excess of 50 kilometres.
- Groundwater was found to be of very limited beneficial use (for instance, cannot be drunk or used for irrigation) due to its high salinity and low yield. There are no known groundwater bores in the local area from which water is being abstracted for a beneficial use.
- An unregistered bore was found on site with remnants of storage infrastructure, however it has been abandoned.
- The subsurface kaolin clays may limit the transport of radionuclides in the unlikely event of a subsurface release of waste material.
- Preliminary soil testing indicates that geological hazards and foundation stability (such as slope instability or soil liquefaction) are unlikely to be present at the site.

Wallerberdina

- Groundwater was found to be present at depths greater than 20 metres below surface, which provides separation between the foundations of the facility and the water table in the unlikely event of a subsurface release of waste material (for instance, radionuclides).
- The groundwater was found to be potentially usable for a range of uses including abstraction for use on the facility. Groundwater is currently used within Wallerberdina Station and the surrounding stations for stock watering, although of a salinity that is not considered suitable for drinking.
- Preliminary soil testing indicates that geological hazards and foundation stability (such as slope instability or soil liquefaction) are unlikely to be present at the site.

Landform stability

Reason for gathering information:

Identify if there is the potential for geomorphological processes, including fluvial (deposits made by rivers/stream), aeolian (wind) or slope/mass movement with the potential to impact on long term site stability, including consideration of how other characteristics (overland flow, soils, flooding etc.) may influence this.

Preferred site characteristics:

Long-term stable landform, and minimal potential for slope or mass movement processes.

Work completed to date:

A desktop assessment including: a review of published topographic maps, digital elevation models (DEMs), published geological mapping, aerial imagery, subsurface data from bores and test pits, relevant geomorphological literature and other factors was undertaken during the study. A field inspection was also undertaken.

To assess the risk of a change in the course (avulsion) of Hookina Creek towards the Wallerberdina site, a scenario in which a blockage occurs in the main channel causing increased flows via an existing breakout channel was run through the predictive flood model.

Limitations of the data:

The hydraulic model used for the Wallerberdina site is a fixed-bed model and thus assumes no changes in channel or floodplain topography from avulsion nor simulates scour behaviour from an avulsion.

The geomorphological assessment is based on the current site terrain and not a concept design for the facility that includes cut and fill works, and the potential establishment of infrastructure that may divert and concentrate surface waters within or around the site.

Lyndhurst

- The shoreline of Lakes Gilles is substantially lower than the site and hence the potential for shoreline erosion to impact the site) is unlikely.
- The velocity and shear strength of flood waters over undulating ground is relatively low even during rare, more extreme flood events and thus unlikely to result in slope and mass movement of soil over the site.

Napandee

- The site is situated on dunes which appear to have formed during a Quaternary period of greater aeolian (wind) activity. The dunes remain potentially susceptible to further wind or water erosion, particularly if the vegetation cover is disturbed
- The velocity and shear strength of flood waters over the site is low and therefore there is a low risk of water erosion and mass movement of soil to impact the site during such events.

Wallerberdina

- The site is situated on the Hookina Creek alluvial fan. It is subject to changes resulting from rare infrequent major flood events such as change in course or avulsion of the creek lines in the local area (either further away from or closer to the site), creek bank erosion and channel migration, and the deposition of sediment of scouring of the floodplain. The site is also likely to be impacted by the deposition of wind-blow sand from nearby dune fields during extended dry periods.
- To assess the risk of a change in the course (avulsion) of Hookina Creek towards the Wallerberdina site, a scenario in which a blockage occurs in the main channel causing increased flows via an existing breakout channel was run through the predictive flood model. It was established that only in a very rare 1 in 10000 AEP flood event would the stream power along the breakout channel, 300 W/m^2, be considered sufficient by Yochum et al. 2017 (i.e. above 230 W/m^2) to represent a credible risk of avulsion.

Seismic activity

Reason for gathering information:

To characterise potential seismic hazards with an emphasis on active faults beneath or near the site, near surface faults, and the presence of ridge crests in the site vicinity (as a result of uplift). This includes the identification of the potential for ground movement and the expected peak ground accelerations to be used in design of the facility.

The IAEA SSG-9 *Seismic Hazards in Site Evaluation for Nuclear Installations* (2010), together with relevant peer-reviewed technical information listed in the methodology and scope of the commissioned AECOM reports and other referenced IAEA documents, informed assessments undertaken by AECOM.

Preferred site characteristics:

Absence of potentially active faults that could cause surface faulting through the facility site, near-surface faults that could cause folding or other deformation within the facility site, nearby faults that could cause hanging wall or rupture directivity effects which amplify ground motions, and ridge crests which amplify ground motions, together with generally low potential for ground motion.

Work completed to date:

The desktop assessment included a review of published reports and the collection of data from accessible databases and historical records, including the Geoscience Australia earthquake catalogue.

On-site field work at Wallerberdina included geophysical acquisition of two shallow seismic reflection profiles within the original 100ha site together with a preliminary interpretation of the results.

Limitations of the data:

The location of the major fault expected to be present near the Wallerberdina site was not located during the seismic survey completed across the original 100ha site. Further seismic surveying and analysis would need to be undertaken to locate the range-front should the Wallerberdina site be selected. This would determine the likely impact of any seismic event on ground motion and to inform design parameters.

Additional seismic survey data will also need to be obtained on the selected site within any areas not covered by the previous survey in which radioactive waste storage and disposal infrastructure is proposed to be located.

Lyndhurst

- The data indicates no potentially active faults in the foundation, and no near-surface faults beneath or near the foundation or in the nearby area (excluding the possibility of one-off faulting) of the location of the original 100 hectare site. The revised approximately 160 hectare site was relocated to the south of the approved site.

Napandee

- The data indicates no potentially active faults in the foundation, and no near-surface faults beneath or near the foundation or in the nearby area (excluding the possibility of one-off faulting) of the original 100 hectare site.

Wallerberdina

- The seismic data collected during the site field surveys has not identified any potentially active faults in the foundation beneath the original 100 hectare site, but there is potential for near-surface faults beneath or near the foundation.
- The Western Range range-front faults (which are east of the nominated site) are anticipated to be adjacent to the nominated site. The exact location of the range-front faults has not been defined; further assessment would be required.
- Seismic hazards from ground shaking and deformation would need to be considered in facility design and implementation of structural engineering measures drawn from industry standards and methods.

Background radiation

Reason for gathering information:

To establish a baseline for future environmental radiation monitoring (to inform possible licence applications), and to identify potential elevated background radiation conditions that could affect safety of personnel.

The International Atomic Energy Agency (IAEA) IAEA-TECDOC-1363 *Guidelines for radioelement mapping using gamma ray spectrometry data* and the IAEA Safety Requirements No. NS-R-3 (Rev. 1) *Site Evaluation for Nuclear Installations* informed the assessments undertaken by AECOM.

Preferred site characteristics:

Background radiation levels within the ARPANSA action levels.

Background radiation levels that are not elevated and will not impact the effectiveness of environmental monitoring.

Work completed to date:

- For Lyndhurst and Napandee, reviews of published historical data and targeted intensive aerial radiometric surveying.
- For Wallerberdina, a review of published historical radiometric aerial survey data on a 200 metre grid.

Limitations of the data:

The data has a coarse level of detail, being derived from an aerial survey and published records. As part of the next stage of works, ground truthing (direct, on-site observation) of the results is required to map the specific radiation profile of the site.

Lyndhurst

- Results from published and collected data do not indicate the presence of elevated background radiation levels.
- As part of the next stage of works, ground truthing of the results is required to map the specific profile of the site.

Napandee

- Results from published and collected data do not indicate the presence of elevated background radiation levels.
- As part of the next stage of works, ground truthing of the results is required to map the specific profile of the site.
- Traces of thorium were discovered to the east of the site during aerial surveying. Thorium is a naturally occurring heavy metal that undergoes long-term radioactive decay, and as such it is expected to have negligible impact on the site background radiation levels to be used for monitoring.

Wallerberdina

- Results from published and collected data do not indicate the presence of elevated background radiation levels.
- The data has a coarse level of detail, being derived from an aerial survey and published records. As part of the next stage of works, ground truthing of the results is required to map the specific profile of the site.

Climatic conditions and climate change

Reason for gathering information:

To establish existing climatic conditions for the site based on historic averages, identify any likely changes to climate, and identify the resulting climate-related hazards that could impact on the facility and its workers.

Australian Standard (AS) 5534-2013 *Climate change adaptation for settlement and infrastructure — A risk based approach*, and the IAEA Specific Safety Guide No. SSG-18 *Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations* informed assessments undertaken by AECOM.

This information summary is relevant to the hydrology and flood risks information summary (p. XXIV).

Preferred site characteristics:

Projected climate conditions where the frequency and intensity of climatic events has minimal impact upon the site and facility, or where design intervention can reasonably mitigate risks.

Work completed to date:

- A desktop assessment, including obtaining and analysing data from the closest weather station and collation of historical climate data from the Bureau of Meteorology (BoM).
- Identification of relevant climate hazards.
- Collation of climate projections from the *Climate Change in Australia Technical Report* (CSIRO/BoM, 2015).

Limitations of the data:

Climate projections are inherently uncertain due to limits in the theoretical understanding of the Earth's climate. Historical records and trends can be extrapolated but do not necessarily provide a high level of certainty.

Lyndhurst

- The site has low annual rainfall (347 millimetres) predominately during winter and spring, with a mild annual average daily maximum temperature (23.6 degrees Celsius), but with an average of 20 days over 35 degrees Celsius, with the highest recorded temperature of 46 degrees Celsius.
- Climate projections indicate hotter and drier conditions, with higher intensity rainfall events.

Napandee

- The site has low annual rainfall (347 millimetres) predominately during winter and spring, with a mild annual average daily maximum temperature (23.6 degrees Celsius), but with an average of 20 days over 35 degrees Celsius, with the highest recorded temperature of 46 degrees Celsius.

- Climate projections indicate hotter and drier conditions, with higher intensity rainfall events.

Wallerberdina

- The site has low annual rainfall (308 millimetres) predominately during winter and spring, with a mild annual average daily maximum temperature (25.2 degrees Celsius), but with an average of 20 days over 35 degrees Celsius, with the highest recorded temperature of 46 degrees Celsius.
- Climate projections indicate hotter and drier conditions, with higher intensity rainfall events.

Enabling infrastructure

The following enabling infrastructure information summaries are based upon three February 2019 Enabling Infrastructure Design Works Reports prepared by AECOM. These reports are provided at attachments N, O and P.

Road transport to site

Reason for gathering information:

To facilitate the effective operation of the facility, a network of local roads is required to support the movement of LLW and ILW from the national highway network (National Land Transport Network) to the facility.

Access to the site for the TN 81 containers (approximately 150 tonnes), being the potentially largest and heaviest movement of radioactive waste for the facility, was considered. This helped develop a strategy for the efficient movement of the waste, considering the overall complexity of the movement which is influenced by the route itself.

The IAEA SSR-6 *Regulations for the Safe Transport of Radioactive Material* (2018), the ARPANSA *Australian Code for the Transport of Dangerous Goods by Road & Rail* (2017), various codes and guides (South Australia) for dangerous goods transport, and other relevant Australian Standards for design of roads, informed assessments undertaken by AECOM.

Preferred site characteristics:

- Major highway access from waste sources around Australia.
- A good local access road network with minimal upgrade requirements and potential for multi-modal transport options to the site.
- Spatial capacity to upgrade roads, if required, to suit the expected volume of traffic.
  - It is noted that rail and port access were also considered, but not in a primary sense, due to the dispersed locations of waste sources around Australia.

Work completed to date:

A desktop assessment of the likely paths of travel for waste from the largest waste holders (CSIRO and ANSTO) and capital cities to the sites, including a review of the National Land Transport Network and other modes of transport (sea and rail). A desktop assessment of the local access roads from the closest point of the National Land Transport Network to the site was completed, including a review of the road reserve width and horizontal and vertical alignment. On-site field work included inspection and video recordings of the local access routes to the site.

Limitations of the data:

The extent of survey information on the road network is limited at this stage of the project. Further work such as survey, service identification, storm-water and 3D design for the road access will be undertaken post site selection. Subsurface and surface conditions that may affect the design and construction of the access road will be investigated and considered in more detail post-site selection.

Lyndhurst

- The Lyndhurst site is located approximately 15 kilometres north-east of the Kimba township.
- The National Land Transport Network (Eyre Highway) passes within approximately 16 kilometres of the Lyndhurst site.
- The area surrounding the nominated site has a local road network mostly consisting of unsealed, low traffic roads. The preferred access route from the National Land Transport Network to the nominated site is via Tola Road, Aerodrome Road and Bindawalla Gate Road, and does not pass through the Kimba township. Aerodrome Road is in good condition and any upgrades will lead to benefits to access to the Kimba Aerodrome. The proposed route provides a direct link between Kimba and the nominated site.
- s 47C [redacted]

Napandee

- The Napandee site is located approximately 20 kilometres west of the Kimba township.
- The National Land Transport Network (Eyre Highway) passes through the Kimba township and within approximately 23 kilometres of the nominated site.
- The area surrounding the nominated site has a local road network mostly consisting of unsealed, low traffic roads. The preferred access route from the National Land Transport Network to the nominated site is via Tola Road. This is the most direct route to the nominated site. Tola Road is currently an unsealed rural road that provides sufficient width for the transport of waste with upgrades to the road. The proposed route provides a direct link between Kimba and the nominated site.
- s 47C [redacted]

Wallerberdina

- The Wallerberdina site is located approximately 30 kilometres north-west of the Hawker township.
- The National Land Transport Network (The Outback Highway) passes through the Hawker township and within approximately 26 kilometres of the nominated site.
- The area surrounding the nominated site has a local road network mostly consisting of unsealed, low traffic roads. The preferred route to the nominated site from The Outback

Highway is via Lake Torrens Homestead Road, which is an unsealed local road. It is the shortest route to the nominated site and uses existing road reserves for access, however it passes closer to Hookina Creek and is subject to flood risk.

- There is a misalignment between the road reserve and actual road location for this proposed route, likely to have resulted from the proximity and movement of the creek and road over time. This would require further survey in future stages to confirm the extent. However, dealing with the realignment would either require adjusting the legal boundaries, establishing a right of way, or realignment of the road; all of which carry risk and cost implications.
- There is an unused rail line in close proximity to the nominated site. While there is the potential to use this for the transport of waste, it is unlikely to be economical due to the cost to develop a rail siding, as well as the ongoing maintenance and operational costs for what would be considered low volumes for rail.
- s 47C [redacted]

Power supply to site

Reason for gathering information:

The facility requires electrical power for operation. Provision of this power for site requirements is required either from the National Electricity Market (grid) or by power generated on site.

The cost of providing a power supply to the site is a key consideration in the overall facility costs.

Various Australian Standards for building and construction informed assessments and design undertaken by AECOM.

Preferred site characteristics:

Access to high voltage power lines with sufficient capacity to service the demands of the site and with a suitable level of reliability inherent in the system.

For on-site generation, access to an area sufficiently large enough to facilitate the placement of a solar array and with little to no overshadowing by local features, to ensure the access to solar energy is maximised.

Work completed to date:

A desktop assessment including discussions with energy companies, reviews of available data on the local electricity networks, and modelling and preliminary design works for solar.

Limitations of the data:

Load profiles of the facility are not yet established, and specific power quality requirements have not been defined. Planning estimates have been developed in line with the concept design phase. An assessment of the potential to export solar-generated electricity has not been undertaken. No assessments have been made to provide power to the surrounding area outside the nominated sites.

Lyndhurst

- The nominated site is approximately 55 kilometres from the closest transmission substation and approximately 45 kilometres from any transmission line (132 kilovolt). Most of the region is serviced by a single-phase network, which is not suitable to supply power to the nominated site and the site requires connection to a substation or medium voltage grid connection.
- The closest substation is approximately 18 kilometres from the nominated site and provides an 11 kilovolt supply to the area. A power supply option is the connection to the 11 kilovolt substation via a new 20 kilometre power line, with an upgrade of the substation required and multiple regulator stations along the power line due to the long distance and potential for voltage drops. This presents reliability issues with the 11 kilovolt supply option. A micro-grid could be coupled with this connection.
- The development of an on-site micro-grid, to meet site-facility demands only, was assessed to address the lack of access to existing power infrastructure.

Napandee

- The nominated site is approximately 65 kilometres from the closest transmission substation and approximately 50 kilometres from any transmission line (132 kilovolt). Most of the region is serviced by a single-phase network, which is not suitable to supply power to the nominated site and the site requires connection to a substation or medium voltage grid connection.
- The closest substation is approximately 22 kilometres from the nominated site and provides an 11 kilovolt supply to the area. A power supply option is the connection to the 11 kilovolt substation via a new 20 kilometre power line, with an upgrade of the substation required and multiple regulator stations along the power line due to the long distance and potential for voltage drops. A micro-grid could be coupled with this connection.
- The development of an on-site micro-grid, to meet site-facility demands only, was assessed to address the lack of access to existing power infrastructure.

Wallerberdina

- The Wallerberdina nominated site is adjacent to a 132 kilovolt above-ground transmission line that connects from Leigh Creek to Neuroodla.
- The proximity of this high voltage line is favourable for a connection to a high reliability power source.
- The existing line has capacity to service the expected demand for the facility, with the closure of the Leigh Creek Coal Mine in 2015 reducing the existing load significantly.
- A substation would need to be constructed for the facility as part of grid connection to reduce the voltage supplied to the nominated site.

Water supply to site

Reason for gathering information:

The facility requires a reliable water supply to facilitate the effective handling and processing of material, and for ongoing operations at the site.

Preferred site characteristics:

The supply of water to the site to the boundary for potable and non-potable purposes from a reliable source, preferably via mains supplied water or a suitable underground aquifer. The water needs to be of sufficient capacity and quality to meet facility demand.

Relevant Australian Standards including AS 3500.1:2018 *Plumbing and drainage — Water services,* informed assessments undertaken by AECOM.

Work completed to date:

- A desktop assessment including the review of borehole records, local geological conditions and discussions with water supply authorities.
- On-site field work including drilling and placement of new groundwater monitoring bores, sampling and testing of any water present and assessment of the potential for that water to be a source for the site. This work was completed through the siting assessment hydrogeological investigation.
- Preliminary design and costing of solutions to provide water to the site.

Limitations of the data:

For the Lyndhurst and Napandee sites, the exact connection point to the existing SA Water network and vertical alignment (depth and profile of depth along the pipeline) of the water supply route are unknown. Flow, pressure and quality have not been fully tested and capacity has been derived from discussions with the supply authority only.

For the Wallerberdina site, the long term drawdown impacts on the local groundwater sources will require further review during the concept and detailed design phases. No assessments have been made to provide water to the surrounding area outside the nominated sites.

Lyndhurst

- There is no existing water supply to the Lyndhurst nominated site. Groundwater in the area is saline and would require significant treatment for the supply to be suitable for potable usage.
- There is an existing water mains along the southern boundary to the nominated site, but it would not have the capacity to support the required demand for the nominated site.
- Supply options include a new 9 kilometre pipeline to the site from the supply on Wilcherry Road, connection to the Iron Knob to Kimba pipeline located 10 kilometres to the south of the site or connection to the Kimba tanks.
- The preferred option to address water requirements for the site includes a new supply main, connecting downstream of the existing Kimba tanks. This option would require the construction of approximately 18 kilometres of new pipe work from the tanks to the site and would provide the best security of supply.

Napandee

- There is no existing water supply to the Napandee site. Groundwater in the area is saline and would require significant treatment for the supply to be used for potable usage.
- There is an existing water main north and east of the site, while likely to provide sufficient capacity, it is made with asbestos cement piping which presents a risk to reliability of supply and longevity.
- Supply options include a new 6 kilometre pipeline to the site from the supply from the existing local network, connection to the Iron Knob to Kimba pipeline located 24 kilometres to the east of the site or connection to the Kimba tanks.
- The preferred option to address water requirements for the site includes a new supply main, connecting downstream of the existing Kimba tanks. This option would require the construction of approximately 24 kilometres of new pipe work from the tanks to the site and would provide the best security of supply.

Wallerberdina

- There is no reticulated water infrastructure at or adjacent to the nominated site. The nearest reticulated water infrastructure is located approximately 37 kilometres from the nominated site in the Hawker township, which comprises of a treated groundwater supply.
- A review of groundwater at the nominated site indicates that while slightly brackish, the groundwater is expected to be suitable for extraction with treatment (using a desalination plant) for potable and non-potable uses. Other treatment may be required, and would be dependent on the incoming water supply quality requirements of the package desalination plant selected. Water sourced for firefighting purposes would not be treated in the desalination plant as this is not required.
- For the Wallerberdina site, the long term drawdown impacts on the local groundwater sources would require further review during the concept and detailed design phases. No assessments have been made to provide water to the surrounding area outside the nominated sites.

Site communications

Reason for gathering information:

The facility requires external communication infrastructure to provide communications for the facility.

Preferred site characteristics:

- The key design objective is the supply of three independent forms of communication to support the facility, including:
- a primary fibre connection to support data and voice service connectivity with a minimum of 25 megabits per second
- a secondary diverse radio communication path to support data and voice service connectivity
- mobile coverage to the site
- very high frequency (VHF) radio coverage to the site.

Work completed to date:

- A desktop assessment including discussions with supply authorities and review of likely routes/paths for communications infrastructure.
- Preliminary design and costing of options.

Limitations of the data:

A small-cell for the provision of mobile coverage requires the support of a telecommunications carrier, and is subject to a formal application. The fee structure for the supply of the infrastructure and the services has been estimated only. No assessments have been made to provide communication services to the surrounding area outside the nominated sites.

Lyndhurst

- The site is located 16 kilometres north-east of the town of Kimba and some 3G mobile coverage is likely to be available with an external high gain antenna, however, not to the degree of reliability required. A small cell 4G service is proposed for the nominated site to provide the required levels of coverage and reliability.
- The primary supply is proposed to be a fibre connection to the exchange in the township of Kimba, with installation of 19 kilometres of direct buried fibre optic cabling connecting the exchange to the site.
- A secondary Very Small Aperture Terminal (VSAT) connection would be required to provide a diverse pathway for redundancy. This is a dedicated satellite service that would require a VSAT dish on site.
- Radio coverage would also be provided through a base station on site for UHF/VHF and the Government Radio Network (GRN) could also provide coverage for emergencies.

Napandee

- The site is located 20 kilometres west of the town of Kimba and some 3G mobile coverage is likely, however not to the degree of reliability required. A small-cell 4G service is proposed for the nominated site to provide the required levels of coverage and reliability.
- The primary supply is proposed to be a fibre connection to the exchange in the township of Kimba, with installation of 26 kilometres of direct buried fibre optic cabling connecting the exchange to the site.
- A secondary Very Small Aperture Terminal (VSAT) connection would be required to provide a diverse pathway for redundancy. This is a dedicated satellite service that would require a VSAT dish on site.
- Radio coverage would also be provided through a base station on site for UHF/VHF and the GRN could also provide coverage for emergencies.

Wallerberdina

- The nominated site is north-west of the town of Hawker and patchy 3G mobile coverage is expected and not to the degree of reliability required. A small-cell 4G service is proposed for the nominated site to provide the required levels of coverage and reliability.
- The primary supply is proposed to be a fibre connection to the exchange in the township of Hawker, with installation of 34 kilometres of direct buried fibre optic cabling connecting the exchange to the site.
- A secondary Very Small Aperture Terminal (VSAT) connection would be required to provide a diverse pathway for redundancy. This is a dedicated satellite service that would require a VSAT dish on site.
- Radio coverage would also be provided through a base station on site for UHF/VHF and the GRN could also provide coverage for emergencies.

Waste generated on site

Reason for gathering information:

To assess the availability and proximity of facilities to treat, recycle or dispose of non-radioactive on-site generated waste streams, and to consider the potential for on-site treatment, recycling and disposal.

Preferred site characteristics:

Proximity to suitable waste management facilities, and site attributes that can accommodate potential on-site waste management options.

Work completed to date:

Desktop assessment including research and information review regarding the presence, capacity and location of waste facilities in proximity to the site.

Limitations of the data:

Only licenced waste facilities were reviewed during the searches undertaken. The actual waste streams to be generated, together with quantity of waste, are not yet confirmed. Therefore, the extent to which waste will need to be managed is unknown. Confirmation of the capacity of the identified waste facilities will be required.

Lyndhurst

- There are a number of local recycling and waste depots capable of accepting/receiving waste.
- Certain types of waste generated on site (listed or hazardous types) may need to be managed on site prior to being transported to a suitable facility outside the local area, due to the lack of suitable facilities nearby.

Napandee

- There are a number of local recycling and waste depots capable of accepting/receiving waste.
- Certain types of waste (listed or hazardous types) may need to be managed on site prior to being transported to a suitable facility outside the local area, due to the lack of suitable facilities nearby.

Wallerberdina

- There are a limited number of waste and recycling depots in close proximity to the site, and on-site management and transport/disposal may need to be considered.

Renewable energy

Reason for gathering information:

To assess the availability of renewable resources in the site area, to provide power to the site, and to offset grid-supplied energy.

Preferred site characteristics:

Location which has high potential to generate renewable energy, particularly solar and wind energy, that can be harnessed to increase the network reliability of power supply to the site.

Work completed to date:

- Desktop assessment including review of the sites for wind, solar, hydro and geothermal resources (tidal excluded because of distance of all sites from the sea).
- Review of capital expenditure and operating expenses, and land required to facilitate harnessing the resource.
- Review of connecting infrastructure surrounding the site.

Limitations of the data:

All studies completed are preliminary in nature, with the exception of solar photovoltaic energy which is explored further in the power supply to site information summary (p. XLIV). Further information including the likely load profile, equipment and site requirements is required before further assessment can be made.

Lyndhurst

- Located in an area of moderate to high solar exposure, and a moderate wind resource area.
- Both wind and solar power would require connection to a high voltage network. This would require construction of new long transmission lines to connect to the existing transmission network (refer to power supply to site information summary (p. XLIV) for more detail).

Napandee

- Located in an area of moderate to high solar exposure, and a moderate wind resource area.
- Both wind and solar power would require connection to a high voltage network. This would require construction of new long transmission lines to connect to the existing transmission network (refer to power supply to site information summary (p. XLIV) for more detail).

Wallerberdina

- Located in an area of high solar exposure, and low wind resources.
- Site is close in proximity to existing high-voltage transmission network. A thermal limit exists for the line and export of power would likely require an upgrade to the 132 kilovolt line. However, it is noted that the closure of the Leigh Creek mine has significantly reduced the load required on the end of the transmission line. A connection enquiry would be required for future stages.

Aboriginal cultural heritage

The following Aboriginal cultural heritage information summary is based on two reports prepared by RPS: the July 2018 Kimba Aboriginal Heritage Desktop Assessment Report and the July 2018 Wallerberdina Aboriginal Cultural Heritage Report (public version). These reports are provided at attachments Q and R.

Aboriginal cultural heritage

Reason for gathering information:

Aboriginal cultural heritage values are broadly represented in Australia's landscapes. A cultural heritage assessment of each of the nominated sites is essential to ensure cultural values are appropriately managed and potential impacts minimised for the lifetime of the facility.

Aboriginal cultural heritage assessments were undertaken with respect to definitions of heritage and Traditional Owners, existing site registers and future approval processes that may be required once a site is selected, which were drawn from the following relevant legislation: *Aboriginal Heritage Act 1988* (SA), EPBC Act, ATSIHP Act, and the *Native Title Act 1993* (Cth).

Preferred site characteristics:

Protection of Aboriginal cultural heritage values that may be impacted by the project, including demonstrated opportunities for local Traditional Owners to be involved in the planning, construction and operational phases of the project to help achieve this.

Work completed to date:

The department has undertaken preliminary Aboriginal Cultural Heritage Assessments (ACHAs) of the nominated sites. The work reported here draws on the findings of independent cultural heritage consultants from RPS who were engaged to conduct two separate ACHAs: one for the Lyndhurst and Napandee sites and one for the Wallerberdina site. This includes evaluations of the specific land areas within each of the nominated sites that have been selected as preferred locations for the facility.

The Wallerberdina ACHA was conducted from late-2017 to mid-2018. The Kimba ACHA was conducted from early to mid-2018. Both ACHAs included:

- desktop research to identify existing and potential Aboriginal cultural heritage values across the sites, which included use of the South Australia Register of Aboriginal Sites and Objects
- landscape mapping and LiDAR surveys to enable predictive modelling of archaeological site locations.

The Wallerberdina ACHA additionally included:

- establishment of a Heritage Working Group (HWG) to facilitate discussions and consultation for the assessment at Wallerberdina
- consultation and cultural heritage site visits with HWG members at Wallerberdina.

Limitations of the data:

The Kimba ACHA is limited in scope as consultation with relevant Traditional Owners was unable to occur. If either site at Kimba is selected to host the facility, the Government will continue to seek the involvement of the local Traditional Owners in all stages of the project.

Once a site has been acquired a comprehensive archaeological investigation and consultation with the relevant Traditional Owners will be required. This process will fully assess the cultural values that may be impacted and to develop an Aboriginal Cultural Heritage Management Plan.

Lyndhurst and Napandee (Kimba)

- Although Native Title has been extinguished in both nominated sites, the Barngarla and Gawler Ranges Traditional Owners hold Native Title in surrounding lands.
- No registered or listed sites were identified within a 10 kilometre radius from either the Lyndhurst or Napandee sites although unregistered sites may exist.
- Archaeological research is limited within the general area, although predictive landscape mapping identified features such as dunes throughout the area that have potential for archaeological sites, most likely to be stone artefact scatters.
    - The Lyndhurst block has a greater presence of landscape features with archaeological potential than the Napandee block, which has very limited archaeological potential.
- If the project should proceed in either area, comprehensive archaeological investigation, consultation and site visits with the Traditional Owners would be required to fully assess the cultural values that may be impacted and to develop an Aboriginal Cultural Heritage Management Plan.

Wallerberdina (Hawker)

- While Native Title has been extinguished on Wallerberdina, the Adnyamathanha People have a strong and ongoing connection to Country within the area and its surrounds as exemplified by the intangible and tangible heritage values associated with the Flinders Ranges.
- The selection of a preferred location for the facility in the western portion of Wallerberdina was chosen so as to not impact on any known Aboriginal cultural heritage sites and to limit impacts on potential archaeological sites (it has a moderate potential for stone artefact scatters, based on predictive landscape mapping).
- If Wallerberdina is selected to host the facility, there are opportunities for the Adnyamathanha community to be involved in all future stages of the project, including through employment and training, contributing to the aesthetic design of the facility, and cultural plantings. There is also opportunity to preserve and enhance heritage values through archaeological and ethnographic research in the wider region.
- A registered songline and associated archaeological site intersects with the southern edge of Wallerberdina (no other sites have been registered within the nominated site).

- Various portions of Wallerberdina have cultural significance, including areas with high potential for the location of unregistered archaeological sites (including stone artefact scatters, grinding grooves, scarred trees and rock shelter sites).
- The eastern portion of Wallerberdina is considered highly significant when considering heritage due to the presence of sensitive Aboriginal cultural heritage sites located adjacent to and within the site boundaries.
- Hookina Creek, which runs along, and generally just outside, the western and southern boundary of the proposed Wallerberdina site, has broad cultural significance.
- Access along Lake Torrens Homestead Road through Wallerberdina should be maintained throughout the life of the project if it proceeds, as this is considered important for ongoing cultural practices of hunting and gathering in the area and travel to and from Lake Torrens and Cotabena.
- If Wallerberdina is selected to host the facility, a comprehensive archaeological investigation and consultation with the Traditional Owners would be required to fully assess the cultural values that may be impacted and to develop an Aboriginal Cultural Heritage Management Plan.

Socio-economic impact

The following socio-economic impact information summaries are based on two social baseline reports prepared by the University of Queensland (November 2018, see full reports at attachment S), and two economic impact assessment reports prepared by Cadence Economics (July 2018, see full reports at attachment T).

Social impact

Reason for gathering information:

Obtain baseline measures of socio-economic indicators for the communities near the nominated sites, and community views about the facility, in order to assess potential social impacts and to inform strategies to enhance the benefits and minimise negative impacts from the siting of the facility near a community.

There is no legislative mandate to conduct a social impact assessment, however it is considered an important factor in the selection of a suitable site for the facility and is a relevant consideration should an environmental impact assessment be conducted under the EPBC Act. Non-statutory guidelines for social impact assessments are well established in expert literature and impact assessment guidance material published by various Governments.

Preferred site characteristics:

A community willing and able to harness expected opportunities and avoid or mitigate negative impacts from the facility.

Work completed to date:

The work reported here was undertaken in 2018 by The University of Queensland (UQ), which was engaged by the department to conduct social impact assessments of local communities near the sites being considered for the facility. Two reports were prepared: one focused on Kimba (near Lyndhurst and Napandee) and one focused on Hawker and Quorn (near Wallerberdina).

As part of the social impact assessments, UQ conducted a desktop review to construct community profiles based on key socio-economic indicators. This drew on ABS data and a wide range of administrative data sets. Subsequently, researchers conducted interviews in each of the towns (including several by telephone) and received emailed submissions and comments. There were 16 interviews undertaken either with individuals, pairs or small groups of community members in Hawker and Quorn, and over 30 in Kimba, the latter resulted in over 80 people being interviewed. The aim was to hear first-hand the views about possible impacts of the proposed facility and to 'ground-truth' the baseline data.

A separate economic impact report has been completed by Cadence Economics, which focuses on modelling the employment outcomes and value added to local economies (p. LXIII).

Limitations of the data:

Sixteen interviews were conducted in Hawker and Quorn (combined total population: 1,368) and 80 interviewed in Kimba (total population: 629). As these were qualitative interviews the researchers succeeded in capturing a cross-section of community views.

The next section presents the community profile data for each of the towns associated with the nominated sites, followed by the results of the interviews and strategies identified by the researchers to address the issues raised.

Lyndhurst and Napandee (Kimba)

- Kimba's population has remained relatively constant, down slightly from 636 in 2006 to 629 in 2016, however it is ageing, reflected in a marginal contraction in the main adult working age group (25-59 years of age) from 255 in 2006 to 243 in 2016.
- Unemployment in Kimba over the past decade has been low (2 per cent in 2016), with the main industries providing employment also remaining relatively constant, led by agriculture at 21 per cent, followed by construction, retail trade, education and training, and health and social services.
- Over the past decade average personal incomes have generally remained just under the South Australian average, although in 2015–16 average income fell 10 per cent to $44,283 compared to the state average of $50,149.
- Total business income has fluctuated over the past few years and while there has been an observed decline in retail presence, the overall number of businesses (49 in 2016) has remained relatively constant.
- Twenty-five per cent of Kimba's population has a formal education or training qualification beyond high school, 11 per cent have a diploma or degree and 14 per cent have a certificate III or IV.
- School numbers were 173 in 2017 and have been around 170 to 180 for most of the past decade, except for the years 2014–16 when enrolments dipped to around 160.
- The total number of dwellings in Kimba was 356 in 2016, with a 28 per cent vacancy rate, a relatively low median weekly rent of $120 compared to the state median of $260 and low median weekly mortgage repayment of $200 compared to the state median of $344.

Wallerberdina (Hawker and Quorn)

Hawker community profile

- The population of Hawker has fluctuated over the past decade or so, rising from 334 in 2004 to 492 in 2011, then decreasing by 31 per cent to 341 by 2016, including a sharp decline in the main adult working age group from 241 (49 per cent of the population) in 2011 to 132 (38 per cent).
- The level of unemployment in Hawker has increased significantly in the past five years, up from 2 per cent in 2011 to 6 per cent in 2016 (coinciding with the closure of Leigh Creek Coal Mine).
- The main industries providing employment have remained the same since 2006, with agriculture at 20 per cent, followed by accommodation and food services, construction, and education and training, which each contribute over 10 per cent of employment.
- Average personal income has experienced modest growth in recent years, from $42,597 in 2013 to $47,446 in 2016, 5 per cent lower than the state average of $50,149.

- The number of businesses operating in Hawker declined from a peak of 30 in 2014–15 to 25 in 2015–16, which coincides with the Leigh Creek Coal Mine closure.
- 21 per cent of residents have a formal education or training qualification beyond high school, with 10 per cent holding a diploma or degree and 11 per cent with a certificate III or IV.
- Hawker school numbers have ranged between a low of 33 in 2008 and peak of 50 in 2013, and sat at 44 in 2017.
- The total number of dwellings in Hawker was 184 in 2016, with a 34 per cent vacancy rate, a median weekly rent of $123, compared to the state median of $260, and median weekly mortgage repayment of $160 compared to the state median of $344.

Quorn community profile

- Quorn's population has remained relatively constant, down slightly from 1,258 in 2006 to 1,230 people in 2016, however it is ageing, reflected in a marginal contraction in the main adult working age group from 542 in 2006 to 523 people in 2016.
- The unemployment rate has remained relatively constant since 2006, although after reaching a low of 5.5 per cent in 2011, it has increased to 7.2 per cent in 2016.
- The main industries providing employment have remained roughly the same since 2006, with healthcare and social assistance, education and training, public administration and retail each accounting for 10 per cent or more of local workers, and agriculture accounting for 9 per cent.
- Average annual personal income has experienced consistent growth of 7 per cent since 2012–13, with an average of $52,838 in 2015–16, which is 5.3 per cent above the state average of $50,149.
- Business income and numbers of businesses have also increased in recent years, with a notable jump in 2014–15 of 48 per cent in total business income and an increase from 53 to 60 in the number of businesses.
- There has been a significant increase in the percentage of residents who have a formal education or training qualification beyond high school—from 20 per cent in 2006 to 31 per cent in 2016, with 14 per cent holding a diploma or degree and 17 per cent with a certificate III or IV.
- From 2008 to 2017 there has been a significant decline in the number of students (from 265 to 138) and teachers (from 22 to 13) at the local school.
- The total number of dwellings in Quorn was 649 in 2016, with an 18 per cent vacancy rate, a relatively low median weekly rent of $172 compared to the state median of $260 and low median weekly mortgage repayments of $231 compared to the state median of $344.

Results from interviews (Lyndhurst, Napandee and Wallerberdina)

Kimba

Education and training pathways for local people (particularly youth) and additional opportunities for the current workforce were identified as the primary opportunities for the community. Emphasis was placed on the potential for local school students to improve STEM (Science, Technology, Engineering and Mathematics) subject offerings and uptake. The community identified the need for training programs to build skills that will be required for the construction and management of the facility.

A diversified and invigorated economy was also identified as a key benefit of the facility. Residents expect that the facility will create jobs for locals and bring additional workers to the community. These new arrivals and their families would likely increase student numbers, and create opportunities for local businesses. There is an expectation that hosting the facility would create an alternative and constant source of income that would help reduce the town's reliance on agriculture.

Some residents raised concerns that hosting a waste facility would create stigma and ultimately have a negative effect on property prices.

Despite having a hospital in town, the lack of a dedicated full-time doctor in Kimba was a concern for many who were interviewed. There was some discussion around the idea of Kimba becoming a 'government town', which would bring additional services including an increase in doctors.

The community raised concerns about uncertainty in particular aspects of the project, such as the facility operator. 'What if…?' was a commonly used phrase in interviews. The dominant concern was around possible threats to human and environmental safety if the integrity of the structure was compromised or damaged, deteriorated over time, or failed unexpectedly. Ensuring the community fully understand the high safety and security standards required under legislation, will be key in developing the facility.

Some people were concerned that while they might agree to a low or intermediate-level facility, that high level waste would be stored there.

Several local farmers who export internationally, expressed concern about the possibility that produce from the region would become stigmatised given its proximity to the facility.

Hawker and Quorn

A prevalent concern in interviews with community members from Hawker and Quorn was a reduction in social cohesion caused by the nomination process and community consultation. The majority of interviewees were uncertain how the temporary damage to community spirit could be repaired in future. Some social benefits were identified by those interviewed, including the injection of new people into the town and the range of opportunities this would present. The participation of newcomers to a number of community and sporting groups would be welcomed, as would families with children.

Both Aboriginal and non-Aboriginal interviewees expressed the need for respect for Traditional Ownership and concern about possible impacts the facility may have on Aboriginal cultural heritage. There were others (both Aboriginal and non-Aboriginal) who were excited by the opportunities that may arise for raising awareness of and preserving local Aboriginal culture.

Interviewees were split in their concern regarding risk to the environment posed by the facility. Many who supported the facility were convinced the structure would be sound—either from visiting the ANSTO facility at Lucas Heights or through talking with someone who had, or through information supplied by the department.

Some interviewees raised concerns that the facility would damage the area's reputation and industries, especially agriculture, tourism and property values. There was a concern that the facility would significantly and negatively impact on tourism and visitor numbers.

In Hawker, the proposed facility was said to provide a stabilising 'third leg' to the local economy, which is currently reliant on highly seasonal income from agriculture and tourism.

Some of those interviewed in Hawker and Quorn believed the facility would bring improvements to local roads. In Hawker, interviewees also looked forward to increased connectivity in terms of improved telecommunications, as well as connections to ANSTO in Sydney and other host communities globally.

Unfairness and mistrust in the site selection and community consultation process were highlighted as significant concerns for those opposed to the facility. Many opponents expressed the feeling that their concerns are not being listened to or 'seriously considered' by government decision-makers.

Economic impact

Reason for gathering information:

To estimate the economic impact from the development of the facility on local communities in terms of employment and value added to the local economies. There is no legislative mandate to conduct economic impact assessments, however it is considered an important factor in the selection of a suitable site for the facility and is a relevant consideration should an environmental impact assessment be conducted under the EPBC Act. Non-statutory guidelines for economic impact assessments are well established in the expert literature and impact assessment guidance material published by various Governments.

Preferred site characteristics:

Demonstrated positive economic impact for local communities at the construction and operational phases of the facility project. Little or no adverse economic impact from crowding out other activity or other excessive opportunity costs.

Work completed to date:

The work reported here was undertaken by Cadence Economics, which was engaged by the department to conduct two separate economic impact assessments: one for the Kimba community (covering the Kimba District Council area) and one for Hawker and Quorn (covering the Flinders Ranges District Council area). A desktop assessment was undertaken entailing macroeconomic modelling of the regional economies' responses to external funding resulting from the construction and operation of the facility. A theoretical cost curve (rate of spend) for the project was applied to demonstrate changes to production, wages, consumption and value added over time. The economic modelling is based on a set of assumptions in relation to the construction and operational phases of facility, known as the central case scenario, which was tested under various sensitivity analyses.

The modelling has considered 30 years of full operations for the facility, in addition to a construction and pre-operational phase, which extends the period modelled to 2054. This is consistent with Infrastructure Australia's suggestion that as a result of 'uncertainty of demand modelling over longer time horizons, many jurisdictions suggest 30-year appraisal periods' (*Assessment Framework*, March 2018), and recognises the uncertainty associated with predicting waste production and demand management activities post-2054.

Limitations of the data:

The analysis assumed a capital cost for the facility of $325m, spread over 2021–24. ss 34(1)(a) and (2) / s47C [redacted]

Note, the geographic regions used in the economic analysis are not identical to those used in the social impact analysis due to the different levels of aggregation at which relevant data is available.

The regional economic impacts for Kimba, Hawker and Quorn under the central case scenario assumptions are summarised below.

Lyndhurst and Napandee (Kimba District Council area)

- A facility at Lyndhurst or Napandee is projected to confer economic benefits to the Kimba community in terms of economic output, economic welfare, employment and real wages.
- These benefits are driven by an increase in demand for goods and services through both the construction and operational phases of the facility, the increase in supply of workers moving to the region during the operational phase, as well as a wage premium for all workers at the facility.
- By 2030, after the facility is fully operational, real Gross Regional Product (GRP, which is a measure of the goods and services produced in the Kimba region) is projected to be 4.9 per cent higher, which equates to an $8.4 million increase in real 2018 dollars.
- Over the first 33 years of the project, from 2021–54, the Net Present Value (NPV) of the projected increase in real GRP in Kimba is just over $95 million.
- In economic welfare terms, real Gross Regional Income (GRI) is projected to be 4.7 per cent higher ($9.1 million in real 2018 dollars) in 2030.
- In terms of labour market outcomes, the facility will employ 45 FTE (full time equivalent employees). Of these, 34 FTE are to be drawn from the local labour market, redirected to work in this facility from the existing pool of employed persons in Kimba under conservative assumptions. The additional 11 FTE would be relocated to the region to work in the facility.
- The projected net additional economy-wide increase in employment in 2030 in Kimba is 16.6 FTE. This is comprised of the additional 11 FTE that relocate to the region to work in the facility, as well as 5.6 FTE being the result of positive flow-on economic effects of the facility.

Wallerberdina (Flinders Ranges District Council area)

- A facility at Wallerberdina is projected to confer economic benefits to the Flinders Ranges region, including Hawker, in terms of economic output, economic welfare, employment and real wages.
- These benefits are driven by an increase in demand for goods and services through both the construction and operational phases of the facility, the increase in supply of workers moving to the region during the operational phase, as well as a wage premium for all workers at the facility.
- By 2030, after the facility is fully operational, real GRP in the Flinders Ranges is projected to be 8.2 per cent higher which equates to an $8.3 million increase in real 2018 dollars.
- Over the first 33 years of the project, from 2021 to 2054, the NPV of the projected increase in real GRP in the Flinders Ranges is just over $95 million.
- In economic welfare terms, real Gross Regional Income is projected to be 7.8 per cent higher ($9.2 million in real 2018 dollars).
- In terms of labour market outcomes, the facility will employ 45 FTE directly. Of these, 34 FTE are to be drawn from the local labour market, redirected to work in this facility from the existing pool of employed persons in the Flinders Ranges under conservative assumptions. The additional 11 FTE would be relocated to the region to work in the facility.
- The projected net additional economy-wide increase in employment in 2030 in the Flinders Ranges is 18.0 FTE. This is comprised of the additional 11 FTE that relocate to the region to work in the facility, as well as seven FTE being the result of positive flow on economic effects of the facility.

Attachments

Site suitability assessments and supporting documents

A. Site suitability assessment: Technical Assessment (ARPANSA/ASNO/IAEA)
   - Record of authorship and review: Technical Assessment (ARPANSA/ASNO/IAEA)

B. Order of Cost Estimate No. 3.4.1 Class 4 Estimate: ANSTO-NRWMF Facility-3 Site Specific Cost & Differentials for 155Ha Site

C. NRWMF Concept Design Basis Report

D. Preliminary Safety and Waste Acceptance Report of the National Radioactive Waste Management Facility (NWRMF)
   - ANSTO Dose Modelling (draft)

E. Detailed Business Case 2018 extract – [redacted]

F. Lyndhurst Localised Flooding Issues (Issues Register Item 41) Technical memo

G. Stage 2b – Site Comparison (structural) Technical memo

H. ANSTO Recommendations for Flood Risk Assessment for NRWMF shortlisted sites

I. Site suitability assessment: EPBC Act
   - Appendix 2: EPBC Act assessment of potential differentiators
   - Record of authorship and review: EPBC Act Assessment

J. Site suitability assessment: criterion 3 risk assessment tool
   - Department of Industry, Innovation and Science Risk Management Framework 2018-2020

Independent reports

K. AECOM Site Characterisation - Technical Report Lyndhurst
   - Incorporating Technical Report Addendum - Site Characterisation Lyndhurst

L. AECOM Site Characterisation - Technical Report Napandee
   - Technical Report Addendum - Site Characterisation Napandee

M. AECOM Site Characterisation - Technical Report Wallerberdina
   - Technical Report Addendum - Site Characterisation Wallerberdina

N. AECOM Enabling Infrastructure Design Works Report Lyndhurst

O. AECOM Enabling Infrastructure Design Works Report Napandee

P. AECOM Enabling Infrastructure Design Works report Wallerberdina
   - Enabling Infrastructure Design Works: Concept Design Cost Estimate Report Addendum 1

Q. RPS Kimba National Radioactive Waste Management Facility Aboriginal Heritage Desktop Assessment Report

R. RPS Wallerberdina Station National Radioactive Waste Management Facility Aboriginal Cultural Heritage Report – public version

- Wallerberdina Station National Radioactive Waste Management Facility DRAFT Aboriginal Cultural Heritage Report Restricted - Male Version
- Wallerberdina Station National Radioactive Waste Management Facility DRAFT Aboriginal Cultural Heritage Report Restricted - Female Version

S. University of Queensland Social Baseline Reports

- Kimba
- Hawker/Quorn

T. Cadence Economics Economic Impact Assessment of the National Radioactive Waste Management Facility

- Kimba, South Australia
- Hawker, South Australia

Legal and other

U. King & Wood Mallesons - National Radioactive Waste Management Facility Due Diligence Report Exceptions-based legal review report

V. JLL Agribusiness Assessment of Compensation 'Lyndhurst' 143 Bindawalla Gate Road Mosely SA 5641

W. JLL Agribusiness Assessment of Compensation 'Napandee' 1637 Pinkawillinie Road Pinkawillinie SA 5641

X. JLL Agribusiness Assessment of Compensation 'Wallerberdina Station' 377 Wallerberdina Road Barndioota SA 5713

Y. SRK - Independent Technical Report and Valuation of three locations in South Australia for petroleum, geothermal and mineral exploration rights Lyndhurst, Napandee and Wallerberdina areas

Z. Correspondence - Letter addressed to the Minister for the Environment and Energy from s47F and response from Minister Canavan to s47F

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Australian Government
Department of Industry, Innovation and Science

Community Sentiment Report

National Radioactive Waste Management Facility

January 2020

Contents

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About

This Community Sentiment Report (CSR) has been prepared by the Department of Industry, Innovation and Science (the department) to assist the Minister for Resources and Northern Australia, Senator the Hon Matthew Canavan (the Minister) to consider community sentiment about hosting a National Radioactive Waste Management Facility (the facility) at each of the three approved nominated sites. Successive ministers have made a commitment that the facility will be established in a community where there is broad community support. The CSR is supplementary to the Site Assessment Report (SAR) that was provided to the Minister in October 2019 to assist him in making a decision about selection of a site, under the *National Radioactive Waste Management Act 2012* (Cth) (the NRWM Act).

The SAR assessed each of the three sites under consideration for the facility against three site suitability criteria, designed by the department to assist the Minister in his consideration of the various aspects of site suitability, and identify key risks. The CSR sets out information relevant to site suitability criterion 4: *the extent to which there is broad community support for the facility to be hosted at the site.*

To ensure all views available to the department are considered, this report presents a range of government-led and privately conducted community sentiment indicators. These include council-run community ballots, private ballots, public submissions, parliamentary submissions, neighbour surveys, business survey, petitions and ministerial correspondence.

This report contains information about the communities relating to the three sites as measured through these indicators. For Lyndhurst and Napandee, this includes the community centred on the District Council of Kimba, and for Wallerberdina, the Flinders Ranges Council and the area within a 50 kilometre radius of the site, as agreed with the community consultative committees. The sites are referenced in alphabetical order throughout this report.

The department has taken an evidenced-based approach to gathering and analysing the available information about community sentiment. The report is structured to enable the Minister to work logically and methodically through the different measures of community sentiment. The assessment methodology is explained at the beginning of each community indicator assessment and the results are presented in a standardised format.

- Key findings about each site regarding each of the community sentiment indicators are clearly emphasised
- Detailed results of all indicators are presented both in written form and visually in tables and maps. A full dashboard of indicators is included (pp. 17-23)
- The full details of each indicator are attached (refer to the list of attachments, p. 69).

This report contains information classified as Sensitive: Legal which may be subject to legal privilege.

A snapshot of key events and activities

Refer to the Site Assessment Report and the Review of Community Engagement (attachment A) for key events and activities undertaken for the facility prior to October 2019.

2019

October

The community ballots run by the local government authorities and the Australian Electoral Commission (AEC) commenced following a year-long delay due to legal proceedings. The District Council of Kimba community ballot opened on 3 October 2019.

The SAR, concerning regulatory requirements, costs and other matters relevant to the suitability of the site for the establishment and operation of the facility, was provided to the Minister on 18 October 2019.

Guidelines for the business and neighbour surveys were developed with advice from Geoscience Australia, independent market research company ORIMA Research and input from the Kimba Consultative Committee and Barndioota Consultative Committee. These were published on the department's website.

November

Nominations for the business survey for Lyndhurst and Napandee (in the District Council of Kimba), and Wallerberdina (in the Flinders Ranges Council and Outback Communities Authority area) could be made 4-15 November 2019.

Nominations for neighbour surveys for Lyndhurst and Napandee (in the District Council of Kimba), and Wallerberdina (in the Flinders Ranges Council and Outback Communities Authority area) could be made 4 November to 12 December 2019.

The District Council of Kimba community ballot closed on 7 November 2019.

The Flinders Ranges Council community ballot opened on 11 November 2019.

The business survey began 27 November.

The neighbour surveys guidelines were updated to clearly reflect the intention that the surveys included any person that resides within the five km radius set for the neighbour surveys (including short term residents), and any person that is a Crown lessee or is the proprietor of a freehold estate.

December

Public submissions and consideration of Ministerial correspondence closed 12 December 2019.

The Flinders Ranges Council community ballot closed on 12 December 2019. Following the result of the ballot, the Minister for Resources and Northern Australia, Senator the Hon Matt Canavan, announced that the ballot did not demonstrate a sufficient level of support for broad community support to be achieved and that he would no longer consider the Wallerberdina land as a possible site for the facility. The business and neighbour surveys relating to the Wallerberdina site were discontinued.

The neighbour surveys began on 13 December 2019.

The Kimba business survey noted above was completed on 19 December 2019.

The Lyndhurst and Napandee neighbours surveys noted above were completed on 19 December 2019.

About the communities

Lyndhurst and Napandee

The Lyndhurst and Napandee sites are near Kimba, west of Whyalla in the northern Eyre Peninsula. The township of Kimba is the single major population centre for the District Council of Kimba Local Government Area (LGA). Lyndhurst is approximately 16 km north-east of Kimba and Napandee is approximately 25 km west of Kimba (figure 1).

At the 2016 census the population of Kimba was 629, and the Kimba District Council LGA was 1061. The local economy relies heavily on agriculture; the other main industries providing employment are construction, retail trade, education and training, and health and social services.

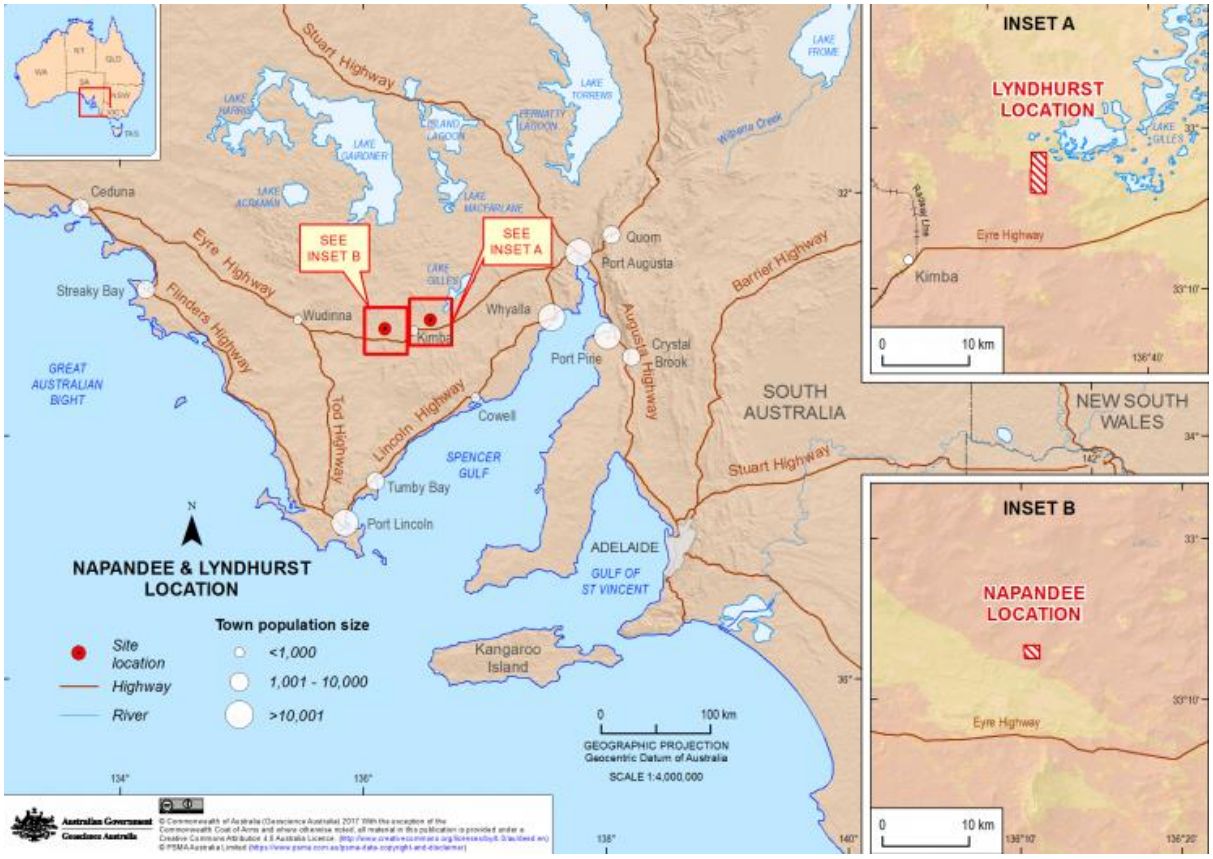

Figure 1: Map of the approved sites at Napandee and Lyndhurst in relation to Kimba and the broader region

Wallerberdina

The Wallerberdina site is approximately 30 km north-west of Hawker, which is located in the Flinders Ranges Council LGA. There are two major population centres in the LGA, with Hawker in the north and Quorn located in the southern part of the LGA (90 km south of the site) (figure 2).

At the 2016 census the population of Hawker was 341, Quorn's population was 1230, and the Flinders Ranges Council LGA was 1643. The main industries providing employment in Hawker are agriculture, followed by accommodation and food services, construction, and education and training. The main industries providing employment in Quorn are healthcare and social assistance, education and training, public administration and retail, which each account for 10 per cent or more of local workers, and agriculture accounting for 9 per cent.

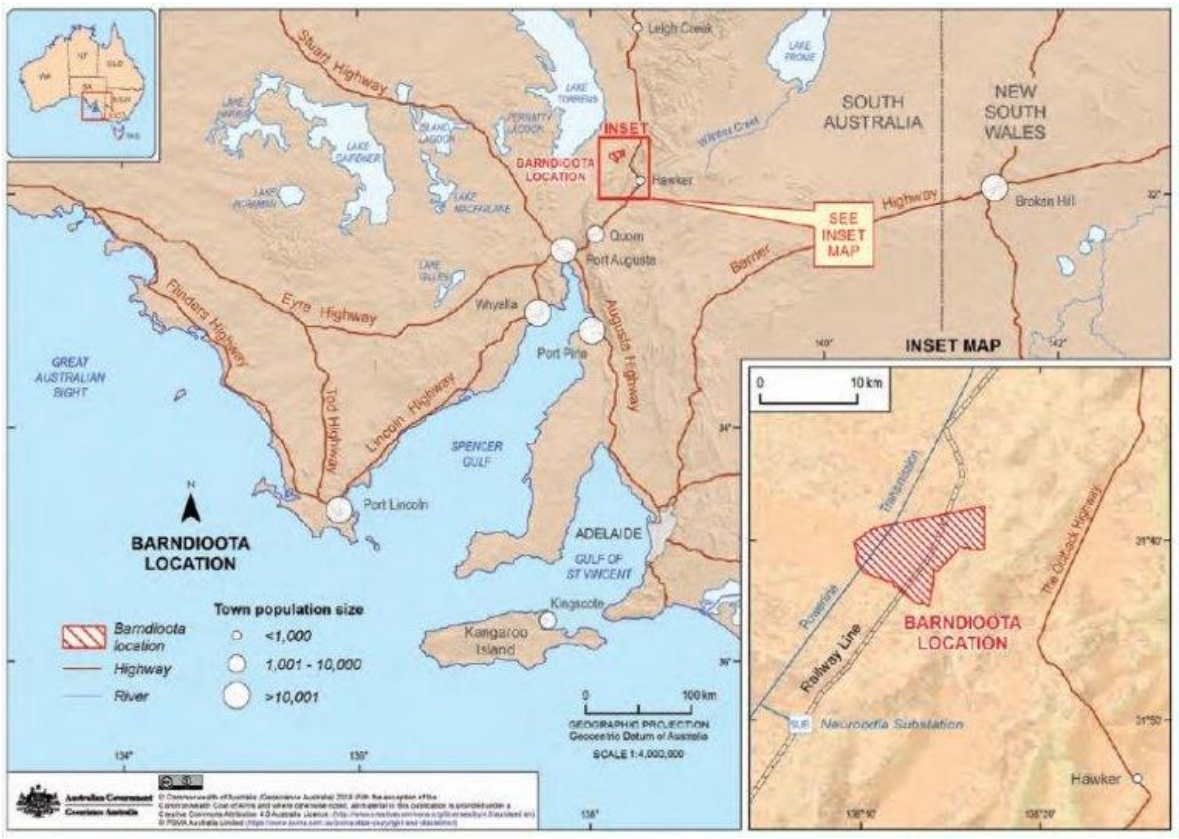

Figure 2: Map of the approved site at Wallerberdina in relation to Hawker and the broader region

Community engagement activities

To inform communities of the implications of hosting a facility and provide a platform for the community to interact with departmental staff and subject matter specialists, the department and Minister have undertaken a significant program of engagement work.

Printed and digital information was communicated via fact sheets, newsletters, a dedicated website and Facebook. Community information sessions, webinars with specialists and town hall meetings were supplemented with tailored heritage, agricultural and economic/business development events. Consultative committees and economic working groups were established in each local government area and physical offices were maintained, staffed with local Community Liaison Officers and visiting departmental staff. There were opportunities for the community to hear from a broad spectrum of specialists, including those with divergent views about the facility. In addition, the department enabled over 230 community members to visit the Australian Nuclear Science and Technology Organisation (ANSTO) to gain a firsthand insight into radioactive waste management, as well as into the work ANSTO does to support nuclear medicine and research.

This broad program of consultation activities coordinated by the department in relation to site selection is described in detail in the Review of Community Engagement at attachment A. These activities underpinned work to gauge the level of community sentiment for the facility.

Selecting a site

The Australian Government is committed to delivering the facility on a site volunteered by the owner alongside a community that broadly supports hosting it. The sites considered in this report were nominated under the NRWM Act. Full details of this process are in the SAR.

Site suitability criteria were developed to enable a suitability assessment to support a decision about site selection. Site suitability criteria 1, 2 and 3 are addressed in the SAR. The additional criterion 4, is addressed in this CSR.

Site suitability criterion 4

The extent to which there is broad community support for the facility to be hosted at the site.

Successive ministers have made a commitment that the facility will be established in a community where there is broad community support. Key indicators of community sentiment are presented in this report, to assist the Minister's consideration of this criterion.

About community sentiment

There are many different ways to define a 'community'. Individuals who are part of a community may be directly or indirectly impacted by the establishment and operation of the facility. They may live and work in the area surrounding a site and be directly affected by the facility on a social and economic basis. Individuals may also have a particular interest in the facility, such as cultural or business links with a site or the area surrounding a site, or be interested in nuclear medicine or radioactive waste management.

One way of describing 'community' – for the purposes of considering 'broad community support for hosting the facility' – is to consider the community that might experience the socio-economic impacts of the facility, or that might have a socio-economic interest in the facility. LGA boundaries usually provide an appropriate proxy for determining the scope of that community because the LGAs are generally constructed around key population centres and often map the social and economic connections that define those communities as being separate to neighbouring communities. On this basis, the ballots run by the AEC (one of the indicators used to assess community sentiment) were held based on the LGA boundaries. At the same time, noting that the Wallerberdina site is located adjacent to the border of the Flinders Ranges Council LGA, the Wallerberdina local community ballot boundary was extended to include the Outback Community Authority (OCA) land within a 50 km radius of the nominated site.[1] This ensures an appropriate economic centre is captured, while including the large neighbouring properties located near the nominated site but outside the Flinders Ranges Council boundaries. The boundaries for both ballots were supported by the respective community consultative committees.

Taking into account the above, in setting out the results of indicators including the AEC-run ballots, the CSR distinguishes between 'local' and 'non-local' responses, where 'local' refers to respondents who gave an address within the relevant LGA (plus the OCA land within a 50 km radius of Wallerberdina). In particular, these community boundaries were referenced when considering neighbour and business surveys. As well, in the analysis of public submissions, petitions and correspondence, the correspondent was classified as 'local' based on these local geographic boundaries.

This description of community is not intended to indicate that the relevant 'community' cannot be defined in a different way based on different considerations. In recognition of the variety of stakeholders with an interest in the facility, this report presents views collected via a range of government-led and privately conducted community sentiment indicators. These include council-run community ballots, private ballots, public submissions, parliamentary submissions, neighbour surveys, business survey, petitions and ministerial correspondence.

[1] The Lyndhurst and Napandee sites are wholly within the District Council of Kimba LGA.

While it has been important to draw on a variety of mechanisms to assess community sentiment to ensure all voices are heard, the department notes that there is a large variation in the quality of the data produced by the different methods and the types of inferences that can be drawn. Some indicators lend themselves to a rigorous quantitative analysis based on verifiable results: for example, the AEC-run ballots. Other indicators are based on unknown or unverifiable sampling parameters, such as petitions or public submissions.

All mechanisms provide important qualitative information about sentiment, and results should be interpreted in the context of the approaches that produced them.

Information about each of the indicators is presented in a standardised way (setting out their context, approach and findings based on a template) to ensure, as far as possible, the results can be easily interpreted and compared in coming to an overall conclusion about community sentiment.

There may also be overlap between respondents in different indicator groups. For example, a person may have responded in the ballot and in a petition, or a resident may have cultural ties to the land in addition to owning a business in the local area. This is reflective of the many different ways individuals may identify as a part of their community.

About community sentiment indicators

Below is a brief description of the community sentiment indicators presented in this report.

Community sentiment indicator	Indicator characteristics
Community ballots – **District Council of Kimba** – **Flinders Ranges Council and Outback Community Authority**	This targeted sentiment indicator was gathered by an independent organisation. The local government authorities arranged for the Australian Electoral Commission (AEC) to conduct ballots to establish the level of support for the facility among their constituents, in order for this information to be provided to the Minister.
Neighbour surveys	These targeted sentiment indicator was gathered by an independent organisation (ORIMA Research) to determine sentiment of Lyndhurst and Napandee's direct and near neighbours about the facility.
Business survey	This targeted sentiment indicator was gathered by an independent organisation (ORIMA Research) to determine sentiment toward the facility held by businesses in the same local government area as Lyndhurst and Napandee.
Public submissions	This sentiment indicator was gathered via the Public Submission process, which commenced on 1 August 2018 and closed on 12 December 2019. This formal process was undertaken by the department and open to all Australians to gather sentiment towards the proposal to establish a National Radioactive Waste Management Facility at the nominated sites of Lyndhurst, Napandee and Wallerberdina Station, and the reasons given for that sentiment. The analysis of public submissions was undertaken by an independent organisation (ORIMA Research).
Ministerial correspondence	This sentiment indicator was gathered via existing channels. Ministerial correspondence is correspondence about the proposal to establish a National Radioactive Waste Management Facility at the nominated sites of Lyndhurst, Napandee and Wallerberdina Station, sent directly to the relevant Minister via electronic and physical channels outside of the public submission process (June 2017 to 12 December 2019). Ministerial correspondence was analysed by an independent organisation (ORIMA Research).
AGM motion—Adnyamathanha Traditional Lands Association (ATLA)	This targeted sentiment indicator was gathered via a community-led process: a motion passed at the ATLA Annual General Meeting (March 2018) opposing the facility at Wallerberdina.

Ballot— Barngala Determination Aboriginal Corporation (BDAC)	This targeted sentiment indicator was gathered by an independent organisation. BDAC arranged for the Australian Election Company (a private polling company) to conduct a ballot to establish the level of support for the facility among its members, in order for this information to be provided to the Minister.
Ballot—Viliwarinha Yura Aboriginal Corporation (VYAC)	This targeted sentiment indicator was gathered via a community-led process: a ballot undertaken by VYAC amongst members of VYAC in order to convey to the department their sentiment towards the facility.
Community-led business survey	This targeted sentiment indicator was gathered via a community-led process: a survey of business owners in Hawker to establish sentiment towards the facility.
Correspondence-- Gawler Ranges Aboriginal Corporation (GRAC)	This targeted sentiment indicator was gathered via existing channels: a letter from GRAC to the department conveying its position on GRAC's involvement in future consultations regarding the facility.
Petitions	These sentiment indicators were gathered via existing channels: petitions are documents signed by a number of people demanding or asking for some action from the government or Parliament with respect to the proposal to establish the facility, and were received through a variety of channels including the public submission process and Ministerial correspondence.
Senate inquiry submissions (ATLA and BDAC)	These sentiment indicators were gathered via existing channels: submissions made to the 2018 Senate Economic References Committee Inquiry into the selection process for a National Radioactive Waste Management Facility in South Australia. While all submissions to the Inquiry are available to the Minister, the department draws attention to these two submissions because they clearly set out the position of organisations currently engaged in legal action relating to the proposal for the facility.

Executive summary

The following pages present an overview of community sentiment for Lyndhurst, Napandee and Wallerberdina.

The tables summarise sentiment results by indicator, and show where further information can be found in the report and associated attachment.

Lyndhurst community sentiment

Community ballot – District of Kimba Council (p. 25 and attachment B)

	Yes	No	Other	Participation rate
Local	452	282	11*	90.41%**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	N/A	N/A	N/A

** Rejected at preliminary scrutiny or informal vote (the ballot paper has not been completed properly and it is set aside and not counted towards any candidate). **90.41 per cent of 824 eligible voters.*

Neighbour surveys (p. 29 and attachment D)

	Potential^	Eligible*	Actual~	Yes	No	Mixed#	Other	Participation rate
Parcels	35	24	24	58.3%	20.8%	20.8%	0.0%	100%
Participants	n/a	23	19	68.4%	31.6%	0.0%	0.0%	82.6%
Responses	n/a	49	41	65.9%	34.1%	0.0%	0.0%	83.7%

*^ Potential = the total number of parcels * Eligible = the total number of eligible parcels or participants*

~ Actual = the total number of participants or parcels where a response is recorded

 # Mixed means different individuals expressed different sentiment.

***By Participant*:** Direct neighbours, that share a boundary with the nominated site at Lyndhurst, are divided in their views towards the facility. Of all direct and indirect neighbours, those that share a boundary and that fall within the neighbour radius of 5 kilometres, 68.4 per cent were supportive and 31.6 per cent opposed.

Business survey (p. 34 and attachment E)

	Yes	No	Other	Participation rate
Overall	59.3%	40.7%	0.0%	n = 135

Public submissions (p. 36 and attachment F)

		Yes	No	Other^	Participation Rate
All	Local submissions	59.8%	39.8%	0.4%	n=254
	Non-local submissions	2.8%	94.5%	2.6%	n=2,879
Bespoke	Local submissions	63.0%	36.6%	0.4%	n=238
	Non-local submissions	24.7%	71.1%	4.2%	n=287
	All submissions	42.1%	55.4%	2.5%	n=525
Proforma*	Local submissions	12.5%	87.5%	0.0%	n=16
	Non-local submissions	0.4%	97.1%	2.5%	n=2,592
	All submissions	0.5%	97.1%	2.5%	n=2,608

** Proforma include proforma and proforma+ submissions. ^ Other in submissions means neutral, unspecified or undecided.*

Ministerial correspondence (p. 38 and attachment G)

		Yes	No	Other	Participation Rate
Bespoke	Local correspondence	19.2%	71.2%	9.6%	n=73
	Non-local correspondence	3.3%	80.0%	16.7%	n=60
	All correspondence	12.0%	75.2%	12.8%	n=133
Proforma		*All proforma and group correspondence was opposed. This included: a letter signed by 11 families; a proforma sent by 7 families; an email proforma sent by 266 individuals (referencing both SA sites); a petition signed by 26 individuals; and a petition signed by 932 individuals**.*			

^ Other in correspondence means neutral, unspecified or undecided.

***Correspondence that comprised petitions is reported on separately in the Petitioner Group reports.*

Ballot – Barngarla Determination Aboriginal Corporation (BDAC) (p. 43 and attachment I)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	0	83	4*	39.71%**

**Four ballot papers recorded as 'rejected at preliminary scrutiny'.*

***39.71 per cent of 209 eligible voters (total of BDAC membership).*

Correspondence – Gawler Ranges Aboriginal Corporation (GRAC) (p. 48 and attachment L)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	N/A	✓*	N/A

**The correspondence is from GRAC, which is not based in the relevant LGA and lists its address as C/-Norman Waterhouse Lawyers, Adelaide. However as details of who participated in the preparation of the correspondence are unknown to the department the location of the correspondence is recorded as 'unknown'.*

Petitioner Group 1 – Local resident petitioners (p. 50 and attachment M)

	Yes	No	Other	Participation rate
Local	N/A	26	N/A	*
Non-local	N/A	0	N/A	N/A
Unknown	N/A	0	N/A	N/A

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 1.24 per cent of all petitioners.*

Petitioner Group 2 – Eyre Peninsula petitioners (p. 51 and attachment N)

	Yes	No	Other	Participation rate
Local	N/A	0	N/A	N/A
Non-local	N/A	20	N/A	*
Unknown	N/A	4	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 1.15 per cent of all the signatures received by the department in petitions.*

Petitioner Group 3 – House of Representatives petitioners (p. 52 and attachment O)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	932	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 44.44 per cent of all the signatures received by the department in petitions.*

Petitioner Group 4 – Senate petitioners (p. 54 and attachment P)

	Yes	No	Other	Participation rate
Local	N/A	107	N/A	**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	932*	N/A	**

**The bulk of these petitioners give an address which indicates they are likely to be considered non-local for the purposes of this report. However, the department cannot confirm that they are all non-local.*
***It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 49.55 per cent of all the signatures received by the department in petitions.*

Petitioner Group 5 – Campaign postcard petition (p. 55 and attachment Q)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	76	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 3.62 per cent of all the signatures received by the department in petitions.*

Senate inquiry submission – Barngarla Determination Aboriginal Corporation (p. 58 and attachment S)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	✓*	N/A	N/A

**The submission is from BDAC, which is not based in the relevant LGA and lists its address as C/-Norman Waterhouse Lawyers, Adelaide. However as details of who participated in the preparation of the submission are unknown to the department the location of the submission is recorded as 'unknown'.*

Napandee community sentiment

Community ballot – District of Kimba Council (p. 25 and attachment B)

	Yes	No	Other	Participation rate
Local	452	282	11*	90.41%**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	N/A	N/A	N/A

** Rejected at preliminary scrutiny or informal vote (the ballot paper has not been completed properly and it is set aside and not counted towards any candidate). **90.41 per cent of 824 eligible voters*

Neighbour surveys (p. 29 and attachment D)

	Potential^	Eligible*	Actual~	Yes	No	Mixed#	Other	Participation rate
Parcels	25	24	22	75.0%	16.7%	0.0%	8.3%	91.6%
Participants	n/a	28	25	60.0%	40.0%	0.0%	0.0%	89.3%
Responses	n/a	53	44	72.7%	27.3%	0.0%	0.0%	83.0%

*^ Potential = the total number of parcels * Eligible = the total number of eligible parcels or participants*
~ Actual = the total number of participants or parcels where a response is recorded
 # Mixed means different individuals expressed different sentiment.

By Participant: All direct neighbours, that share a boundary with the nominated site at Napandee, are in favour of the facility. Of all direct and indirect neighbours, those that share a boundary and that fall within the neighbour radius of 5 kilometres, 60 per cent were supportive and 40 per cent opposed.

Business survey (p. 34 and attachment E)

	Yes	No	Other	Participation rate
Overall	59.3%	40.7%	0.0%	N = 135

Public submissions (p. 36 and attachment F)

		Yes	No	Other^	Participation Rate
All	Local submissions	59.8%	39.8%	0.4%	n=254
	Non-local submissions	2.8%	94.5%	2.6%	n=2,879
Bespoke	Local submissions	63.0%	36.6%	0.4%	n=238
	Non-local submissions	24.7%	71.1%	4.2%	n=287
	All submissions	42.1%	55.4%	2.5%	n=525
Proforma*	Local submissions	12.5%	87.5%	0.0%	n=16
	Non-local submissions	0.4%	97.1%	2.5%	n=2,592
	All submissions	0.5%	97.1%	2.5%	n=2,608

** Proforma include proforma and proforma+ submissions. ^ Other in submissions means neutral, unspecified or undecided.*

Ministerial correspondence (p. 38 and attachment G)

		Yes	No	Other	Participation Rate
Bespoke	Local correspondence	19.2%	71.2%	9.6%	n=73
	Non-local correspondence	3.3%	80.0%	16.7%	n=60
	All correspondence	12.0%	75.2%	12.8%	n=133
Proforma		*All proforma and group correspondence was opposed. This included: a letter signed by 11 families; a proforma sent by 7 families; an email proforma sent by 266 individuals (referencing both SA sites); a petition signed by 26 individuals; and a petition signed by 932 individuals**.*			

^ Other in correspondence means neutral, unspecified or undecided.
***Correspondence that comprised petitions is reported on separately in the Petitioner Group reports.*

Ballot – Barngarla Determination Aboriginal Corporation (p. 43 and attachment I)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	0	83	4*	39.71%**

**Four ballot papers recorded as 'rejected at preliminary scrutiny'.*
***39.71 per cent of 209 eligible voters (total of BDAC membership).*

Petitioner Group 1 – Local resident petitioners (p. 50 and attachment M)

	Yes	No	Other	Participation rate
Local	N/A	26	N/A	*
Non-local	N/A	0	N/A	N/A
Unknown	N/A	0	N/A	N/A

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 1.24 per cent of all petitioners.*

Petitioner Group 2 – Eyre Peninsula petitioners (p. 51 and attachment N)

	Yes	No	Other	Participation rate
Local	N/A	0	N/A	N/A
Non-local	N/A	20	N/A	*
Unknown	N/A	4	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 1.15 per cent of all the signatures received by the department in petitions.*

Petitioner Group 3 – House of Representatives petitioners (p. 52 and attachment O)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	932	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 44.44 per cent of all the signatures received by the department in petitions.*

Petitioner Group 4 – Senate petitioners (p. 54 and attachment P)

	Yes	No	Other	Participation rate
Local	N/A	107	N/A	**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	932*	N/A	**

**The bulk of these petitioners give an address which indicates they are likely to be considered non-local for the purposes of this report. However, the department cannot confirm that they are all non-local.*

*** It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 49.55 per cent of all the signatures received by the department in petitions.*

Petitioner Group 5 – Campaign postcard petition (p. 55 and attachment Q)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	76	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 3.62 per cent of all the signatures received by the department in petitions.*

Senate inquiry submission – Barngarla Determination Aboriginal Corporation (p. 58 and attachment S)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	✓*	N/A	N/A

** The submission is from BDAC, which is not based in the relevant LGA and lists its address as C/-Norman Waterhouse Lawyers, Adelaide. However as details of who participated in the preparation of the submission are unknown to the department the location of the submission is recorded as 'unknown'.*

Wallerberdina community sentiment

Community ballot – Flinders Ranges Council (p. 27 and attachment C)

	Yes	No	Other	Participation rate
Local	408	454	18*	71.08%**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	N/A	N/A	N/A

** Rejected at preliminary scrutiny or informal vote (the ballot paper has not been completed properly and it is set aside and not counted towards any candidate).*
***71.08 per cent of 1238 eligible voters.*

Public submissions (p. 36 and attachment F)

		Yes	No	Other^	Participation Rate
All	Local submissions	12.5%	86.6%	0.9%	n=112
	Non-local submissions	1.1%	96.3%	2.6%	n=2,746
Bespoke	Local submissions	45.2%	51.6%	3.2%	n=31
	Non-local submissions	10.9%	85.3%	3.8%	n=184
	All submissions	15.8%	80.5%	3.7%	n=215
Proforma*	Local submissions	0.0%	100.0%	0.0%	n=81
	Non-local submissions	0.4%	97.1%	2.5%	n=2,562
	All submissions	0.4%	97.2%	2.4%	n=2,643

** Proforma include proforma and proforma+ submissions.*
^ Other in submissions means neutral, unspecified or undecided.

Ministerial correspondence (p. 38 and attachment G)

		Yes	No	Other^	Participation Rate
Bespoke	Local correspondence	16.7%	66.7%	16.7%	n=24
	Non-local correspondence	2.3%	77.3%	20.5%	n=44
	All correspondence	7.4%	73.5%	19.1%	n=68
Proforma		*All proforma and group correspondence was opposed. This included: a petition signed by 17 people; and an email proforma sent by 266 individuals (referencing both SA sites).***			

^ Other in correspondence means neutral, unspecified or undecided.
***Correspondence that comprised petitions is reported on separately in the Petitioner Group reports.*

AGM motion – Adnyamathanha Traditional Lands Association (ATLA) (p. 40 and attachment H)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	0	61	0	100%*

**100 per cent of the 61 members present at the ATLA AGM (this represents 8.6 per cent of ATLA's total 707 members).*

Ballot— Viliwarinha Yura Aboriginal Corporation (VYAC) (p. 46 and attachment J)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	45	34	1*	72.73%**

**Recorded as a 'blank vote'.*
***72.73 per cent of the total of 110 VYAC members.*

Community-led business survey (p. 47 and attachment K)

	Yes	No	Other	Participation rate
Local	2	10	5*	**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	N/A	N/A	N/A

**Classified in the survey as 'Neutral or prefer not to say'. **Not provided*

Petitioner Group 2 – Eyre Peninsula petitioners (p. 51 and attachment N)

	Yes	No	Other	Participation rate
Local	N/A	0	N/A	N/A
Non-local	N/A	20	N/A	*
Unknown	N/A	4	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 1.15 per cent of all the signatures received by the department in petitions.*

Petitioner Group 3 – House of Representatives petitioners (p. 52 and attachment O)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	932	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 44.44 per cent of all the signatures received by the department in petitions.*

Petitioner Group 4 – Senate petitioners (p. 54 and attachment P)

	Yes	No	Other	Participation rate
Local	N/A	107	N/A	**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	932*	N/A	**

**The bulk of these petitioners give an address which indicates they are likely to be considered non-local for the purposes of this report. However, the department cannot confirm that they are all non-local.*

*** It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 49.55 per cent of all the signatures received by the department in petitions.*

Petitioner Group 5 – Campaign postcard petition (p. 55 and attachment Q)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	76	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 3.62 per cent of all the signatures received by the department in petitions.*

Senate inquiry submission – Adnyamathanha Traditional Lands Association (p. 56 and attachment R)

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	✓*	N/A	N/A

** The submission is from ATLA, which is based in Port Augusta. However as details of who participated in the preparation of the submission are unknown to the department the location of the submission is recorded as 'unknown'.*

Indicators of community sentiment

The range of indicators used to measure community sentiment ensure a wide variety of stakeholders with an interest in the facility have had an opportunity to have their views heard. The results and assessment methods for each indicator are summarised below. Detailed information about each indicator is attached (see list of attachments at p. 69).

Community ballot—District of Kimba Council

(Lyndhurst and Napandee)

To provide the Minister with a measure of local community sentiment, the District Council of Kimba agreed to conduct a postal ballot in relation to support for locating the facility at either of the two nominated sites within its local government area (Lyndhurst and Napandee). As noted on page 13 of this report, the department considers that LGA boundaries are an appropriate proxy for identifying the persons who are likely to experience the socio-economic impacts of a facility, as LGAs are generally constructed around key population centres and typically map the social and economic connections that define those communities as being separate from neighbouring communities.

To have been eligible to vote, a person must have been on the SA House of Assembly roll for the LGA (used for federal and state elections) or be on or able to enrol on the CEO's roll. For a person to be eligible for the CEO's roll they must own or occupy (for at least one month) a property within the Council boundary (either as an individual, a group or body corporate).The eligibility criteria used to assess applications to the CEO's roll are those identified in section 14 of the *Local Government (Elections) Act 1999* (SA).

The roll for the ballot was open on 23 August 2019 and closed 13 September 2019. The AEC sent ballot papers to voters' postal address from 3 October 2019 and the ballot closed on 7 November 2019. The results were released by the AEC on 7 November 2019. The question on the ballot paper was:

> *'Do you support the proposed National Radioactive Waste Management Facility being located at one of the nominated sites in the community of Kimba?'*

Results—Lyndhurst and Napandee

	Yes	No	Other	Participation rate
Local	452	282	11*	90.41%**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	N/A	N/A	N/A

** Rejected at preliminary scrutiny or informal vote (the ballot paper has not been completed properly and it is set aside and not counted towards any candidate).*
***90.41 per cent of 824 eligible voters.*

There were 824 eligible voters for the District Council of Kimba ballot. In total, 745 ballot papers were returned for scrutiny, which represents a participation rate of 90.41 per cent. Nine ballot papers were rejected at preliminary scrutiny and two were found to be informal, meaning 734 returned ballot papers were recognised as formal votes (marked according to the rules for the ballot and can be counted towards the results).

Of these:

- 452 (61.58 per cent) voted Yes.
- 282 (38.4 per cent) voted No.

Further details of this assessment are at attachment B.

Community ballot—Flinders Ranges Council

(Wallerberdina)

To provide the Minister with a measure of local community sentiment, the local government authorities agreed to facilitate a postal ballot in relation to hosting the facility at the approved nominated site of Wallerberdina. The nominated site at Wallerberdina Station straddles the Flinders Ranges Council LGA and the Outback Community Authority boundary.

The primary social and economic centres closest to the site that might be impacted are Hawker and Quorn in the Flinders Ranges Council LGA. As noted on page 13 of this report, the department considers that LGA boundaries are an appropriate proxy for identifying the persons who are likely to experience the socio-economic impacts of a facility, as LGAs are generally constructed around key population centres and typically map the social and economic connections that define those communities as being separate from neighbouring communities.

At the same time, noting that the proposed land acquisition parcel is located adjacent to the border of the Flinders Ranges Council LGA, the Wallerberdina local community ballot boundary was extended to include OCA land within a 50 km radius of the nominated site. This ensures an appropriate economic centre is captured, while including the large neighbouring properties located near the nominated site but outside the Flinders Ranges Council boundaries. The boundary for the ballot was supported by the community consultative committee.

The ballot was undertaken by the AEC on behalf of the Flinders Ranges Council and Outback Communities Authority and funded by the department. The AEC conducted, scrutinised and counted the ballot.

For those within the Flinders Ranges Council LGA to have been eligible to vote a person must have been on the SA House of Assembly roll for the LGA plus the 50 km radius (the one used for federal and state elections) or be on or able to enrol on the Council's Supplementary Roll. For a person to be eligible for the Supplementary Roll they must own or occupy (for at least one month) a property within the Council boundary (either as an individual, a group or body corporate).The eligibility criteria used to assess applications to the Supplementary Roll are those identified in section 14 of the *Local Government (Elections) Act 1999* (SA). For those outside the Flinders Ranges Council LGA and within the 50 km radius, information (including forms) on how they could register to be included on the ballot roll was sent via post.

The roll for the ballot was opened September 2019 and closed 18 October 2019. The AEC sent ballot papers to voters' postal address from 11 November 2019 and the ballot closed on 12 December 2019. The votes were scrutinised and counted by the AEC and the results were released on 12 December 2019.

The question on the ballot paper was:

> *'Do you support the proposed National Radioactive Waste Management Facility in your community?'*

Results—Wallerberdina

	Yes	No	Other	Participation rate
Local	408	454	18*	71.08%**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	N/A	N/A	N/A

** Rejected at preliminary scrutiny or informal vote (the ballot paper has not been completed properly and it is set aside and not counted towards any candidate).*
***71.08 per cent of 1238 eligible voters.*

There were a total of 1238 eligible voters for the Flinders Ranges Council ballot. In total, 880 ballot papers were returned for scrutiny, which represents a participation rate of 71.08 per cent. Of these, 12 were rejected at preliminary scrutiny and six were found to be informal, meaning 862 were recognised as formal votes (marked according to the rules for the ballot and can be counted towards the results). Of these:

- 408 (47.33 per cent) voted Yes.
- 454 (52.67 per cent) voted No.

Further details of this assessment are at attachment C.

Neighbour surveys

(Lyndhurst and Napandee)

The surveys were conducted by ORIMA Research on behalf of the department. ORIMA Research is an ISO20252[2] accredited company and a member of the Association of Market and Social Research Organisations. ORIMA's fieldwork partner is Action Market Research, an Adelaide-based research company, which is also ISO20252 accredited. Following the outcome of the Flinders Ranges Council community ballot on 12 December 2019, the neighbour survey for Wallerberdina was discontinued.

For the purposes of the surveys, a *neighbour* is:

- A person that is the proprietor of a freehold estate registered in the Register Book *or a Crown lessee as registered in the Register of Crown leases* under the *Real Property Act 1886 (SA).*
- A person in a partnership who is the proprietor of a freehold estate registered in the Register Book *or a Crown lessee as registered in the Register of Crown leases* under the *Real Property Act 1886 (SA)*
- A person who is a trustee of a trust that is the proprietor of a freehold estate registered in the Register Book *or a Crown lessee as registered in the Register of Crown leases* under the *Real Property Act 1886 (SA)*
- A representative of a company or organisation that is a proprietor of a freehold estate registered in the Register Book *or a Crown lessee as registered in the Register of Crown leases* under the *Real Property Act 1886 (SA)*
- A representative of a company or organisation that is in a partnership that is a proprietor of a freehold estate registered in the Register Book *or a Crown lessee as registered in the Register of Crown leases* under the *Real Property Act 1886 (SA)*
- A representative of a company or organisation that is a trustee of a trust that is a proprietor of a freehold estate registered in the Register Book *or a Crown lessee as registered in the Register of Crown leases* under the *Real Property Act 1886 (SA)*
- A person who, as at the survey start date, had resided within the neighbour radius for at least 30 consecutive days immediately prior to that date (a person resides at a place if they temporarily or permanently live at that place)

[2] ISO20252 is the international standard for Market and Social Research. Companies are accredited via an external certification body.

For the purposes of the neighbour surveys the *neighbour radius* is the 5 km radius drawn from all points along the boundary of the nominated sites of Lyndhurst and Napandee, as determined by Geoscience Australia.

The eligibility guidelines were developed with input from the Kimba Consultative Committee and Kimba Economic Working Group, and operationalised with advice from Geoscience Australia and ORIMA Research (detailed guidelines were published on the department's website and incorporated in the ORIMA report). Neighbours were eligible to participate if they are 18+ and are owners or reside on an eligible property. Further details concerning eligibility for the neighbour surveys are in attachment D.

The department wrote to eligible neighbours asking them to nominate and to provide contact details for relevant owners and residents. Data was collected via a telephone survey, during which respondents were asked to confirm their identity. The survey data was validated, checked and analysed using statistical software in accordance with ISO20252 data handling and quality checking processes. While every effort was made to identify all eligible neighbours within the geographic boundaries, it is possible that some may not have been identified via the available mechanisms.

Results—Lyndhurst

	Potential^	Eligible*	Actual~	Yes	No	Mixed#	Other	Participation rate
Parcels	35	24	24	58.3%	20.8%	20.8%	0.0%	100%
Participants	n/a	23	19	68.4%	31.6%	0.0%	0.0%	82.6%
Responses	n/a	49	41	65.9%	34.1%	0.0%	0.0%	83.7%

^ *Potential = the total number of parcels*

* *Eligible = the total number of eligible parcels or participants*

~ *Actual = the total number of participants or parcels where a response is recorded*

\# *Mixed means different individuals expressed different sentiment.*

By Participant: Direct neighbours, that share a boundary with the nominated site at Lyndhurst, are divided in their views towards the facility. Of all direct and indirect neighbours, those that share a boundary and that fall within the neighbour radius of 5 kilometres, 68.4 per cent were supportive and 31.6 per cent opposed.

Results—Napandee

	Potential^	Eligible*	Actual~	Yes	No	Mixed#	Other	Participation rate
Parcels	25	24	22	75.0%	16.7%	0.0%	8.3%	91.6%
Participants	n/a	28	25	60.0%	40.0%	0.0%	0.0%	89.3%
Responses	n/a	53	44	72.7%	27.3%	0.0%	0.0%	83.0%

^ *Potential = the total number of parcels*

* *Eligible = the total number of eligible parcels or participants*

~ *Actual = the total number of participants or parcels where a response is recorded*

Mixed means different individuals expressed different sentiment.

By Participant: All direct neighbours, that share a boundary with the nominated site at Napandee, are in favour of the facility. Of all direct and indirect neighbours, those that share a boundary and that fall within the neighbour radius of 5 kilometres, 60 per cent were supportive and 40 per cent opposed.

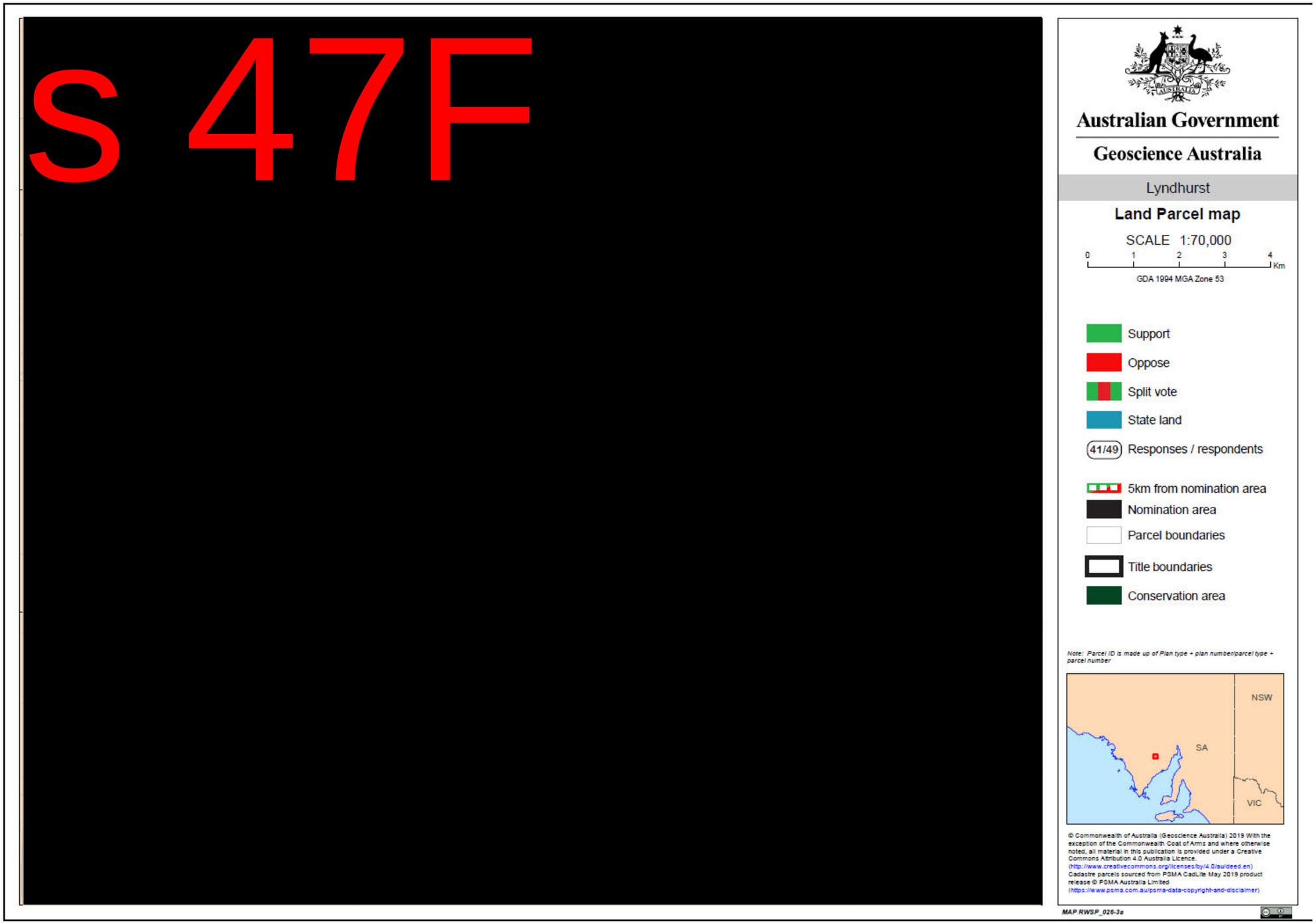

Figure 3: Lyndhurst neighbour sentiment

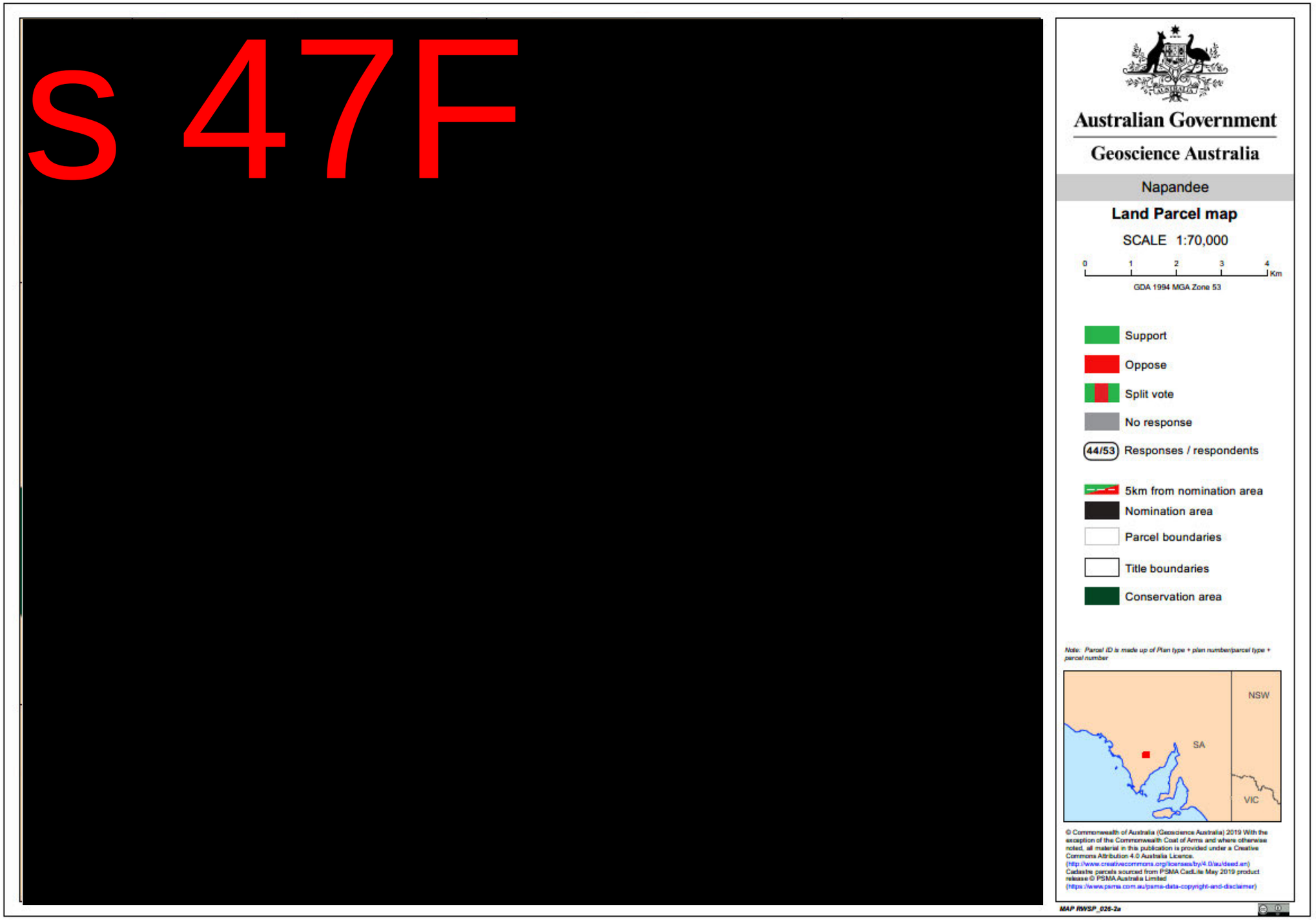

Figure 4: Napandee neighbour sentiment

Business survey

(Lyndhurst and Napandee)

A survey of businesses within the relevant geographic boundaries was conducted by ORIMA Research and its fieldwork partner, Action Market Research, on behalf of the department. Both are ISO20252[3] accredited companies and ORIMA is a member of the Association of Market and Social Research Organisations. The survey commenced 27 November and completed close of business on 19 December 2019. Following the outcome of the Flinders Ranges Council community ballot on 12 December 2019, the business survey for Wallerberdina was discontinued.

For the purposes of the survey, the *geographic boundaries* were the Kimba District Council LGA. A *business* is any entity that undertakes a commercial activity on a for profit basis, that is registered on the Australian Business Register (ABR) with an active Australian Business Number (ABN) on 1 October 2019.

The eligibility guidelines were developed with input from the Kimba Consultative Committee and Kimba Economic Working Groups and Barndioota Consultative Committee and Wallerberdina Economic Working Group,[4] and operationalised with advice from Geoscience Australia and ORIMA Research (detailed guidelines were published on the department's website and incorporated in the ORIMA report at attachment E). As the characteristics of businesses vary widely, determining the eligibility of businesses for the survey was challenging. The intention of the survey was to capture the views of those whose businesses operated on a commercial basis. Therefore, a threshold consideration for a business to be included in the survey was that it had to be for-profit. Other factors taken into account included location, registration, business structure and the types of activities businesses are engaged in. To be eligible to participate, businesses must have been active in the geographic regions within the last 12 months,[5] and required to submit tax returns for the last two financial years. Each eligible business was able to provide one response to the business survey.

A detailed discussion of the challenges of identifying eligible businesses is in the ORIMA Research report at attachment E.

Data was collected via a telephone survey. During the survey, respondents were asked to confirm the business's eligibility, and that they were authorised to speak on behalf of the business. Where they were not authorised to speak, they were asked to provide additional

[3] ISO20252 is the international standard for Market and Social Research. Companies are accredited via an external certification body.

[4] Both community consultative committees were consulted in developing the guidelines, although Wallerberdina was subsequently excluded from the business survey during the data collection phase following the Minister's media release on 13 December 2019 that the Wallerberdina community ballot result demonstrated that there is not enough broad community support for the proposal.

[5] This was determined by asking in the survey questionnaire whether this was the case and in addition, businesses being able to demonstrate they had filed the requisite tax returns and had an active ABN

contact details of someone who could. The survey data was validated, checked and analysed using statistical software in accordance with ISO20252 data handling and quality checking processes. While every effort was made to identify all eligible businesses within the geographic boundaries, it is possible that some businesses may not have been identified via the available mechanisms.

Results—Lyndhurst and Napandee

Business survey results

	Yes	No	Other	Participation rate
Overall	59.3%	40.7%	0.0%	N = 135

Support mostly increased with business size, from 50.0 per cent amongst businesses with a single employee up s 47F [redacted] 64.0 per cent of businesses with turnovers under $500,000 supported the facility. 37.5 per cent of those with a turnover between $500,000 and $1 million did so. 69.7 per cent support for the facility was recorded from businesses with a turnover of $1 million or more.

Most industry types supported the facility, with a notable exception being *agriculture, forestry and fishing* (47.7 per cent). Within *agriculture, forestry and fishing*, 54.5 per cent of *other grain growing* supported the facility, but 56.8 per cent of *grain-sheep or grain-beef cattle farming* opposed it.

Public submissions

(Lyndhurst, Napandee and Wallerberdina)

The department invited public submissions on the proposal to establish and operate a facility from 1 August 2018 and the process remained open until 12 December 2019. The call for submissions was advertised on the NRWMF website, through the community consultative committees, and through Facebook and traditional media. Submissions were received via electronic and physical mailboxes. Submissions were logged by the department and provided to ORIMA Research for analysis and reporting. The full report is at attachment F.

Hard copies of all public submissions have been provided to the Minister (separately to the CSR).

A total of 3,692 public submissions that related to the facility and the sites under consideration were logged by the department and provided for analysis. Where multiple submissions were received from the same submitter (individual or other entity), these were merged into a single combined record for the purpose of analysis and reporting, with the most recent expression of overall sentiment taking precedence. If multiple submissions included any combination of *bespoke* and *proforma/proforma+* content, then the entire merged submission is classified as proforma+.[6]

In total, public submissions from 3,212 different *submitters* (individuals and other entities) were used for the analysis. Results are reported for each community separately, split by *local*[7] and *non-local/unknown* sources; bespoke public submissions are reported both with and without proforma submissions included. Proforma public submissions were much more common in the non-local/unknown category (e.g. 27 per cent of local and 90 per cent of non-local public submissions were proformas). In total 11 per cent of the public submissions related to Kimba only, 2 per cent to Wallerberdina only, 71 per cent to both sites and 15 per cent did not specify which site they related to (most proformas either explicitly related to both sites or were unspecified).

[6] Submissions that were individually written were classed as 'bespoke'. Submissions where five or more individuals used the same template (e.g. through an organised campaign) were classed as 'proforma'. In some cases, submissions with mainly proforma content also had some individual content or variation from the original proforma. These were classified as *proforma+* in ORIMA's full analysis, but for the purposes of presenting the summary results here, proforma and proforma+ have been grouped together.

[7] Submissions are classified as local or non-local based on the geographic boundaries of the Kimba District Council local government area; and the Flinders Ranges Council local government area plus a 50km radius drawn from the boundary of Wallerberdina Station. If the location of the submission cannot be determined it is classified as unknown and aggregated with the non-local submissions.

Results—Lyndhurst and Napandee

		Yes	No	Other^	Participation Rate
All	Local submissions	59.8%	39.8%	0.4%	n=254
	Non-local submissions	2.8%	94.5%	2.6%	n=2,879
Bespoke	Local submissions	63.0%	36.6%	0.4%	n=238
	Non-local submissions	24.7%	71.1%	4.2%	n=287
	All submissions	42.1%	55.4%	2.5%	n=525
Proforma*	Local submissions	12.5%	87.5%	0.0%	n=16
	Non-local submissions	0.4%	97.1%	2.5%	n=2,592
	All submissions	0.5%	97.1%	2.5%	n=2,608

** Proforma include proforma and proforma+ submissions. ^ Other in submissions means neutral, unspecified or undecided.*

Results—Wallerberdina

		Yes	No	Other^	Participation Rate
All	Local submissions	12.5%	86.6%	0.9%	n=112
	Non-local submissions	1.1%	96.3%	2.6%	n=2,746
Bespoke	Local submissions	45.2%	51.6%	3.2%	n=31
	Non-local submissions	10.9%	85.3%	3.8%	n=184
	All submissions	15.8%	80.5%	3.7%	n=215
Proforma*	Local submissions	0.0%	100.0%	0.0%	n=81
	Non-local submissions	0.4%	97.1%	2.5%	n=2,562
	All submissions	0.4%	97.2%	2.4%	n=2,643

** Proforma include proforma and proforma+ submissions.*
^ Other in submissions means neutral, unspecified or undecided.

Ministerial correspondence

(Lyndhurst, Napandee and Wallerberdina)

Ministerial correspondence was received via electronic and physical channels outside of the public submission process. Correspondence was logged by the department and provided to ORIMA Research for analysis and reporting. As with the public submissions, ORIMA Research undertook an independent analysis of Ministerial correspondence received expressing views about the facility (report at attachment G). Hard copies of all Ministerial correspondence have been provided to the Minister (separately to the CSR).

A total of 275 items of Ministerial correspondence that related to the facility and the sites under consideration were received and logged from between June 2017 and 12 December 2019.[8] Where multiple items of correspondence were received from the same submitter (individual or other entity), these were merged into a single combined record for the purpose of analysis and reporting, with the most recent expression of overall sentiment taking precedence. Correspondence that did not refer to one of the proposed sites in SA was classified as out-of-scope and excluded from the analysis.

In total, in-scope Ministerial correspondence from 155 *correspondents* was used for the analysis. Results are reported for each community separately, split by *local* and *non-local/unknown* sources; and bespoke correspondence is reported separately to proforma and group correspondence, with the proforma correspondence summarised separately. In total, 56 per cent of the Ministerial correspondence related to Kimba, 14 per cent to Wallerberdina, 23 per cent to both and 7 per cent did not specify which specific site it referred to.

The sentiment expressed in the Ministerial correspondence is summarised below.

Results—Lyndhurst and Napandee

		Yes	No	Other	Participation Rate
Bespoke	Local correspondence	19.2%	71.2%	9.6%	n=73
	Non-local correspondence	3.3%	80.0%	16.7%	n=60
	All correspondence	12.0%	75.2%	12.8%	n=133
Proforma		*All proforma and group correspondence was opposed. This included: a letter signed by 11 families; a proforma sent by 7 families; an email proforma sent by 266 individuals (referencing both SA sites); a petition signed by 26 individuals; and a petition signed by 932 individuals**.*			

^ *Other in correspondence means neutral, unspecified or undecided.*

***Correspondence that comprised petitions is reported on separately in the Petitioner Group reports.*

[8] The start date of June 2017 reflects when all three sites had moved into the assessment phase.

Results—Wallerberdina

		Yes	No	Other^	Participation Rate
Bespoke	Local correspondence	16.7%	66.7%	16.7%	n=24
	Non-local correspondence	2.3%	77.3%	20.5%	n=44
	All correspondence	7.4%	73.5%	19.1%	n=68
Proforma		*All proforma and group correspondence was opposed.* *This included: a petition signed by 17 people; and an email proforma sent by 266 individuals (referencing both SA sites).***			

^ *Other in correspondence means neutral, unspecified or undecided.*

***Correspondence that comprised petitions is reported on separately in the Petitioner Group reports.*

AGM motion—Adnyamathanha Traditional Lands Association

(Wallerberdina)

ATLA is the Registered Native Title Body Corporate (RNTBC) (also known as prescribed body corporate) that represent Adnyamathanha People that hold Native Title as determined by the Federal Court.

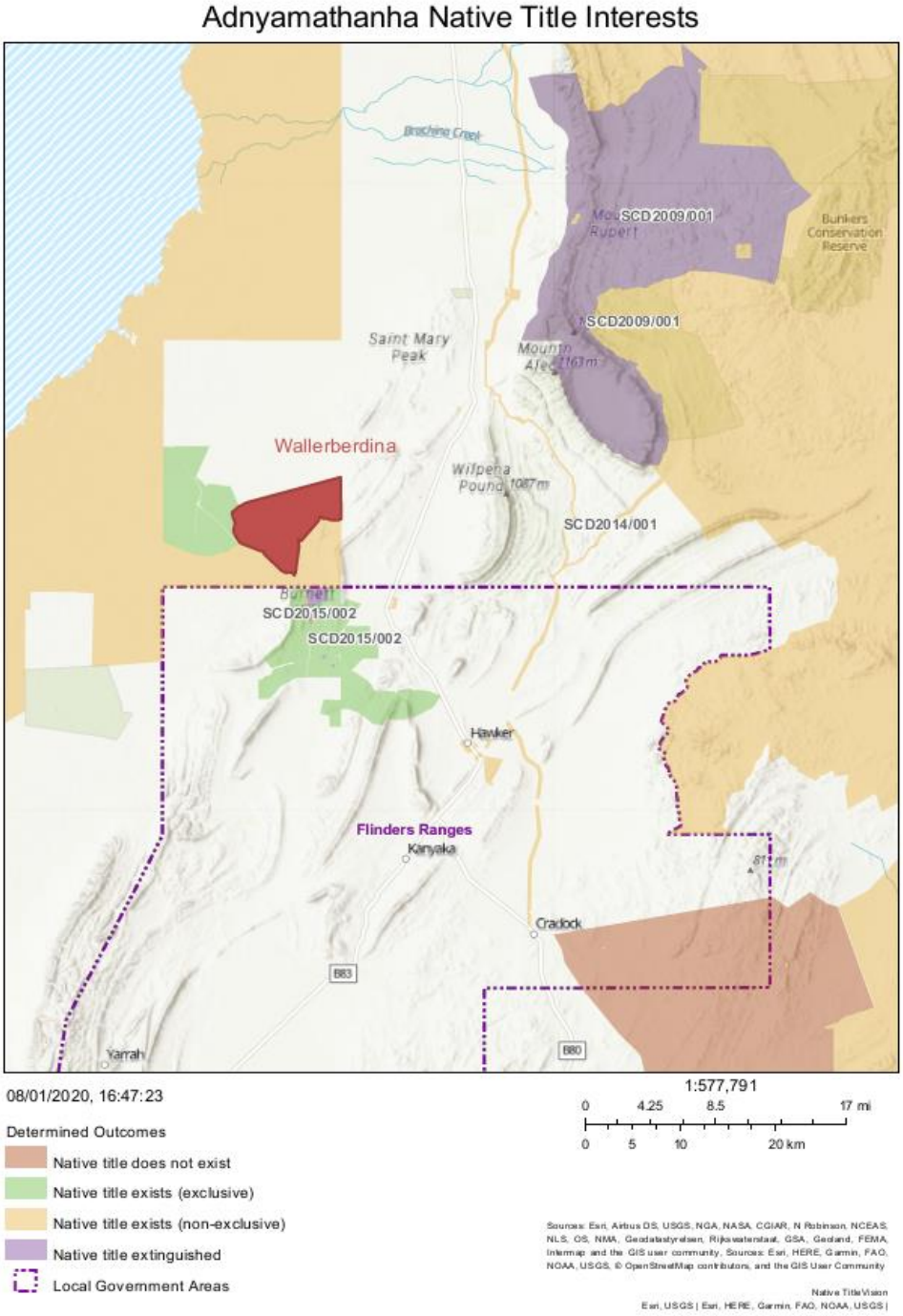

Figure 5: Map of Adnyamathanha Native Title interests

Although Native Title has been extinguished on the approved nominated site, the Adnyamathanha People hold Native Title in parts of the region surrounding the site (refer to figure 5). They also have an ongoing cultural heritage connection with the land more generally (refer to the SAR for a discussion of the management of Aboriginal cultural heritage values in relation to the approved nominated site). ATLA is also the peak body for the Adnyamathanha People for matters relating to land, culture, heritage, language and Native Title.

The ATLA Member List published on the Office of the Registrar of Indigenous Corporations website on 19 September 2019 lists 707 members. The membership list included with ATLA's General Report 2018 (Published) for the financial year ending 30 June 2018 also listed 707 members.

Since 2018 the department has offered financial support for ATLA to undertake its own ballot of its members. This offer has been reiterated on a number of occasions, most recently through correspondence by the Minister in October 2019, although not taken up. Separately, ATLA made submissions to the 2018 Senate Economic Reference Committee Inquiry, which outlines its reasons for opposing the facility (attachment R refers).

ATLA has provided a redacted copy of a 24 March 2018 Annual General Meeting record of a motion referring to the facility under a covering letter from Maurice Blackburn Lawyers, dated 30 May 2019. At a meeting with the Minister on 21 August 2019, ATLA representatives indicated that the motion still represented the position of ATLA.

Results—Wallerberdina

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	0	61	0	100%*

**100 per cent of the 61 members present at the ATLA AGM (this represents 8.6 per cent of ATLA's total 707 members).*

A redacted version of ATLA's 2018 AGM motion was provided to the department. It conveys that with all of the 61 members present voting, the following motion was carried unanimously:

> *That ATLA remains totally opposed to the Nuclear Waste Dump at Wallerberdina. This is our land and our culture and we must have veto over this toxic waste being dumped in our country. Udnyus come and go but we will be here forever. We say NO to the waste dump for our Grandchildren and their Grandchildren and many generations to come.*

Further details of this indicator including a copy of the motion are at attachment H.

ATLA has made a complaint to the Australian Human Rights Commission (a complaint form was filed with the AHRC on 18 December 2018) that refers to two aspects: the proposed 2018 ballot on the facility by the Flinders Ranges Council and the Aboriginal cultural heritage assessment for Wallerberdina. The AHRC is currently reviewing the complaint to determine next steps and the department will engage with the AHRC's complaint/conciliatory processes as required.

Ballot—Barngarla Determination Aboriginal Corporation

(Lyndhurst and Napandee)

BDAC is the Registered Native Title Body Corporate (also known as prescribed body corporate) for the Barngarla Native Title holders as defined in the Barngarla Determination of Native Title made by the Federal Court.

Although Native Title has been extinguished on the approved nominated sites, the Barngarla People hold Native Title in parts of the region surrounding the sites (refer to figure 6 on p. 45). They also have an ongoing cultural heritage connection with the land more generally in the Barngarla Determination area (refer to the SAR for a discussion of management of Aboriginal cultural heritage values in relation to the approved nominated sites). BDAC is also the peak body for the Barngarla People for matters relating to land, culture, heritage, language and Native Title.

The BDAC General Report 2019 (Published) for the financial year ending 30 June 2019 filed with the Office of the Registrar of Indigenous Corporations lists 208 members.

Since 2018 the department has offered financial support for BDAC to undertake its own ballot of its members. This offer has been reiterated on a number of occasions, most recently through correspondence by the Minister in October 2019, although not taken up.

On 20 November 2019, BDAC provided the results of a ballot of its members to the Minister. The ballot was conducted by the Australian Election Company, a private independent polling company, on behalf of BDAC. The ballot was timed to coincide with the postal ballot conducted by the Australian Electoral Commission on behalf of the District Council of Kimba (which was from 3 October to 7 November 2019). Subsequently, BDAC provided a report to the Minister on 16 December 2019 prepared by the Australian Election Company, which explained the methodology used for the ballot (copy at attachment I).

At the time of the ballot, there were 209 members on the membership list provided by BDAC to the Australian Election Company, which constituted the eligible voters for the ballot. A ballot with a single question was posted to all members on the membership list with a reply paid envelope. Members could also choose to vote in person by attending a culturally appropriate venue in Port Augusta on 23 October, in Whyalla on 24 October, and Port Lincoln on 25 October 2019.

There was a single question on the ballot paper, which was the same as the Kimba Council's ballot question:

> *'Do you support the proposed National Radioactive Waste Management Facility being located at one of the nominated sites in the community of Kimba?'*

The department notes that it appears that, as at 30 June 2018, no BDAC members were

residents within the LGA of the District Council of Kimba.[9] However, as the department did not validate the addresses of voters in relation to the BDAC ballot, the location of voters in the summary of results below is recorded as 'unknown'.

Results—Lyndhurst and Napandee

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	0	83	4*	39.71%**

**Four ballot papers recorded as 'rejected at preliminary scrutiny'.*
***39.71 per cent of 209 eligible voters (total of BDAC membership).*

The Australian Election Company's declaration of results submits that a total of 83 ballots were counted (with four votes having been rejected 'at preliminary scrutiny'), from 209 eligible voters, which represents a participation rate of 39.71 per cent.

Of the 83 counted ballot papers:

- 0 voted Yes.
- 83 (100 per cent) voted No.

Notwithstanding that all those who chose to vote were opposed to it, given that around 60 per cent of BDAC members chose not to vote, it remains unclear what the position of a large proportion of the membership is with respect to the facility.

BDAC has challenged the validity of the ballots commissioned by the District Council of Kimba and Flinders Ranges Council to measure community support for the facility on the basis that they contravene the *Racial Discrimination Act 1975* (Cth).[10] While the Federal Court dismissed BDAC's claim, BDAC has lodged an appeal, which is set to be heard by the Full Court on 21 Feburary 2020.

In addition, BDAC made a submission to the 2018 Senate Economic Reference Committee Inquiry, which outlines its reasons for opposing the facility (see separate report summarised at p. 58 and included in full at attachment S).

BDAC also provided a submission through the public submission process on 12 December 2019, which has been included in the analysis of public submissions (p. 36 and attachment F).

[9] See *Barngarla Determination Aboriginal Corporation RNTBC v District Council of Kimba* [2019] FCA 1092 (*BDAC v Kimba Council*).
[10] See *BDAC v Kimba Council* at [10].

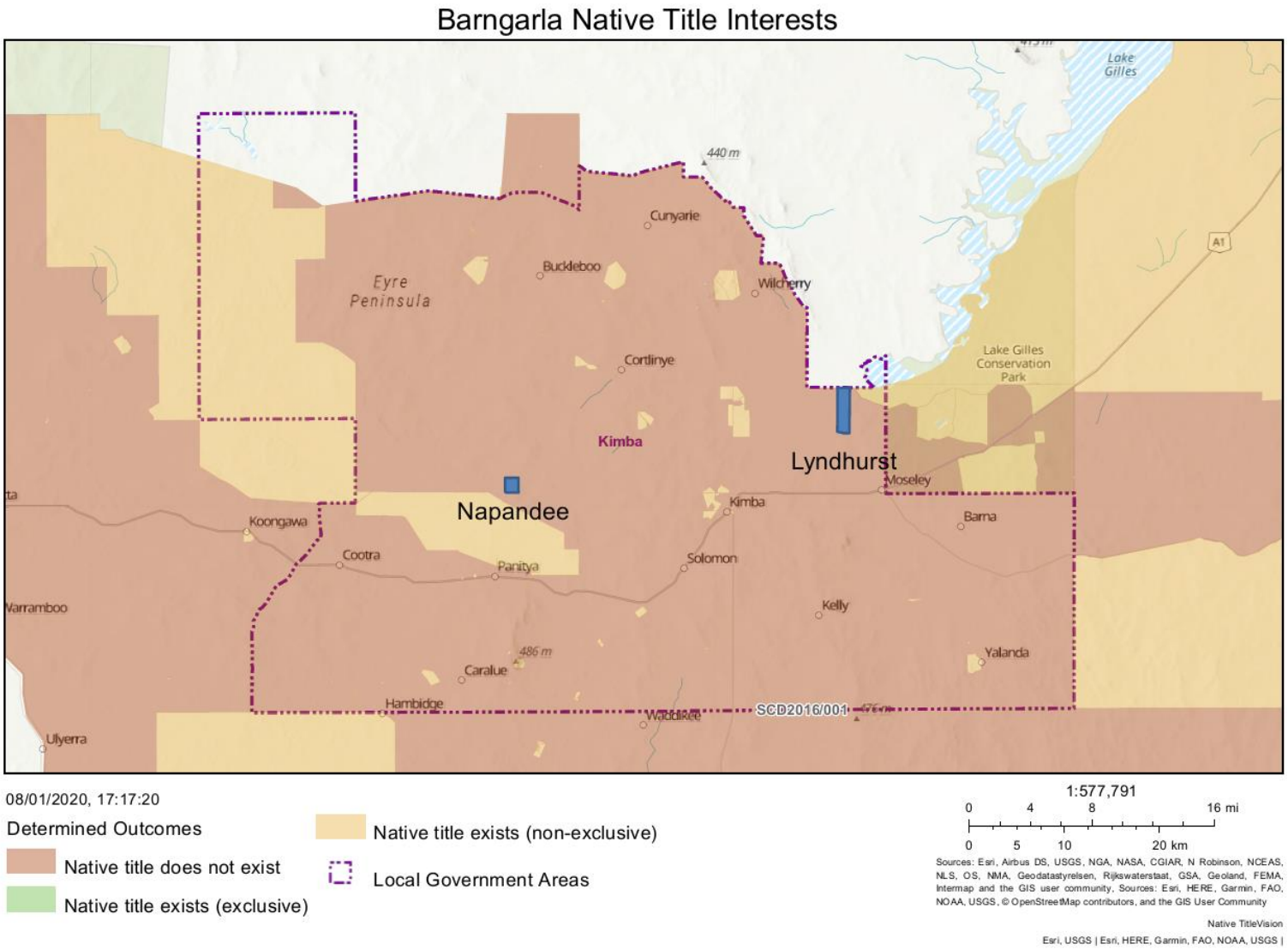

Figure 6: Map of Barngarla Native Title interests

Ballot—Viliwarinha Yura Aboriginal Corporation

(Wallerberdina)

The Viliwarinha Yura Aboriginal Corporation (VYAC) was established by the McKenzie family to address poor outcomes for Aboriginal people and holds perpetual leases in Yappala pastoral station neighbouring the approved site at Wallerberdina. Its members are Adnyamathanha People and its membership overlaps with ATLA[11]. Yappala Station is also an Indigenous Protected Area managed by VYAC. In its General Report lodged on 3 December 2018 with the Office of the Registrar of Indigenous Corporations, VYAC lists 110 members.

The department wrote to VYAC in August 2018 offering support for VYAC to conduct a vote of its members to show their sentiment towards having the facility at Wallerberdina. VYAC conducted a ballot on 18 August 2018. The department understands that votes could be cast at a venue in Port Augusta or over the phone and that members had several days of advance notice of the ballot (details of this have not been confirmed with VYAC). Correspondence providing the results of the VYAC ballot was sent to the department from the VYAC Chair on 31 August 2018. At a meeting with the Minister on 21 August 2019, VYAC representatives indicated that the vote of 18 August 2018 still represented the position of VYAC.

Results – Wallerberdina

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	45	34	1*	72.73%**

**Recorded as a 'blank vote'.*
***72.73 per cent of the total of 110 VYAC members.*

Of the 80 members who cast a vote on 18 August 2018, 45 (56 per cent) voted in favour, and 34 against. The Chair of the VYAC advised that one other respondent 'chose to put in a blank vote'. Given the 110 members recorded in VYAC's 2018 General Report filed with the Office of the Registrar of Indigenous Corporations on 3 December 2018 for the financial year ending 30 June 2018, this represents a participation rate of 73 per cent.

Further details of this assessment are at attachment J.

[11] VYAC in not a native title representative body. ATLA is the appropriate Registered Native Title Body Corporate (RNTBC) for the area.

Community-led business survey

(Wallerberdina)

On 2 June 2019, a member of the Flinders Local Action Group, who oppose hosting the facility in the region, emailed details of an April 2019 survey of businesses in Hawker to the Minister (copy at attachment K).

The survey was not undertaken by an independent accredited research organisation. To supplement the limited information initially provided, the department sought further details that would help validate the survey methods or results.

The extent to which the survey captures a sample of local businesses remains unclear. Business owners were identified based on the local knowledge of 'several people' and were approached (in person, by email or by phone) by the correspondent and another community member and 'offered an explanatory letter'. Following this approach, identified business owners could choose to provide a signature indicating if they supported the facility, opposed the facility, held a neutral position or preferred not to say. Participants were also given the option to provide a confidential response to a local Justice of the Peace.

Results – Wallerberdina

	Yes	No	Other	Participation rate
Local	2	10	5*	**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	N/A	N/A	N/A

**Classified in the survey as 'Neutral or prefer not to say'.*
***Not provided*

Correspondence—Gawler Ranges Aboriginal Corporation (GRAC) letter

(Lyndhurst)

GRAC is the Registered Native Title Body Corporate for the Gawler Ranges People Native Title holders as recognised in the McNamara/Gawler Ranges People Determination of Native Title made by the Federal Court.

The department consulted with the Gawler Ranges People since the beginning of the project on the basis that they hold Native Title in land that borders the northern boundary of the Lyndhurst site and may have an interest in cultural heritage aspects more broadly in the vicinity of the site (refer to figure 7 on the following page). Following an invitation to GRAC to a meeting with the Minister in August 2019 and an information session in October 2019, GRAC wrote to the department saying that it did not wish to be involved in further consultations.

Results—Lyndhurst

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	N/A	✓*	N/A

**The correspondence is from GRAC, which is not based in the relevant LGA and lists its address as C/-Norman Waterhouse Lawyers, Adelaide. However as details of who participated in the preparation of the correspondence are unknown to the department the location of the correspondence is recorded as 'unknown'.*

Further details and a copy of the letter are at attachment L.

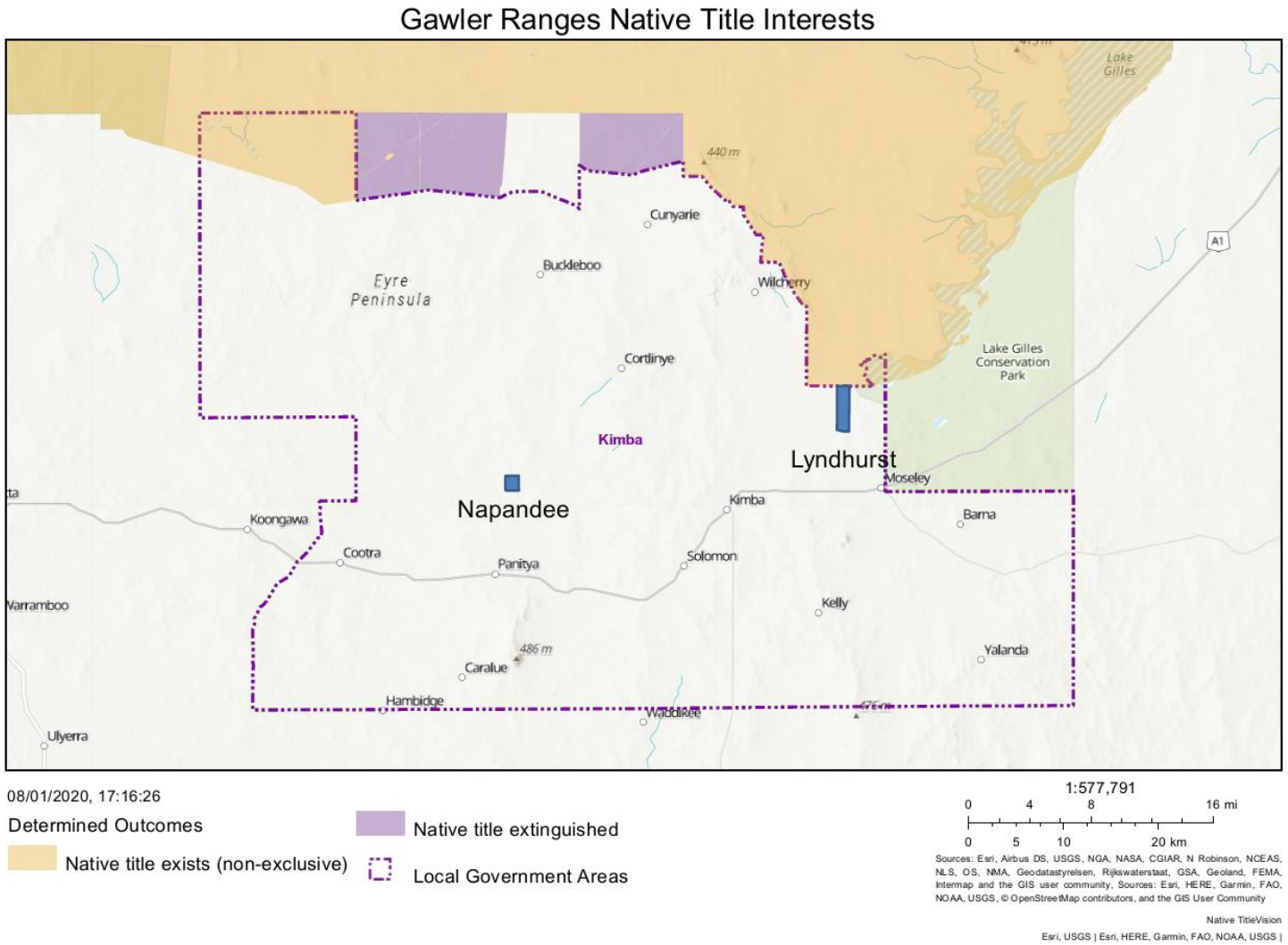

Figure 7: Map of Gawler Ranges Native Title interests

Petitioner group 1—Local resident petitioners

(Lyndhurst and Napandee)

The petition dated 19 September 2018 was sent to the department through the public submission process by one of the signatories. The decision was made to treat it separately as a petition given its format. The petitioners are identified in the petition as being 'neighbours', defined as persons who farm or reside within 10km of either Lyndhurst or Napandee. The collection method is unknown. A 'proximity to site' distance is provided for each signatory, although the site (Lyndhurst or Napandee) is not specified.

Results

	Yes	No	Other	Participation rate
Local	N/A	26	N/A	*
Non-local	N/A	0	N/A	N/A
Unknown	N/A	0	N/A	N/A

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 1.24 per cent of all petitioners.*

There were 26 signatories to the petition, which states 'We are neighbours strongly opposed to the siting of a low-intermediate level radioactive waste facility on farming land in the Kimba District'. It also expresses concern at the 'lack of acknowledgement of neighbour opposition'.

Further details and a copy of the petition are at attachment M.

Petitioner group 2—Eyre Peninsula petitioners

(Lyndhurst, Napandee and Wallerberdina)

The petition was received on 26 September 2018 through the public submission process. The decision was made to treat it separately as a petition given its format. The petitioners are identified in the petition as 'residents and/or owners of property on eastern Eyre Peninsula'. The collection method is unknown. Most of the signatories' addresses are in Cowell, a coastal town on the east side of the Eyre Peninsula, approximately 90 km south-east of Kimba and 300 km south-west of Hawker.

Results

	Yes	No	Other	Participation rate
Local	N/A	0	N/A	N/A
Non-local	N/A	20	N/A	*
Unknown	N/A	4	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 1.15 per cent of all the signatures received by the department in petitions.*

The petition has 24 signatories and states that they 'object to the proposed storage of low to medium nuclear waste in the Kimba area, also the possible selection of Port Lincoln as a port for the transport of nuclear waste to the selected site'.

Further details and a copy of the petition are at attachment N.

Petitioner group 3—House of Representatives petitioners

(Lyndhurst, Napandee and Wallerberdina)

A petition addressed to the House of Representatives, with 932 signatures, was tabled on 22 October 2018. Under its procedures, the House requires that a principal petitioner, responsible for sponsoring or organising the petition, provides their details to the House, but it does not release details about the petition other than the petition text and number of signatories. However, subsequently a copy of the petition was provided to the department by the *No Radioactive Waste on Agricultural Land in Kimba or SA* group (at the same time they also provided a copy of a similar petition to the Senate). The petitioners are identified by the petition as 'Concerned citizens of Kimba District, Eyre Peninsula, South Australia and Australia'. The covering letter to the copy of the petition provided to the department, says that the petition was collected over the three day Eyre Peninsula Field Days held in Cleve, SA, which is located approximately 70 km south of Kimba and 300 km south-west of Hawker.

There is no locality breakdown of the figures available or any further information to add about the House of Representatives petition. There is some commonality between this petition and the Senate one, which was tabled around the same time. They have an almost identical text, many of the same signatories and comparable number of signatories. The main difference between the petitions is that the Senate petition also had addresses for each of the signatories (see Petitioner group 4 report, which includes a locality breakdown).

The Minister for Resources tabled a letter to the principle petitioner, responding to the issues raised.

Results

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	932	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 44.44 per cent of all the signatures received by the department in petitions.*

The petition has 932 signatories and states that they are 'opposed to the siting of the National Radioactive Waste Management Facility on agricultural land in Kimba or South Australia, as is currently proposed'. It also expresses concern 'about the risks this proposal presents to Kimba and Eyre Peninsula's clean and green reputation'.

The petition requests the House to ‘Remove both Kimba sites from the shortlist to host (the facility)’ and that the Australian Government ‘undertake a proper process to find the best possible site for disposal of (Australia’s radioactive waste).’

Further details of the petition and the Minister’s response to it are at attachment O.

Petitioner group 4—Senate petitioners

(Lyndhurst, Napandee and Wallerberdina)

A petition was provided to the Senate on 4 October 2018 and tabled 27 November 2018. A copy was also provided to the Minister. The principal petitioner, responsible for sponsoring or organising the petition and providing it to the Senate, is a group called *No Radioactive Waste on Agricultural Land in Kimba or SA*. Subsequently a copy of the petition was also provided to the department by the group (at the same time they also provided a copy of a similar petition to the House of Representatives). The petitioners are identified by the petition as 'Concerned citizens of Kimba District, Eyre Peninsula, South Australia and Australia'. The covering letter to the copy of the petition provided to the department says that the petitions were collected over the three day Eyre Peninsula Field Days held in Cleve, SA, which is located approximately 70 km south of Kimba and 300 km south-west of Hawker.

Addresses were provided for each of the signatures to the Senate petition, which enabled the department to analyse the information to give a breakdown of the figures. There is some commonality between this petition and the one tabled in the House, in that they have an almost identical text, many of the same signatories and a comparable number of signatories (see Petitioner group 3 report).

Results

	Yes	No	Other	Participation rate
Local	N/A	107	N/A	**
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	932*	N/A	**

**The bulk of these petitioners give an address which indicates they are likely to be considered non-local for the purposes of this report. However, the department cannot confirm that they are all non-local.*

***It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 49.55 per cent of all the signatures received by the department in petitions.*

The petition has 1039 signatories and states that they are 'opposed to the siting of the National Radioactive Waste Management Facility on agricultural land in Kimba or South Australia, as is currently proposed'. It also expresses concern 'about the risks this proposal presents to Kimba and Eyre Peninsula's clean and green reputation'.

The petition requests the Senate to 'Remove both Kimba sites from the shortlist to host (the facility)' and that the Australian Government 'undertake a proper process to find the best possible site for disposal of (Australia's radioactive waste).'

Further details and a copy of the petition are at attachment P.

Petitioner group 5—Campaign postcard petition

(Lyndhurst, Napandee and Wallerberdina)

The source of the petition is unknown although it was delivered with a postcard, which was part of a campaign organised by the group *No Radioactive Waste on Agricultural Land in Kimba or SA*. It was received through the public submission process on 9 October 2019. The decision was made to treat it separately as a petition given its format.

Results

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	76	N/A	*

**It is not possible to calculate a participation rate for a petition, given the nature of a petition. Overall the department received petitions covering 2097 signatories. This petition represents 3.62 per cent of all the signatures received by the department in petitions.*

The 76 petitioners 'write in opposition to the Federal Government's nuclear waste plans in South Australia'. The reasons given are that it would risk the region's heritage, and tourism and agriculture industries, that SA laws make it illegal and that the need for it has not been proven.

The petitioners request that the Government halt the current plans and undertake an evidence-based assessment process that considers all options.

Senate inquiry submission—Adnyamathanha Traditional Lands Association

(Wallerberdina)

ATLA represents the Native Title holders covered by the relevant Native Title determinations by the Federal Court. Although Native Title has been extinguished on the approved nominated site, the Adnyamathanha People hold Native Title in parts of the region surrounding the site (refer to figure 5 on p. 40). They also have an ongoing cultural heritage connection with the land more generally (refer to the SAR for a discussion of the management of Aboriginal cultural heritage values in relation to the approved nominated site). ATLA is also the peak body for the Adnyamathanha People for matters relating to land, culture, heritage, language and Native Title.

ATLA made several submissions (undated) to the Senate Economic Reference Committee Inquiry into the selection process for a national radioactive waste management facility in South Australia, which was active between February and August 2018. The department is drawing the attention of the Minister to ATLA's Senate submission as it clearly sets out their position on the public record. This is an important means for conveying ATLA's views in light of ATLA's complaint to the Australian Human Rights Commission about the proposed 2018 ballot on the facility by the Flinders Ranges Council and the Aboriginal cultural heritage assessment for Wallerberdina (complaint filed with the AHRC on 18 December 2018). The department notes that it has been challenging engaging with all Native Title holders who may be affected by the facility as they are dispersed over a large geographical area, many outside the local area. In addition, the department has been required to engage with ATLA primarily through its legal representatives.

All submissions to the inquiry, its report and Government response are available on the Committee's website.

Senate inquiry:
https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Wastemanagementfacility

Results – Wallerberdina

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	✓*	N/A	N/A

** The submission is from ATLA, which is based in Port Augusta. However as details of who participated in the preparation of the submission are unknown to the department the location of the submission is recorded as 'unknown' (noting ATLA's role as peak body for the Adnyamathanha People for matters relating to land, culture, heritage, language and Native Title).*

ATLA submission No. 42 high level summary

- The proposed facility at Wallerberdina Station is in Adnyamathanha country, and ATLA opposes the proposal.
- ATLA passed a motion at its AGM on 24 March 2018 opposing the facility and has made their view public.
- ATLA believes that the facility will affect all Adnyamathanha People and is concerned that the sentiment process will not fully take into consideration the views of the Adnyamathanha People.
- ATLA are worried about the affect the facility will have on tourism in the Flinders Ranges.

Supplementary submission 42.1

- ATLA remains opposed to the proposed facility at Wallerberdina Station.
- ATLA believes that all Adnyamathanha people must be included in any vote that happens in relation to the facility at Wallerberdina Station.
- ATLA withdrew from the Aboriginal Cultural Heritage Assessment for Wallerberdina Station and do not accept any of its outcomes.

Supplementary submission 42.2

- ATLA is opposed to the proposed facility at Wallerberdina Station.
- ATLA oppose the findings of the department's Aboriginal Cultural Heritage Assessment, and state that the proposed facility would impact and disrupt the Pungka Pudinah and Seven Sisters songlines.
- ATLA is aggrieved by the actions of the department and contractors RPS and believe that sites significant to Adnyamathanha women were desecrated.
- ATLA believes that adequate consultation has not occurred, and that consultation with the Viliwarinha Yura Aboriginal Corporation does not constitute engagement with the broader Adnyamathanha People.
- ATLA ask that the views of all Adnyamathanha Traditional Owners be taken into account when determining the level of community support.

Supplementary submission 42.3

- ATLA does not believe that the Aboriginal Cultural Heritage Assessment conducted at Wallerberdina Station has been comprehensive enough.

Further details about ATLA's submission are at attachment R, including information about the Senate Economic References Committee report on the inquiry and the Australian Government response to relevant recommendations.

Senate inquiry submission—Barngarla Determination Aboriginal Corporation

(Lyndhurst and Napandee)

BDAC is the Registered Native Title Body Corporate (also known as prescribed body corporate) for the Barngarla Native Title holders as defined in the Barngarla Determination of Native Title made by the Federal Court. Although Native Title has been extinguished on the approved nominated sites, the Barngarla People hold Native Title in parts of the region surrounding the sites (refer to figure 6 on p. 45). They also have an ongoing cultural heritage connection with the land more generally in the Barngarla Determination area (refer to the SAR for a discussion of management of Aboriginal cultural heritage values in relation to the approved nominated sites). The department recognises BDAC as the peak body for the Barngarla People for matters relating to land, culture, heritage, language and Native Title.

On 3 April 2019, BDAC made a submission to the Senate Economic Reference Committee Inquiry into the selection process for a national radioactive waste management facility in South Australia, which was active between February and August 2018.

The department is drawing the attention of the Minister to BDAC's Senate submission as it clearly sets out their position on the public record. This is an important means for conveying BDAC's views in light of current legal proceedings concerning the conduct of the community ballot. The department notes that it has been challenging engaging with all Native Title holders who may be affected by the facility as they are dispersed over a large geographical area. Most BDAC members reside outside the LGA of the District Council of Kimba.[12] In addition, the department has been required to engage with BDAC primarily through its legal representatives.

All submissions to the inquiry, its report and Government response are available on the Committee's website.

Senate inquiry:
https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Wastemanagementfacility

[12] As at 30 June 2018, no BDAC members were residents within the LGA of the District Council of Kimba. See *Barngarla Determination Aboriginal Corporation RNTBC v District Council of Kimba* [2019] FCA 1092 (*BDAC v Kimba Council*).

Results – Lyndhurst and Napandee

	Yes	No	Other	Participation rate
Local	N/A	N/A	N/A	N/A
Non-local	N/A	N/A	N/A	N/A
Unknown	N/A	✓*	N/A	N/A

** The submission is from BDAC, which is not based in the relevant LGA and lists its address as C/- Norman Waterhouse Lawyers, Adelaide. However as details of who participated in the preparation of the submission are unknown to the department the location of the submission is recorded as 'unknown' (noting BDAC's role as peak body for the Barngarala People for matters relating to land, culture, heritage, language and Native Title).*

BDAC submission No. 56 high level summary

- BDAC believe that the level of consultation with the Barngarla People has been inadequate, with particular reference to the lack of effective consultation with regard to Aboriginal cultural heritage issues.
- BDAC does not support the proposed facility in Kimba.
- The submission includes a map showing the Barngarla Determination area and a chain of correspondence, primarily between Norman Waterhouse Lawyers and the department.

Supplementary submission 56.1

- The supplementary submission includes additional correspondence between Norman Waterhouse Lawyers and the department, which focuses on Aboriginal cultural heritage issues and the conduct of the proposed community ballot by the AEC.

Aboriginal cultural heritage values

- BDAC submits that the department's consultation with it was inadequate, and in particular failed to ensure that a suitable assessment was undertaken of Aboriginal cultural heritage values. At the same time, BDAC submit the desktop study undertaken by the department was insufficient (management of Aboriginal cultural heritage values is discussed separately in the SAR).
- BDAC commissioned its own heritage assessment which indicates there are Aboriginal cultural heritage sites in the vicinity of Lyndhurst and Napandee. A redacted version of a report by Dr Dee Gorring (dated 4 June 2018), entitled 'Preliminary Report: Kimba Radioactive Waste Management Facility Heritage Assessment', is included in the submission.
- Dr Gorring's report submits that there are a number of significant Aboriginal heritage sites, most of which are associated with the 'Seven Sisters Dream story' in the vicinity of the nominated sites.

- The report recommends that: ‘should [the department] commence works in either the Lyndhurst or Npandee properties…BDAC should be contacted immediately and engaged to carry out a detailed cultural heritage assessment as soon as practical to ensure the protection of significant Barngarla cultural heritage.’

Further details about BDAC’s submission are at attachment S, including information about the Senate Economic References Committee report on the inquiry and the Australian Government response to relevant recommendations.

BDAC also provided a submission through the public submission process on 12 December 2019, which has been included in the analysis of public submissions (p. 36 and attachment F).

Additional resources

Glossary

TERM	DESCRIPTION
A	
Approved site (or approved land)	Land which was voluntarily nominated and approved under the processes specified in the NRWM Act. There were three approved sites under consideration as the site for the facility, at Lyndhurst, Napandee and Wallerberdina. Following the outcome of the Flinders Ranges Council community ballot, Wallerberdina was removed from the site selection process.
Adnyamathanha Traditional Lands Association	The Adnyamathanha Traditional Lands Association (ATLA) represents the Native Title holders, covered by the relevant Native Title determinations by the Federal Court. ATLA is also the peak body for Adnyamathanha People for matters relating to land, culture, heritage, language and Native Title.
B	
Barndioota Consultative Committee	See Consultative Committee. An advisory forum for the community related to the nominated site of Wallerberdina.
Barngarla Determination Aboriginal Corporation	The Barngarla Determination Aboriginal Corporation (BDAC) is the Registered Native Title Body Corporate for the Barngarla Native Title holders. BDAC is also the peak body for Barngarla People for matters relating to land, culture, heritage, language and Native Title.
Ballot	A system of voting secretly and in writing on a particular issue.
Business survey	A means devised by the Department of Industry, Innovation and Science to determine the level of support for the facility among business owners in the communities related to the nominated sites.
C	
Community Liaison Officer (CLO)	An appointed person who communicates and coordinates activities between an organisation and a community.
Community	There are many different ways to define a ‘community’. Individuals who are part of a community may be directly or indirectly impacted by the establishment and operation of the facility. They may live and work in the area surrounding a site and be directly affected by the facility on a

	social and economic basis. Individuals may also have a particular interest in the facility, such as cultural or business links with a site or the area surrounding a site, or be interested in nuclear medicine or radioactive waste management. One way of describing 'community' – for the purposes of considering 'broad community support for hosting the facility' – is to consider the community that might experience the socio-economic impacts of the facility, or that might have a socio-economic interest in the facility. LGA boundaries usually provide an appropriate proxy for determining the scope of that community because the LGAs are generally constructed around key population centres and often map the social and economic connections that define those communities as being separate to neighbouring communities. For the Lyndhurst and Napandee sites, this is the District Council of Kimba area. However, noting that the Wallerberdina site is located adjacent to the border of the Flinders Ranges Council LGA, the Wallerberdina local community ballot boundary was extended to include the Outback Community Authority (OCA) land within a 50 km radius of the nominated site. This ensures an appropriate economic centre is captured, while including the large neighbouring properties located near the nominated site but outside the Flinders Ranges Council boundaries. The boundaries for both ballots were supported by the respective community consultative committees.
Community engagement	A planned process with the specific purpose of working with identified groups of people whether they are connected by geographic location, special interest or affliction, to address issue affecting their wellbeing.
Community sentiment	The views or opinions that are held or expressed by members of a community.
Consult	To obtain public feedback on analysis alternatives and/or decisions.
Consultative Committee	An advisory forum represented of a community and appointed by the Minister which meets regularly for constructive dialogue and information exchange between Government and the community on all aspects of the project during the site-selection process.
D	
E	
Economic Working Group	A forum whose members are focused on the economic development opportunities and considerations of the facility or site selection process.
Engagement	Engagement is a planned process with the specific purpose of working across organisation, stakeholders and communities to shape the

	decisions or actions of the members of the community, stakeholder or organisation in relations to a problem, opportunity or outcome.
F	
Facility	The facility referred to in the NRWM Act, for the management of controlled material generated, possess or controlled by the Commonwealth or a Commonwealth entity.
H	
I	
Intermediate Level Waste (ILW)	Waste that, because of its content, particularly of long-lived radionuclides, requires a greater degree of containment and isolation than that provided by near surface disposal. However, ILW needs little or no provision for heat dissipation during its storage and disposal. Intermediate level waste may contain long lived radionuclides, in particular alpha emitting radionuclides, which will not decay to an activity concentration acceptable for near surface disposal during the time for which institutional controls can be relied upon. Therefore, waste in this class requires disposal at greater depths, in the order of tens of metres to a few hundred metres.
International best practice	Codes, standards, recommendations and guides that are produced by the international organisations listed below: • United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) • International Atomic Energy Agency (IAEA) • World Health Organisation (WHO) • International Commission on Radiological Protection (ICRP) • International Commission on Non-Ionizing Radiation Protection (ICNRP) • Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD). NB The Australian Radiation Protection and Nuclear Safety Act 1998 (the ARPANS Act) states that the CEO of ARPANSA must take into account international best practice in relation to radiation protection and nuclear safety when making licensing decisions. Although the ARPANS Act does not define the term ‘international best practice’, the CEO has taken it into account by, among other things, the codes, standards, recommendations and guides produced by the above organisations.
J	
K	

Kimba Consultative Committee	See Consultative Committee. An advisory forum for the community related to the nominated sites of Lyndhurst and Napandee.
L	
Low Level Waste (LLW)	Waste that is above exemption levels, but with limited amounts of long-lived radionuclides. Such waste requires robust isolation and containment for periods of up to a few hundred years and is suitable for disposal in engineered surface facilities. This class covers a very broad range of waste. Low Level waste may include: • short lived radionuclides at higher activity concentration levels, and • long lived radionuclides, but only at relatively low activity concentration.
M	
N	
National Radioactive Waste Management Facility	A purpose-built facility for the permanent disposal of low level radioactive waste and the temporary storage of intermediate level waste.
Neighbour survey	A means devised by the Department of Industry, Innovation and Science to determine the level of support for the NRWMF among neighbours of the nominated sites.
Nominated site	Land which was voluntarily nominated and approved under the processes specified in the NRWM Act. There were three approved sites under consideration as the site for the facility, at Lyndhurst, Napandee and Wallerberdina. Following the outcome of the Flinders Ranges Council community ballot, Wallerberdina was removed from the site selection process.
O	
ORIMA Research	An independent research company, providing end-to-end research and data analytics. ORIMA is ISO20252 accredited.
P	
Q	
R	
Radioactive	Exhibiting radioactivity; emitting or relating to the emission of ionising radiation or particles.

Radioactive waste	Waste that contains or is contaminated with radioactive substances and has an activity or activity concentration higher than the level for clearance from regulatory requirements, and for which no further use in Australia is envisaged.
S	
Sentiment	A view or opinion that is held or expressed.
Stakeholders	Any individual, group of individuals, organisation or political entity with an interest or stake in the outcome of a decision.
Sentiment gathering	A process of formally gathering views and opinions.
Site characterisation	Desktop and field-based investigations of aspects of a site which can be used to assess its suitability.
Site suitability criteria	Site suitability criteria have been developed to enable a suitability assessment to support a decision about site selection. The legislatively-driven criteria (1, 2 and 3) are centred on the regulatory, cost and other relevant considerations of selecting a site for a radioactive waste management facility and of establishing and operating such a facility on the selected site to ensure that radioactive waste generated, possessed or controlled by the Commonwealth or a Commonwealth entity is safely and securely managed. The additional criterion 4 is driven by a commitment by successive ministers that the facility will be established in a community where there is broad community support.
Submission	A written proposal, application or argument for consideration.
Storage	The emplacement of waste in a facility with the intent and in a manner such that it is being temporarily stored, and later can be retrieved.
Surface disposal	The disposal of radioactive waste in structures located above the natural ground surface and covered by layer(s) of natural and/or manufactured materials.
T	
Traditional Owners	For the purposes of this report, this refers to Native Title holders near the Lyndhurst site (the Barngarla People and the Gawler Ranges People); the Napandee site (the Barngarla People); and the Wallerberdina site (the Adnyamathanha People). The relevant registered Native Title bodies corporate (RNTBC) are the Barngarla Determination Aboriginal Corporation (BDAC), Gawler Ranges Aboriginal Corporation (GRAC) and the Adnyamathanha Traditional

	Lands Association (ATLA). Another relevant Traditional Owner organisation is the Viliwarinha Yura Aboriginal Corporation (VYAC).
U	
V	
Viliwarinha Yura Aboriginal Corporation	The Viliwarinha Yura Aboriginal Corporation (VYAC) was established by the McKenzie family to address poor outcomes for Aboriginal people and holds perpetual leases in Yappala pastoral station neighbouring Wallerberdina.
W	
Waste Acceptance Criteria (WAC)	Quantitative and qualitative criteria specified by the facility operator and approved by the regulator, for radioactive waste to be accepted by the operator of a repository for disposal or storage.

Abbreviations

ABN	Australian Business Number
ABR	Australian Business Register
AEC	Australian Electoral Commission
AHRC	Australia Human Rights Commission
ANSTO	Australian Nuclear Science and Technology Organisation
ATLA	Adnyamathanha Traditional Lands Association
BDAC	Barngarla Determination Aboriginal Corporation
CLO	Community Liaison Officer
CSR	Community Sentiment Report
GRAC	Gawler Ranges Aboriginal Corporation
IAEA	International Atomic Energy Agency
LGA	Local Government Area
N/A	Not applicable
NRWMF	National Radioactive Waste Management Facility (the facility)
NRWM Act	National Radioactive Waste Management Act 2012 (Cth)
ORIC	Office of the Registrar of Indigenous Corporations
RNTBC	Registered Native Title Bodies Corporate
SA	South Australia
SAR	Site Assessment Report
VYAC	Viliwarinha Yura Aboriginal Corporation
WAC	Waste Acceptance Criteria

Attachments

A. Review of Community Engagement

B, Community ballot – District of Kimba Council
(Lyndhurst and Napandee)

C. Community ballot – Flinders Ranges Council
(Wallerberdina)

D. Neighbour surveys
(Lyndhurst and Napandee)

E. Business survey
(Lyndhurst and Napandee)

F. Public submissions
(Lyndhurst, Napandee and Wallerberdina)

G. Ministerial correspondence
(Lyndhurst, Napandee and Wallerberdina)

H. AGM motion – Adnyamathanha Traditional Lands Association
(Wallerberdina)

I. Ballot – Barngarla Determination Aboriginal Corporation
(Lyndhurst and Napandee)

J. Ballot – Viliwarinha Yura Aboriginal Corporation
(Wallerberdina)

K. Community-led business survey
(Wallerberdina)

L. Correspondence – Gawler Ranges Aboriginal Corporation (GRAC) letter
(Lyndhurst)

M. Petitioner group 1 – Local resident petitioners
(Lyndhurst and Napandee)

N. Petitioner group 2 – Eyre Peninsula petitioners
(Lyndhurst, Napandee and Wallerberdina)

O. Petitioner group 3 – House of Representatives petitioners
(Lyndhurst, Napandee and Wallerberdina)

P. Petitioner group 4 – Senate petitioners
(Lyndhurst, Napandee and Wallerberdina)

Q. Petitioner group 5 – Campaign postcard petition
(Lyndhurst, Napandee and Wallerberdina)

R. Senate inquiry submission – Adnyamathanha Traditional Lands Association
(Wallerberdina)

S. Senate inquiry submission – Barngarla Determination Aboriginal Corporation (Lyndhurst and Napandee)