Verdant Earth Technologies

Restart of Redbank Power Station and Use of Biomass (Excluding Native Forestry Residues from Logging) as a Fuel SSD-56284960

Briefing Presentation for Independent Planning Commission
30 July 2025

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https://www.jacksonenvironment.com.au/

Brief Overview of Proposal

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- The Proposal will involve the following:
  - Recommissioning of the newest power station in the Hunter Valley (10 km west of Singleton)
  - Will use up to 700,000 (dry) tpa of sustainably sourced and grown biomass as fuel to produce near net-zero emissions electricity
  - Maintenance, repair and recommissioning works of the plant within the 151 MW power station
  - Minor adjustments to the site's feedstock supply system including:
    - Adjustments to 2 conveyor belts
    - Alterations to 6 fuel storage bins
    - Changes to supply of fuel and on-site logistics

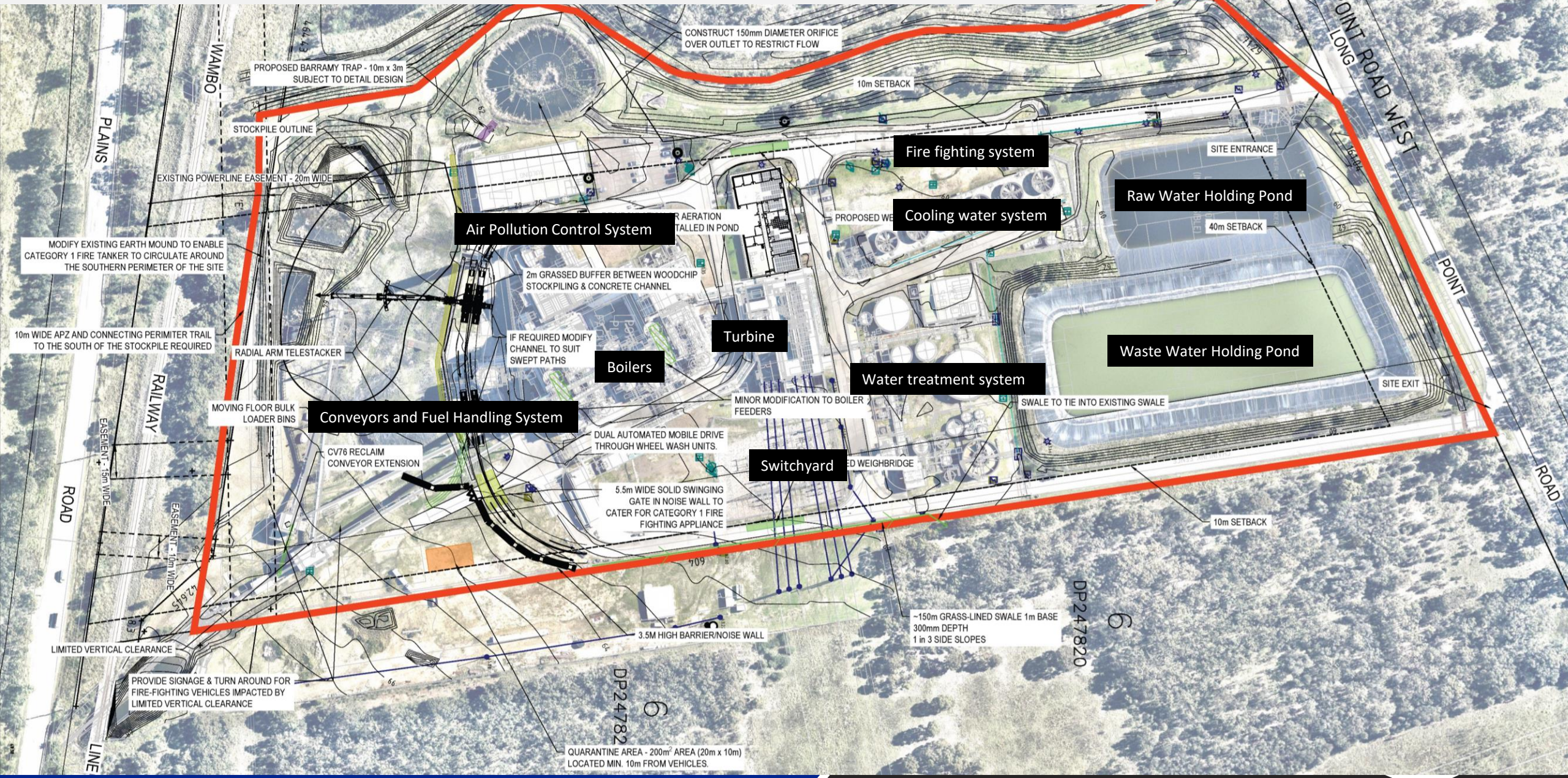
Brief Overview of Proposal

- Fines Circulating Fluidised Bed Combustion Technology (FiCirc™) boilers are in place
- With both boilers in service, plant can accept electrical output load changes between 70% and 100% (110MW to 151MW)
- Plant can also operate with only one boiler in service (minimum 55MW)
- Fluidised bed boilers specifically designed for variable moisture content biomass fuels to combust with high efficiency and low emissions
- Similar power station conversions to date in Europe, USA and many other countries to help accelerate progress to net-zero emissions electricity generation
- Biomass fuel will result in 90% less emissions intensity (0.0182 tCO_2 / MWhr) compared to the NSW average grid supplied electricity (0.53 tCO_2 / MWhr)

Brief Overview of Proposal

- Proposal will help close AEMO forecast supply gaps from 2025 in the electricity market – during peak summer and winter high demand periods
- Reduces risks of unscheduled coal plant outages
- Provide 24/7 grid firming or dispatchable electricity
- Proposal is a form of Modern Bioenergy which is recognised by the IPCC and the International Energy Agency is part of a critical solution for the intermittent nature of solar and wind to help replace coal and fossil fuel electricity generation
- The project will help drive us towards NSW Government's *Net Zero Plan Stage 1: 2020-2030* and Commonwealth Government's goal of net-zero emissions by 2050 under the *Climate Change Act* 2022
- 1,009 direct and indirect jobs during construction and operations
- $901M direct contribution (NPV) in first 25 years

Site Changes to Enable Biomass Fuel Use

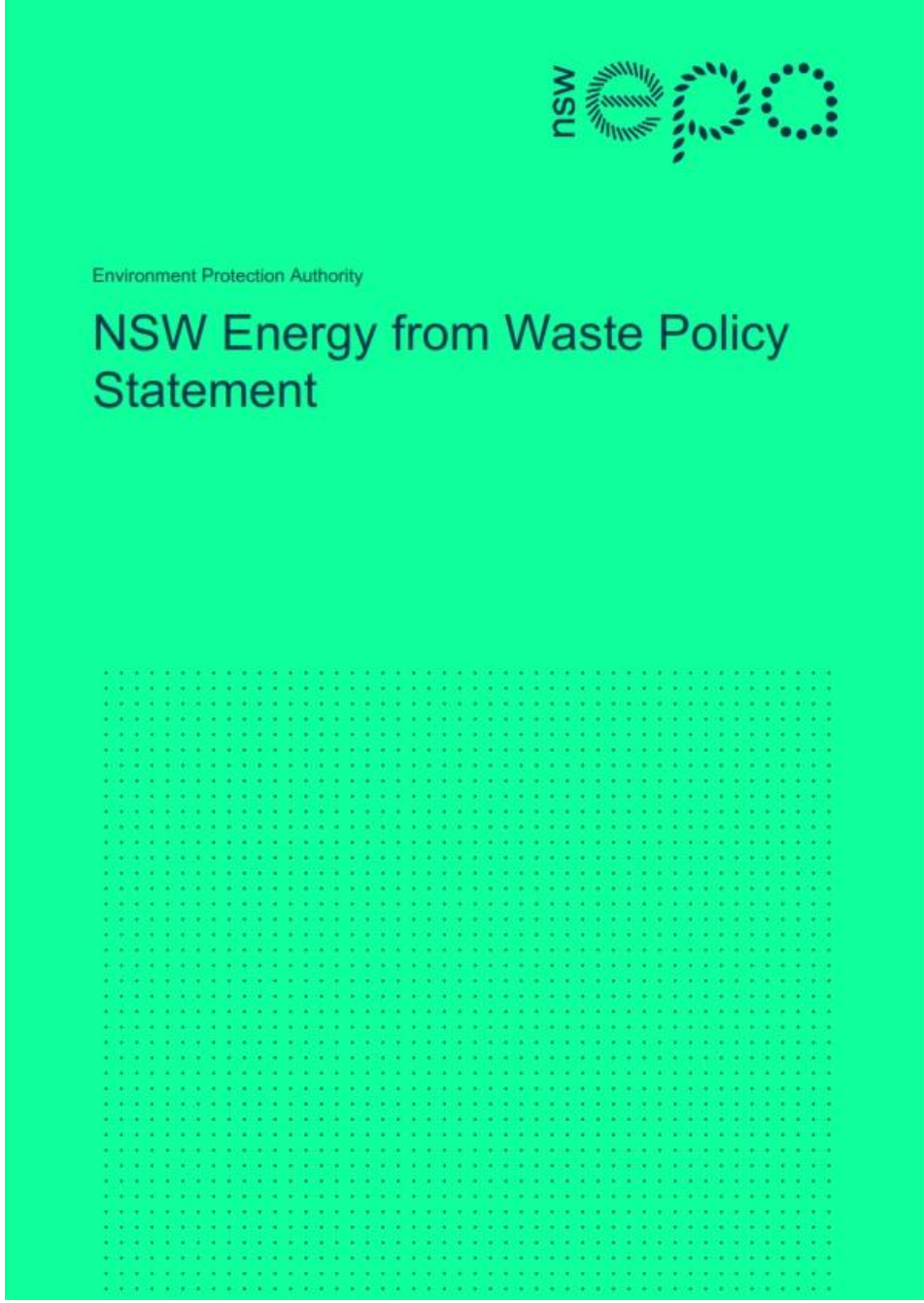


Energy Context

Energy Context

Energy from Waste Policy

- Proposal fully complies with the NSW EPA's *Energy from Waste Policy Statement* (2021) (the Policy)
- Applies to facilities in NSW that propose to thermally treat "waste or waste-derived fuels for the recovery of energy"
- Eligible waste fuels are those that are considered by the EPA to pose a low risk of harm to human health and the environment due to their origin, composition and consistency
- The policy requires that facilities proposing to use eligible waste fuels must meet the following criteria:
  - Consistently meets the definition of an EPA-approved eligible waste fuel
  - Confirm there are no practical, higher order reuse opportunities for the waste
  - Fully characterise the waste and/or undertake proof of performance
  - Meet the relevant emission standards as set out in the *Protection of the Environment Operations (Clean Air) Regulation* 2022



Energy Context
Energy from Waste Policy

- Prior to the use of an Eligible Waste Fuel, the power station will need to seek an EPA approved ‘Specific Resource Recovery Order and Exemption’ under Clause 93 of the *Protection of the Environment Operations (Waste) Regulation* 2014
- Proposed eligible waste fuels to be used in the power station include (biomas with no higher order uses:
  - Invasive native species control on agricultural land
  - Approved land clearing activities such as major infrastructure developments for approved civil infrastructure, road clearing works, right of ways and related approved projects
  - Agricultural waste biomass products or residues
  - End of life waste woody biomass manufactured and produced into a fuel to specification (“Domestic Biomass”) (subject to EPA approval as an eligible waste fuel)
- **EPA has issued conditions of approval supporting the proposed use of these fuels**

Energy Context
Energy from Waste Policy

- The following conditions of approval have been recommended by EPA of approval to address waste related matters for the Proposal, if approved:
  - Only Eligible Wastes Fuels as defined in the NSW EPA Eligible Waste Fuel Guidelines or Standard Fuels as described in the *Protection of the Environment Operations (Clean Air) Regulation* 2022 are permitted to be used at the premises
  - All Eligible Waste Fuels used at the premises must have a Resource Recovery Order and Exemption in place prior to use
  - The facility must meet the thermal efficiency criteria and demonstrate that at least 25% of the energy generated from the thermal treatment of the material will be captured as electricity (or an equivalent level of recovery for facilities generating heat alone)
- The applicant agrees to and is committed to complying with these conditions (note: plant will achieve a projected thermal efficiency of 27.2%, see Appendix F of EIS)

Energy Context
Biomass fuel (sourcing)

- A detailed Fuel Supply Strategy and Characterisation Study (Appendix M) has been prepared as part of the EIS to supply the power station with reliable, consistent quality and sustainably sourced biomass
- The plant will be supplied mostly by eligible waste fuels initially and will be partly replaced by standard fuels (purpose grown fuel crops)
- Eligible waste fuels to be used (with no other higher order uses) (93% in year 1 declining to 30% by year 5)
- Standard fuels (7% in year 1 increasing to 70% by year 5)
- **All biomass will be tested and meet strict specifications before it will be accepted at the power station**

Energy Context
Biomass fuel (availability)

- Biomass arising from invasive native species control on agricultural land:
  - Important fuel source in the first 3 years of operation
  - Part 5A, Division 5 of the *Local Land Services Act* 2013 sets out the mechanism to regulate the removal of native vegetation
  - *The Land Management (Native Vegetation) Code* 2018 applies to all rural lands throughout NSW and provides directions on what native vegetation can and cannot be cleared, how much clearing is permitted
  - Landowners are required to have Property Vegetation Plans (PVPs) and certificates (60Y certification) confirming that their proposed removal of INS is compliant with the *Native Vegetation Code* 2018
  - INS will be removed by landholders in accordance with Local Land Services (LLS) approvals – under the Proposal the applicant will recover this material to fuel Redbank (rather than i.e. burning in situ)
  - The Higher Order Use Study prepared by ARCHE (see Table E1-2 in Appendix H of the RTS) available INS with no higher order uses is approximately 1.5 million tonnes annually

Energy Context
Biomass fuel (availability)

- Biomass from approved land clearing activities (e.g. infrastructure):
  - Biomass from approved civil infrastructure developments, road clearing works, right of ways and related projects with development consent
  - The Higher Order Use Study prepared by ARCHE (see Table E1-2 in Appendix H of the RTS) estimated that 100,430 tonnes per annum available in Central West, Greater Sydney, Hunter and Western areas with no higher order uses
  - Only land clearing biomass with relevant planning approvals where it has no other higher order uses (e.g. mulch) will be sourced
  - Verdant have agreements with contractors in the industry and will continue to negotiate during project feasibility and tendering stages.

Energy Context
Biomass fuel (availability)

- Agricultural waste biomass products or residues:
  - The Higher Order Use Study prepared by ARCHE (see Table E1-2 in Appendix H of the RTS) estimated that within a 300 km radius of Singleton 675,294 tonnes per year available with no Higher Order Use
  - Biomass sourced from agricultural waste or residues will comprise left over material from existing approved agricultural operations
  - Includes wheat straw, oat straw, barley straw, maize straw, triticale straw and cotton straw
  - The biomass material potentially suitable for use will be left over material after the cropping and harvesting phase on cropping lands
  - Verdant will continue to assess agricultural markets and producers for material availability and suitability for Redbank on an ongoing basis

Energy Context
Biomass fuel (availability)

- End of life waste woody biomass manufactured and produced into a fuel to specification (“Domestic Biomass”) (subject to EPA approval as an eligible waste fuel)
  - The DBF targeted as potential fuel includes Construction and Demolition (C&D) and Dry Sorted Commercial and Industrial (C&I) waste sourced primarily from industry skip and bulk bin collection, and demolition
  - Sources only from woody materials destined for landfill
  - Production of a fuel using this material would promote diversion of waste from landfill
  - End of life waste woody biomass manufactured and produced into a fuel to specification <5% contamination – more than 118,000 tpa available in Sydney

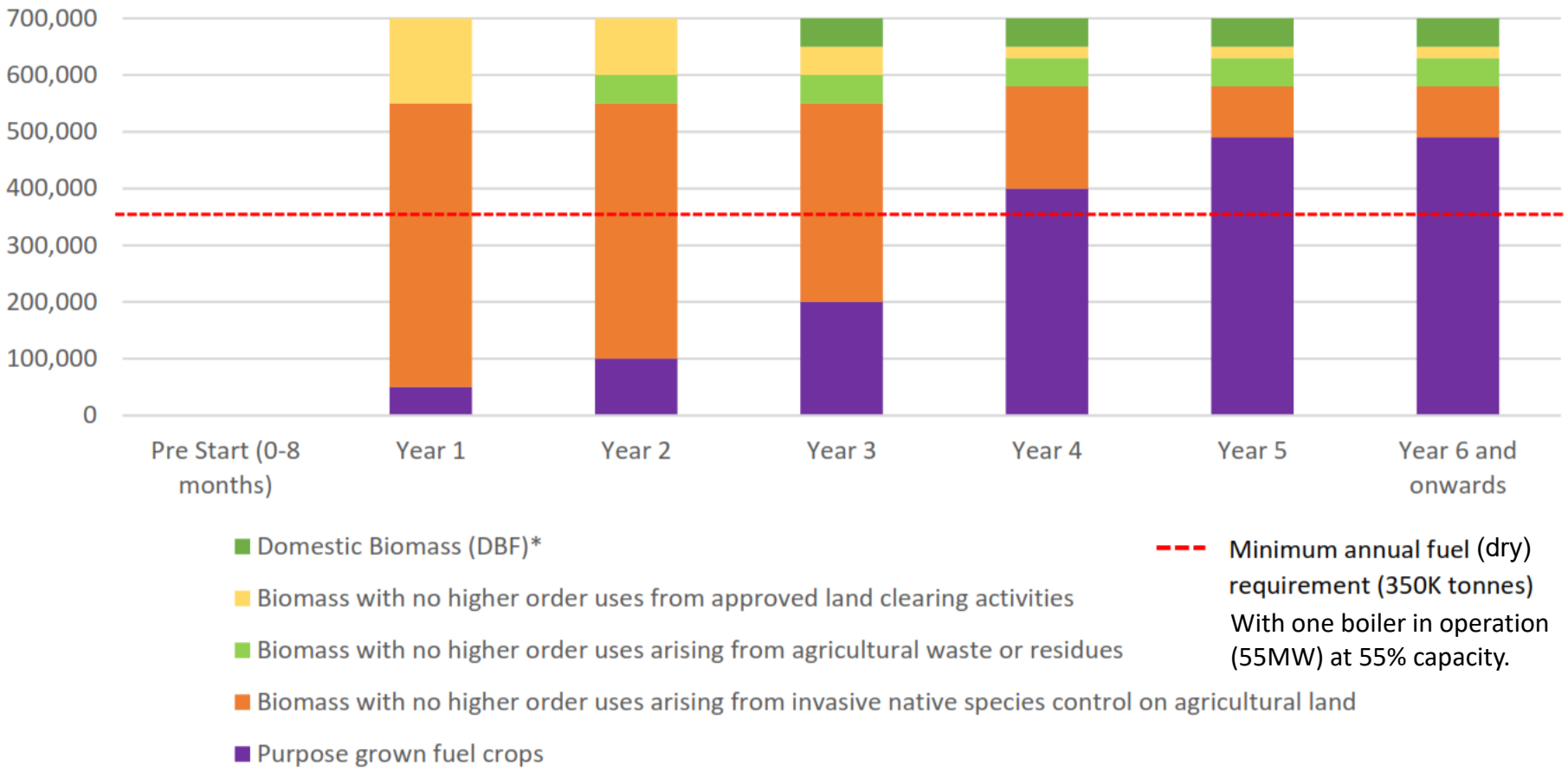
Energy Context

Purpose Grown Fuel Strategy

- Specifically grown fuel crops include such sources as annual crops, perennial grasses, and quick rotation native plant materials (e.g. coppice crops), sourced as seasonally and/or regionally available
- Short-rotation woody crops (SRWC) are fast-growing trees that are coppiced (harvested) every three to five years to provide feedstocks for bioenergy
- SRWC includes mallees, eucalypts and acacias. Coppicing allows the trees to grow new stems and above ground branches from the existing in place stump and root system
- Research shows coppicing planted mallees for biomass can yield between 35 and 100t/ha at year 4
- 56,000ha to meet year 5 onwards
- Will use contract suppliers and Verdant grown
- Hunter Valley Region over the next 16 yrs – 130,000 ha of closing coal mining lands – opportunities for repurposing, future business, employment, renewable energy

Energy Context

Biomass Fuel (strategy summary)



* Subject to EPA approval as an eligible waste fuel.

Energy Context
Ash Assessment

- Typical biomass ash generation is 2-3% (versus coal ash at is +25%)
- Assessment in the EIS used a high conservative estimate of 5% ash generated at about a rate of 42,500 tonnes / year
- Use of existing onsite ash transfer and storage system – loaded on delivery trucks as needed and beneficially used in compliance with a RROE
- Ash silo has 3 days storage
- Will be reused under *The Ash From Burning Biomass Order* 2014 as a valuable soil amendment to improve agricultural soils

Environmental Context

Environmental Context
Ecologically Sustainable Development

- EIS included an assessment of ESD, and considers all relevant social, economic and environmental aspects
- Proposal is supported by a detailed social impact assessment, economic impact assessment and environmental assessment
- Precautionary principle:

  'If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'

  - The electricity generated from biomass under this Proposal would reduce NSW GHG emissions directly, by displacing coal emissions, and provide grid stability to complement other balancing options, enabling accelerated expansion of wind and solar power, further reducing NSW GHG emissions and contributing to the global goal of net zero, required to reach the Paris Agreement
  - Production of electricity from biomass at Redbank Power Station will save about 882 kgCO_2-eq for every MWh generated (Lifecycles, November 2023) (EIS Appendix N)
  - Biomass sources are considered sustainable, will not result in deforestation or biodiversity loss and will not impact higher order uses

Environmental Context
Ecologically Sustainable Development

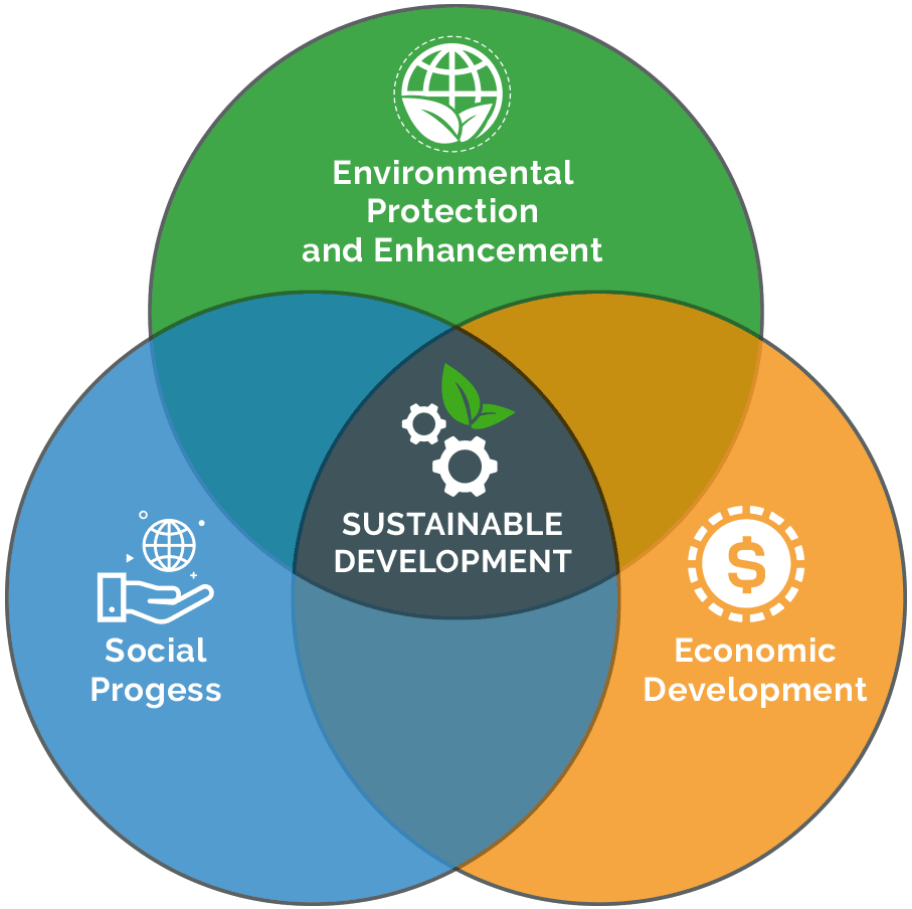
- Intergenerational equity

  '*The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations*'

  - Emissions of CO_2 from combustion of fossil fuel cause permanent warming of the planet
  - Taking action now to support rapid decarbonisation reduces the absolute quantity of CO_2 in the atmosphere and therefore reduces future warming
  - Delaying action, which leads to additional fossil fuel emissions, will impose additional burden on future generations to achieve deep emissions reductions and deploy large-scale carbon dioxide removal strategies, which will be costly and have adverse effects on natural ecosystems and food security
  - The Proposal will reduce fossil fuel emissions, reducing the burden on future generations to undertake carbon dioxide removal and adapt to extreme climate change

Environmental Context
Ecologically Sustainable Development

- Conservation of Biological Diversity and Ecological Integrity
  The conservation of biological diversity and ecological integrity should be a fundamental consideration in environmental planning and decision-making processes. Biodiversity refers to the variety of all life
  - Biodiversity and ecological integrity are threatened by climate change. The Proposal would reduce fossil fuel emissions, thus contributing to reducing global warming and its impacts on biodiversity and ecological integrity
  - Biomass sources are considered sustainable, and will not result in biodiversity loss
- Improved Valuation and Pricing
  - Proposal is a very efficient means of repurposing a $700M asset to help drive down emissions from electricity sector
- Cleaner Production Principles
  - World best practice technology will be used for converting biomass fuel into electricity
  - Cleaner production considered in the Proposal with life cycle assessment and waste minimisation



Environmental Context
Air Quality

- The AQIA concluded that operation of Redbank using biomass will meet relevant legislative and regulatory air quality criteria (and exceed the stringent Group 6 air emissions criteria)
- NSW has some of the strictest air quality standards in the world
- All existing emission controls at Redbank Power Station will be retained for the Proposal and are consistent with best practice
- Continuous monitoring and reporting of emissions will occur in accordance with EPA requirements
- An Air Quality Management Plan will be prepared and implemented
- EPA reviewed the EIS and RTS and considers matters have been adequately addressed and issued recommended conditions

Environmental Context
Human Health

- Study completed by EnRisks concluded that all risks to human health are considered negligible, including acute inhalation risk, chronic risk, exposure to particulates, individual exposure pathways and combined multiple pathway exposure
- Emissions from the Proposal would have a negligible impact on water quality in rainwater tanks used for drinking water and on crops and produce grown in the area
- To adequately satisfy NSW Health, Verdant:
  - Developed an onsite mosquito management of stagnant water including staff awareness program and maintenance inspections
  - Noted that an external service provider is engaged to manage the cooling water system
  - Supply drinking water via bottled water through an external provider (i.e. the water treatment plant is solely for Redbank plant and equipment).

Environmental Context

Greenhouse Gases

- IPCC Sixth Assessment Report released in April 2022 acknowledges Modern Bioenergy as important in mitigating climate change by reducing CO_2 emissions from traditional fossil fuel electricity generation
- Redbank would be a near net zero CO_2 project and a small contributor to GHG emissions in NSW representing 0.02% of state-wide emissions in 2030, and 0.07% in 2050
- In quantitative terms, the production of electricity from biomass at Redbank Power Station will save about 882 $kgCO_2$-eq for every MWh generated
- Greenhouse Gas Mitigation Plan for Scope 1 and 3 emissions will be calculated on an annual basis through fuel-based calculations and/or direct emissions monitoring and reviewed annually.

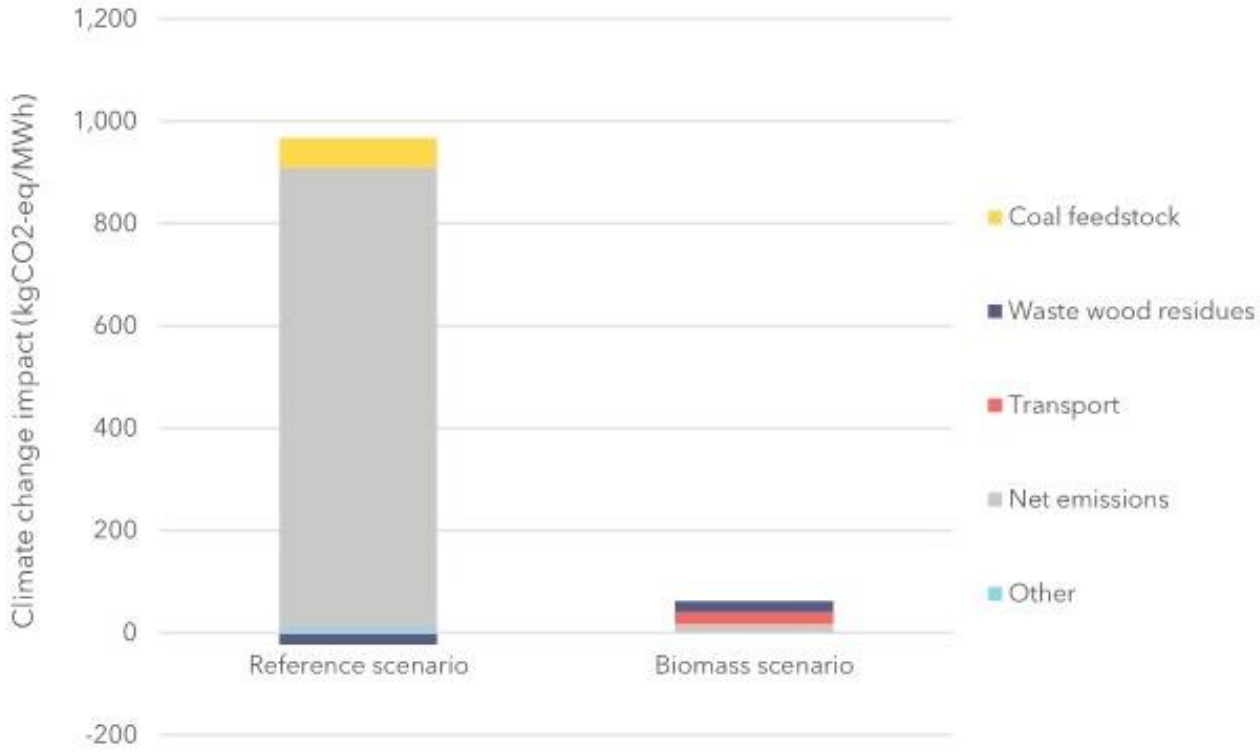
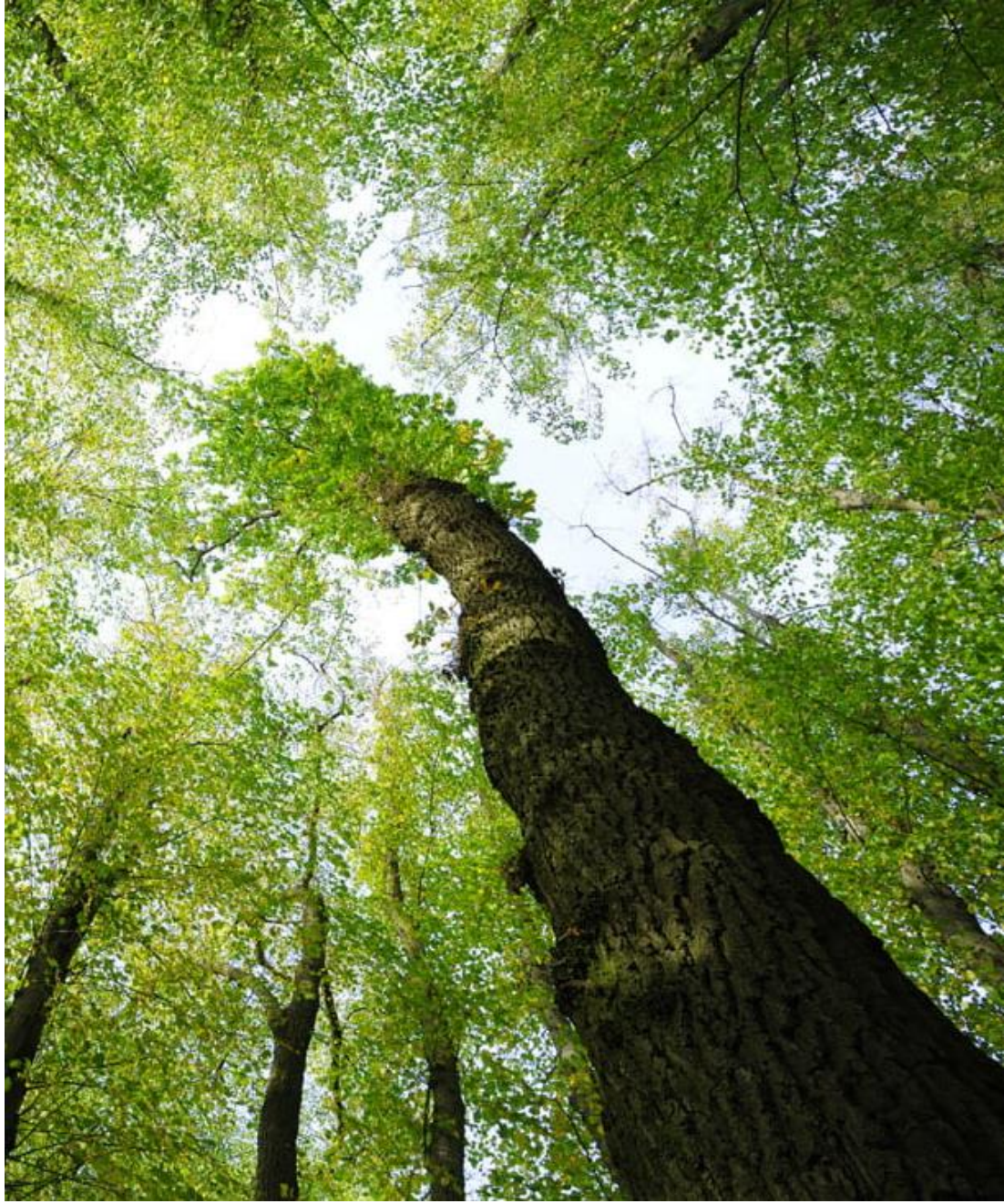


Figure 7 Climate change contribution analysis

Environmental Context

Climate Change Mitigation and Offset

- Greenhouse Gas Mitigation Plan and Climate Change Adaptation Plan prepared as part of the EIS (Appendix P)
- Redbank would be a near net zero CO_2 project and a small contributor to GHG emissions in NSW representing 0.02% of state-wide emissions in 2030, and 0.07% in 2050.
- Could potentially be reduced to zero through the use of electric equipment and vehicles
- Annual environmental reporting requirements and review the Climate Change Adaptation Plan risk assessment will be considered for major revisions to NSW climate modelling
- Applicant will periodically review technological developments, and will prioritise emission-reduction measures that are technically and commercially feasible
- The main mechanism for addressing the remaining GHG emissions into the future will likely be carbon offsetting
- Carbon sinks developed in the purpose-grown programs may lead to negative CO_2 generation



Environmental Context
Offsite Biodiversity Impacts – INS

- Extensive (Invasive Native Scrub) INS Research Program coordinated by the Central West and Western Catchment Management Authorities (now Local Land Services), in collaboration with:
  - NSW Department of Environment, Climate Change and Water (DECCW)
  - CSIRO
  - Natural resource consultants (private sector specialists)
  - Industry & Investment NSW
  - University of New England (UNE) and
  - Landholder community.
- The Program developed *Managing invasive native scrub to rehabilitate native pastures and open woodlands - A Best Management Practice Guide for the Central West and Western Regions (2014, December)*[1] (the Guidelines):
  - *"INS competes for resources (i.e. light, water, nutrients) and can reduce or exclude the growth of other plant species, particularly native perennial grasses. Widespread INS reduces habitat diversity and soils in INS sites can be crusted and hard setting. The reduction in groundcover can increase soil erosion and can be made worse when combined with high total grazing pressure.*
  - Overall bird diversity was greatest when the landscape contained a range of vegetation types.[2]

[1] Web: https://www.lls.nsw.gov.au/__data/assets/pdf_file/0007/685222/managing-invasive-native-scrub.pdf
[2] This is consistent with the conclusions in *Managing Invasive Native Scrublands for Improved Biodiversity Outcomes in Agricultural Landscapes Final Scientific Report*, June 2009, CSIRO.

Environmental Context

Offsite Biodiversity Impacts – INS

- Invasive Native Scrub (INS) management is regulated through *the Land Management (Native Vegetation) Code 2018 (Native Vegetation Code)*[1]
  - The Native Vegetation Code is prepared under Part 5A, Division 3 of the *Local Land Services Act* 2013
  - Schedule 1 of the Code contains a current list of all the listed INS
- The Native Vegetation Code applies to all rural lands throughout NSW and provides directions on what native vegetation can and cannot be cleared, how much clearing is permitted and under what circumstances
- The Native Vegetation Code allows the removal of invasive native species that have reached unnatural densities and dominate an area
- Clearing under the Native Vegetation Code is NOT permitted for some categories of land, including coastal wetlands, old growth forests, littoral rainforests, core koala habitat and critically endangered ecological communities
- All INS removal undertaken by landowners will be undertaken in strict accordance with the *Local Land Services Act* 2013 and the Native Vegetation Code

[1] *Land Management (Native Vegetation) Code* 2018. Web: https://legislation.nsw.gov.au/file/2018-83.pdf

Environmental Context

Offsite Biodiversity Impacts – INS

- The Guidelines require targeted INS removal based on site specific conditions, and the application of appropriate grazing pressure management
- The Guidelines provide a detailed resource for managing INS, including the importance of landscape mosaics, biodiversity and INS management principles and planning
- Under the revised set of Mitigation Measures in the Response to Submissions Report, the applicant has included the following:
    - *"When sourcing INS from landholders, Verdant will confirm and document that the landholder has consulted with LLS regarding the planned INS removal and that the INS management measures proposed on the fuel source location will be planned and completed in accordance with the most recent best management practice guidelines for INS management for the Central West and Western Regions (published by LLS)."*
- Importantly, the Applicant will also be required to gain approval from the NSW EPA and obtain a Resource Recovery Order and Exemption to use INS as a feedstock fuel
- With implementation of the above management and mitigation measures, potential impacts to biodiversity will be managed and either negligible or positive

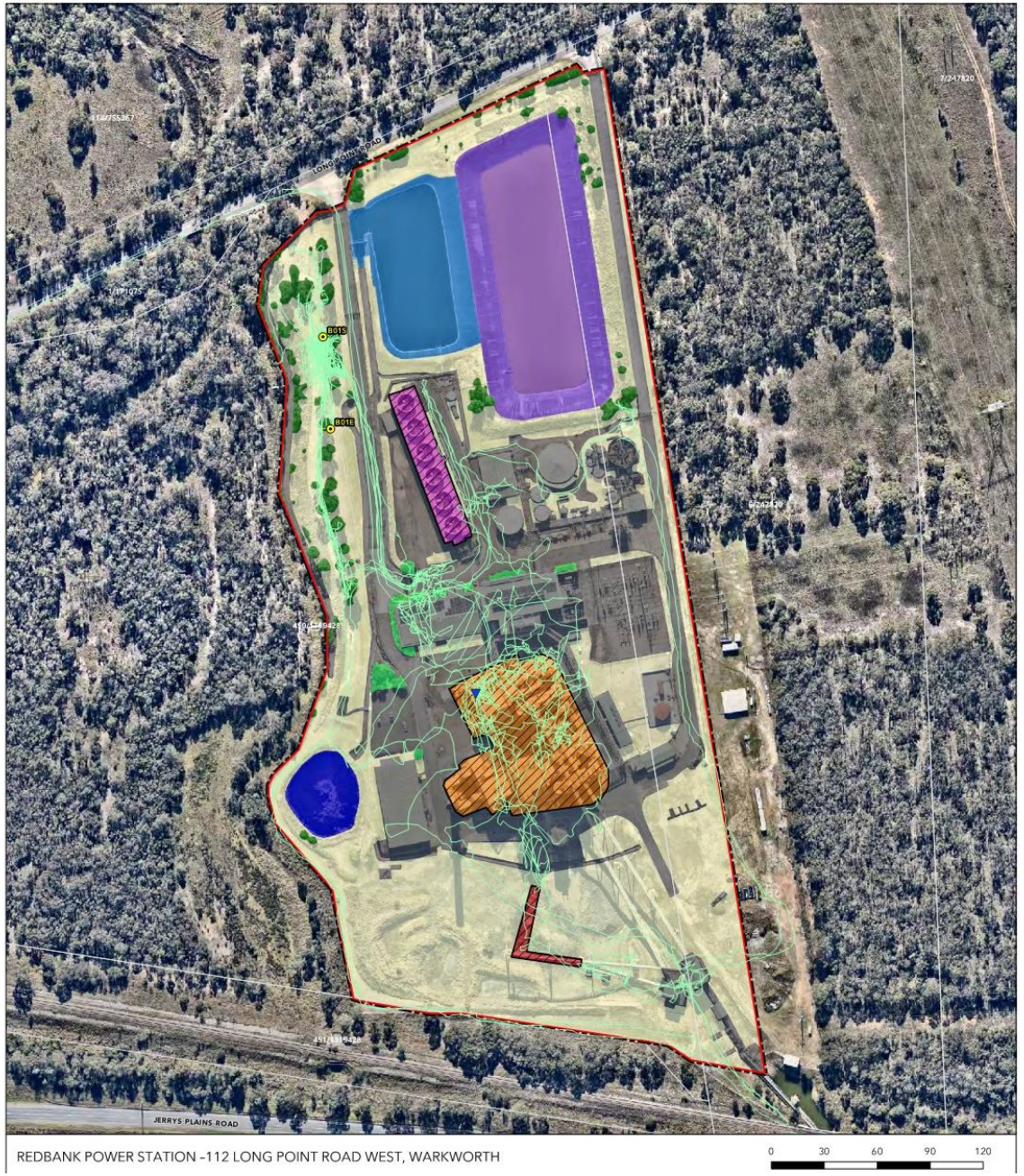
Environmental Context

Offsite Biodiversity Impacts – Approved infrastructure land clearing

- Approved land clearing activities may include the removal of Australian native trees from infrastructure developments for approved civil infrastructure such as:
  - Road clearing works
  - Right of ways clearing and maintenance
  - Infrastructure projects and related developments
- These projects will all have their own separate approvals and be regulated separately (including any required offsets) to this Proposal
- Potential biodiversity impacts to flora and fauna will have been considered and assessed under these separate approvals in accordance with the *Environmental Planning and Assessment Act* 1979
- Potential impacts from this Proposal on these separate projects are already considered and no further assessment is required

Environmental Context
Other – Biodiversity (onsite)

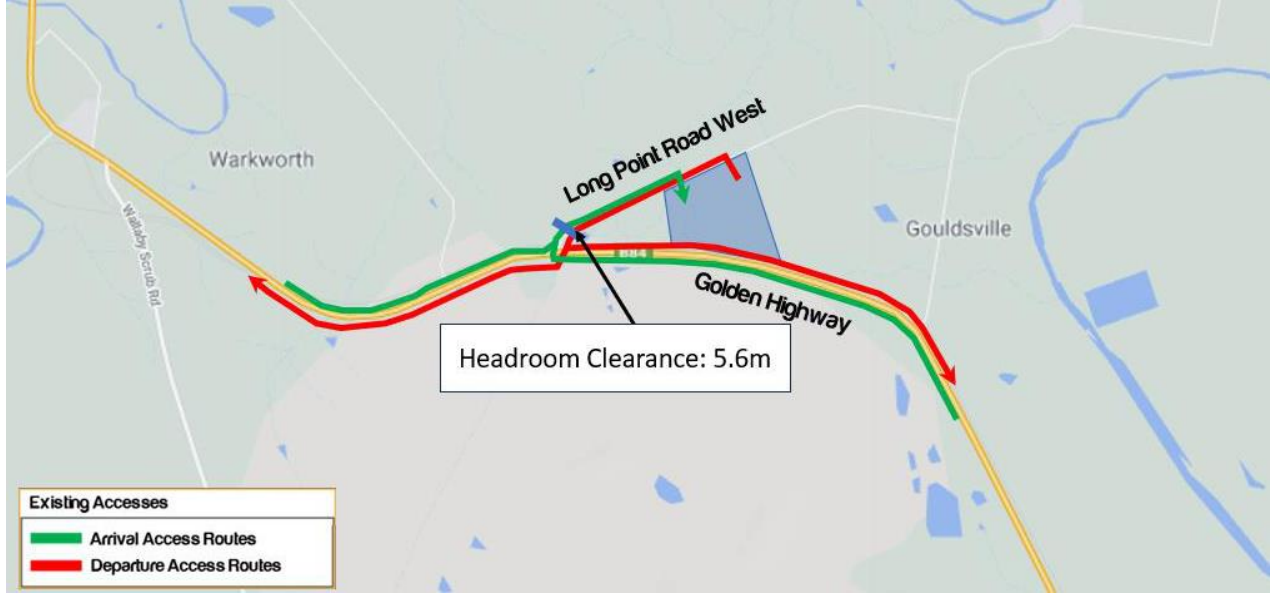
- Biodiversity Development Assessment Report prepared (although not required under clause 6.8A of the *Biodiversity Conservation Regulation* 2017 as the Proposal is considered "continued development")
- Concluded the Proposal is unlikely to significantly impact threatened species, populations, ecological communities or migratory species
- The existing Proposal Site is cleared and highly disturbed
- Sandy Hollow Creek riparian corridor is located to the west of the Proposal (relocated under the previous approval) and will not be impacted
- Prior to commencement of construction, undertake microbat surveys to determine if any microbat species are present in the existing infrastructure
- Develop a microbat management plan to be implemented in the event microbat individuals are located during the pre-work survey



Other Matters

Other Matters
Traffic

- Up to 56 trucks deliveries (or 112 movements) per day, as well as staff vehicle movements up to 70 vehicle trips per day
- Traffic modelling of a conservative development scenario of up to 15 heavy vehicle trips per hour during the peak periods, as well as staff trips occurring in those same peak hours, demonstrates that the Proposal would have no significant impact on the operation of the Golden Highway/ Long Point Road West intersection, nor on road capacity limits or existing geometry requirements
- Existing channelised right turn is adequate
- Localised widening required to accommodate left-in, left-out and right-in manoeuvres
- Left-turn Lane Treatment (AUL) required at 185 m (comfortable deceleration length) – room available along the shoulder



Other Matters
Noise / vibration

- NVIA study concluded noise emissions will comply with the EPA Noise Policy for Industry at all times
- Noise sources (new) include truck movements, greater use of the plant on-site for the unloading and stockpiling of fuel and loading of fuel for firing
- This equipment includes mobile front-end loaders, bulk unloaders, conveyors and silo augers
- Inclusion of a noise barrier to be constructed with a gate leading to the access road – operational equipment may also be reviewed for less noise producing alternatives
- A validation assessment would be undertaken shortly after commencement of operation to verify compliance
- Operational noise emissions will not impact any surrounding receiver, at any time of the day or night
- EPA reviewed the EIS and RTS and considers matters have been adequately addressed and issued recommended conditions

Other Matters
Community Consultation

- 64 households and businesses within 5km of the Proposal received a fact sheet and a letter introducing the Proposal
- Over 400 objectors and supporters of the previous proposal (SEAR 1596) also received this information and a request for additional feedback
- 40 different local and regional organisations received the fact sheet and a letter introducing the Proposal, and specific feedback was received from 7 organisations
- Nine (9) members of local and/or regional communities provided specific feedback
- 15 government agencies were provided additional opportunity to provide feedback (in addition to the SEARs already provided, if applicable). No significant specific feedback was received outside of that already received in the SEARs; and

Other Matters
Community Consultation

- Consultation program highlighted concern in the local community over potential impacts on air quality, road safety and legitimate waste biomass availability for the Proposal
- Top two key issues for objections were concern over Greenhouse Gases/Climate Change and Biodiversity (due to 'native forest' and/or invasive native species clearing)
- The applicant has explicitly excluded native forestry residues from logging as a potential feedstock. INS is already being cleared and burned onsite by landowners.
- Top two key issues for support submissions were benefits to grid stability and security along with economic/social benefits to the community
- All matters comprehensively addressed in the application

Other Matters
Engagement

Ongoing community engagement commitments include:

- Regular engagement with Council, residents, and businesses in the LGA
- Community complaints line advertised via web to receive and address any community complaints or enquiries
- Community Consultative Committee: Verdant, the community, and key stakeholders with representatives of Singleton Council, NSW EPA, Verdant, and two community representatives approved by Council
- Environmental monitoring (including noise and air quality) results publication on the Verdant Earth website
- Recruitment and Training Strategy (RTS) and a Local Content Plan (LCP) to encourage local business participation and target the use of local people and resources

Conclusions

- Redbank Power Station is designed, and will be operated and managed in accordance with best practice
- The facility can meet all relevant legislative policy and regulatory requirements
- The NSW EPA have accepted the responses provided in the RTS and provided draft conditions for approval
- All agency comments, environmental and social issues have been comprehensively addressed
- Merit Review issues thoroughly addressed and now “green” rated
- When approved, Redbank Power Station will provide:
  - Near net zero CO_2 emissions firming power
  - An estimated 1 million megawatt-hours of baseload electricity 24/7 to support the electricity grid
  - Complement other variable renewable energy sources such as solar and wind power
  - Help fill the AEMO identified electricity reliability supply gap
  - Generate an estimated 1,009 direct and indirect jobs and 25-Year Net Present Value (NPV) of $901.1 million

Thank You

Dr Mark Jackson, Director, JEP Environment & Planning

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