KWINANA RENEWABLE FUELS

s. 38 Referral Supporting Document

bp

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Document control record

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A	2023-02-20	Draft	Aurecon	bp KEH	bp KEH manager	KRF Project Manager
1	2023-02-27	Version 1	Aurecon	bp KEH	bp KEH manager	KRF Project Manager
2	2023-03-20	Version 2	Aurecon	bp KEH	bp KEH manager	KRF Project Manager
3	2023-03-31	Version 3	bp KEH	Aurecon	bp KEH manager	KRF Project Manager

Executive Summary

bp Refinery (Kwinana) Pty Ltd (bp) is transitioning its former oil refinery to an energy hub and proposing to establish a Kwinana Renewable Fuels (KRF) biorefinery (this Proposal). The bp Kwinana Energy Hub is within the Kwinana Industrial Area (KIA), Western Australia (WA). KRF would be capable of processing up to 10,000 barrels per day (b/d) of renewable feedstocks such as vegetable oils, animal fats and other waste products to produce hydrotreated vegetable oil (HVO), synthetic paraffinic kerosene (SPK) and bio-naphtha. These products can be blended with mineral oil to produce renewable diesel and sustainable aviation fuel (SAF). In doing so, KRF would provide a reduced carbon fuel source for hard-to-abate sectors, including heavy industry, aviation, mining, and transport.

The Proposal is being referred to the Environmental Protection Authority (EPA) under section 38 of the *Environmental Protection Act 1986* (EP Act). Impacts to the factors of Marine Environmental Quality, Greenhouse Gas Emissions, Flora and Vegetation, Terrestrial Environmental Quality, Terrestrial Fauna, Inland Waters, Air Quality and Social Surroundings were considered relevant to the Proposal, however with existing and proposed mitigation measures it is expected that the EPA objectives would be met for these factors and therefore it is considered that the Proposal will not have a significant impact on the environment.

The Proposal will not have a significant impact on any matters of national environmental significance (MNES) and consequently has not been referred to the Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Proposal is located within a brownfields site within an existing industrial area (KIA) that is adjacent to similar land uses and well-buffered from nearby residential areas. The location also provides for bp to continue its existing stakeholder relationships and long-standing history of safe and reliable supply of fuel and energy products. The Proposal has been well-received by stakeholders, with advocacy and support for the Proposal and its contribution to the energy transition (towards netzero).

The siting of the Proposal has been selected to repurpose existing infrastructure from the former oil refinery for the proposed biorefinery. The Proposal comprises new build of biorefinery infrastructure within the project footprint, repurposing of storage tanks (with limited new build to interface with existing infrastructure), and re-use of existing facilities. As the Proposal utilises much of the existing infrastructure, the Proposal Development Envelope (PDE) has been taken as the lot boundary. The key characteristics of the Proposal are detailed in the following tables in accordance with the EPA instruction and template: *How to identify the Content of a Proposal* (EPA, 2021c).

ES-1 General Proposal content description

Proposal title	**bp KRF**
Proponent name	bp
Short description	The Proposal is for the construction and operation of a Renewable fuels processing facility that produces renewable diesel and sustainable aviation fuel (SAF) from vegetable oils, animal fats and other biowaste products. The biorefinery will reuse the existing processing infrastructure formerly used for hydrocarbon refining (such as hydrofiner units, storage tanks, pipelines and utilities such as the flare and waste water treatment plant) combined with some additional new infrastructure such as a Hydrogen Generation Unit (HGU), Pre-Treatment Unit (PTU), Product Fractionation Unit (PFU) and Anaerobic Bio Digestion Unit. The Proposal is located at the former oil refinery site in the Kwinana Industrial Area and will use existing disturbed footprint to implement this project. No clearing will occur as part of the Proposal. The Proposal Project Development Envelope covers the whole bp boundary which is an already disturbed area. The Proposal is considered to be achieving sustainable outcomes via creation of new job opportunities, production of sustainable fuels from waste feedstocks and by underpinning bp's Kwinana Energy Hub development which will help industry, the State and bp customers to achieve decarbonisation strategy and reduce greenhouse gas emissions.

ES-2 Proposal Content Elements

Proposal element	Location / description	Maximum extent, capacity or range
Physical elements		
Tanks (existing Tanks – these tanks are already part of the terminal and will be overhauled as per bp's maintenance program)	**ES-Fig 1**	Existing infrastructure approved under existing licence L5938/1967/12. 29 tanks containing raw feed, treated feed, bio-naphtha, sustainable aviation fuel (SAF) and renewable diesel with a combined total tank capacity < 200ML.
Hydrofiner 2 (HYD2) (existing unit that will be revamped for the new proposed activities)		4,000 klpd feed
Hydrofiner 3 (HYD3) (existing unit that will be revamped for the new proposed activities)		2,850 klpd feed
Product Fractionation Unit (PFU) (new build)		1,550 klpd HVO based on design feedstock basis 300 klpd Bionaphtha based on design feedstock basis 1,300 klpd SPK based on design feedstock basis
Hydrogen Generation Unit (HGU) (new build)		65 TPD Hydrogen
Pre-treatment Unit (PTU) (new build)		1,600 TPD feed capacity
Anaerobic Bio Digestion Unit (BDU) (new build)		54 TPD feed
Cooling tower (new build)		2,572 tph recirculation rate
Existing utilities such as steam and wastewater treatment		Existing utilities covered under existing licence L5938/1967/12. These utilities are currently operational supporting terminal operations.
Construction elements		
Laydown areas, workshops, crib rooms and carparks	Existing Infrastructure as shown in **Figure 1-2.**	Existing facilities onsite are being used, however several new areas will be developed on existing bp plot. No clearing will occur as part of these activities.
Dewatering		Several sewers, including stormwater drains, will be constructed below ground and dewatering activities may occur. Should this be required after detailed designs have confirmed that groundwater has been reached, and where water abstraction activities cannot be undertaken under the current GWL60605(6) licence, application will be made under the Rights in Water and Irrigation Act 1914. Should dewatering capacity be less than 25,000 KL, dewatering exemption may apply under the RIWI Act.
Operational elements		
Natural gas supply	NA	5,556 kg/hr Natural gas usage will range from 4897 kg/hr when the facility is maximising SAF production to a maximum of 5,556 kg/hr when maximising renewable diesel production

Water supply		Water will be supplied from the Kwinana Water Reclamation Plant (KWRP) at a rate of 86 tonnes per hour water.
Solid waste		Solid waste will be produced from the BDU as a sludge at a rate of up to 37 tonnes per day. Solid waste will comprise organics such as bentonite, sludge. Given that the solid waste produced is considered organic, bp is planning to reuse the waste stream via either composting or in the waste to energy incinerators via third party operators. The waste is expected to be non-hazardous and not a controlled waste. It is expected that all hydrocarbons will be fermented into biogas in the BDU and therefore the sludge will mainly be bentonite and organics.
Wastewater effluent		An average of 150 kL/day of effluent are expected to be produced from the Proposal and will be treated at the existing wastewater treatment plant. The existing wastewater treatment plant is licensed under the existing Prescribed Premises Part V Department of Water and Environmental Regulation (DWER) Licence (L5938/1967/12) for 7.93ML/day therefore has sufficient capacity to treat the Proposal wastewater streams.
Power generation		Internal generation of 2.3 MW from BDU gas engines.
Emissions to air		There are several combustion stacks and flares from the new processing units that will create air emissions. Air quality modelling is progressing, and considered to be well within ambient air quality standards from comparison with the oil refinery modelling. Sulphur Dioxide emissions to air from stack emissions has been estimated to be approximately 150,000 kg/year. Oxides of Nitrogen (NOx) emissions to air from stack emissions has been estimated to be approximately 150,000 kg/year. Minimal dust is expected from construction as the plot is a brownfields site and dust suppression will be managed in the Construction Management plan.
Odour		Odour is expected from the renewable feedstocks storage tanks, PTU and BDU operation. Management of the odour will be via odour devices such as a caustic odour scrubber fitted to the PTU and managerial controls such as ensuring feedstocks are processed in a timely manner. A consultancy has been engaged to undertake a detailed odour assessment for the proposal with reference to *Guideline: Odour Emissions* (DWER, 2019). The odour risk assessment showed that the proposed activities will have low residual impacts regarding odour.
Noise		The noise from the proposal has been modelled and shows predicted noise levels are; • at least 7dB below assigned noise levels at any time of day for the nearest sensitive receptors • below 65 dB(A) for neighbouring industrial premises
Proposal elements with greenhouse gas emissions		
Construction elements:		
10,000 tpa	Scope 1	
Operation elements:		
120,000 tpa	Scope 1	

144,000 tpa	Biogenic CO_2 emissions Biogenic emissions are expected to be reported under *National Greenhouse and Energy Reporting Act* 2007 but separate to Scope 1 emissions (aligned with the reporting requirements of IPCC reporting guidelines for national inventories and practice	
71,400 tpa	Scope 2 unmitigated GHG emissions	
0 tpa	Scope 2 mitigated GHG emissions	
Rehabilitation		
Upon completion of operations, the site will be remediated and rehabilitated to ensure the premises are left in a safe, stable, and non-polluting condition. This project is at an early stage in its development. A decommissioning & rehabilitation plan will be submitted prior to the cessation of operations. Timeframe for submission of the decommissioning & rehabilitation plan will be further discussed with the EPA.		
Commissioning		
Commissioning of the proposed activities is planned to commence in 3Q 2025. Commissioning plans are being developed and will include mitigations to reduce environmental impacts (such as flaring and water use). The environmental commissioning plan will be submitted to DWER as part of the DWER Works Approvals application and assessment process under Part V of the EP Act.		
Decommissioning		
Upon completion of operations, the site will be remediated and rehabilitated to ensure the premises are left in a safe, stable, and non-polluting manner. This project is at an early stage and therefore a decommissioning & rehabilitation plan will be submitted prior to cessation of operations. Timeframe for submission of the decommissioning & rehabilitation plan will be further discussed with the EPA.		
Other elements which affect extent of effects on the environment		
Proposal time*	Maximum project life	Design life of 20 years
	Construction phase	18 months
	Operations phase	20 years
	Decommissioning phase	5 years

ES-Fig 1 Project Location

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Tables

1 Proposal

bp Refinery (Kwinana) Pty Ltd (bp) is proposing to establish a Kwinana Renewable Fuels (KRF) biorefinery (this Proposal), located at its former oil refinery on Mason Road within the Kwinana Industrial Area (KIA), Western Australia (WA) (Figure 1-1). In 2020, bp set its strategy and net zero ambition to become an integrated energy company. As part of this strategy, bp aims to decarbonise its operations and produce energy solutions to help the world achieve net zero. Biofuel production is an important part of this transition as it provides a reduced carbon liquid fuel source for hard-to-abate sectors, including heavy industry, aviation, mining and transport. KRF would be capable of processing up to 10,000 barrels per day (b/d) of renewable feedstocks such as vegetable oils, animal fats and other waste products to produce hydrotreated vegetable oil (HVO), synthetic paraffinic kerosene (SPK) and bio-naphtha. These products can be blended with mineral oil to produce renewable diesel and sustainable aviation fuel (SAF). The former oil refinery was in operation from 1955 to February 2021, when it was closed due to economic factors and converted to a fuel import terminal. bp's vision for the Kwinana site is for it to operate as an energy hub, where existing terminal operations will integrate with biofuel production and potential green hydrogen production. If successful, this integration is expected to result in the site achieving net zero and supplying reduced carbon fuel products to customers and communities.

The proposed KRF biorefinery plans to repurpose some existing oil refinery infrastructure. Oil refinery infrastructure that cannot be repurposed will be removed in support of land reuse per decommissioning plans (separate to this Proposal). New proposed infrastructure involving bulk earthworks is confined to the 'KRF footprint' and all supporting infrastructure re-use (including minor new build to interface with existing infrastructure) is contained within the Proposal Development Envelope (PDE) property boundary of bp's Kwinana site as shown in Figure 1-2.

1.1 Purpose and Scope

This document has been prepared to provide supporting information for referral of the Proposal to the Environmental Protection Authority (EPA) under s. 38 of the *Environmental Protection Act 1986* (EP Act) to enable the EPA to determine if environmental impact assessment is required under Part IV of the EP Act and if so, the level of assessment. This document aims to provide the EPA with the following information:

- Definition of the Proposal and associated activities
- Description of the values of the existing environment
- Identification of the key environmental factors and risk of potential environmental impacts to these factors from the Proposal
- Identification of other environmental factors and risk of potential environmental impacts to these factors from the Proposal
- EPA mitigation hierarchy application in the risk assessment methodology
- Stakeholder engagement efforts
- Efforts in environmental data collation and progress to date
- This Referral Supporting Document has been prepared in accordance with the following documents
- Instructions: How to prepare an Environmental Review Document (EPA, 2021d)
- Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2021b)
- Other EPA guidance documents (see Section 2.1)
- This document should be read in conjunction with the Referral Form and Proposal Content Form

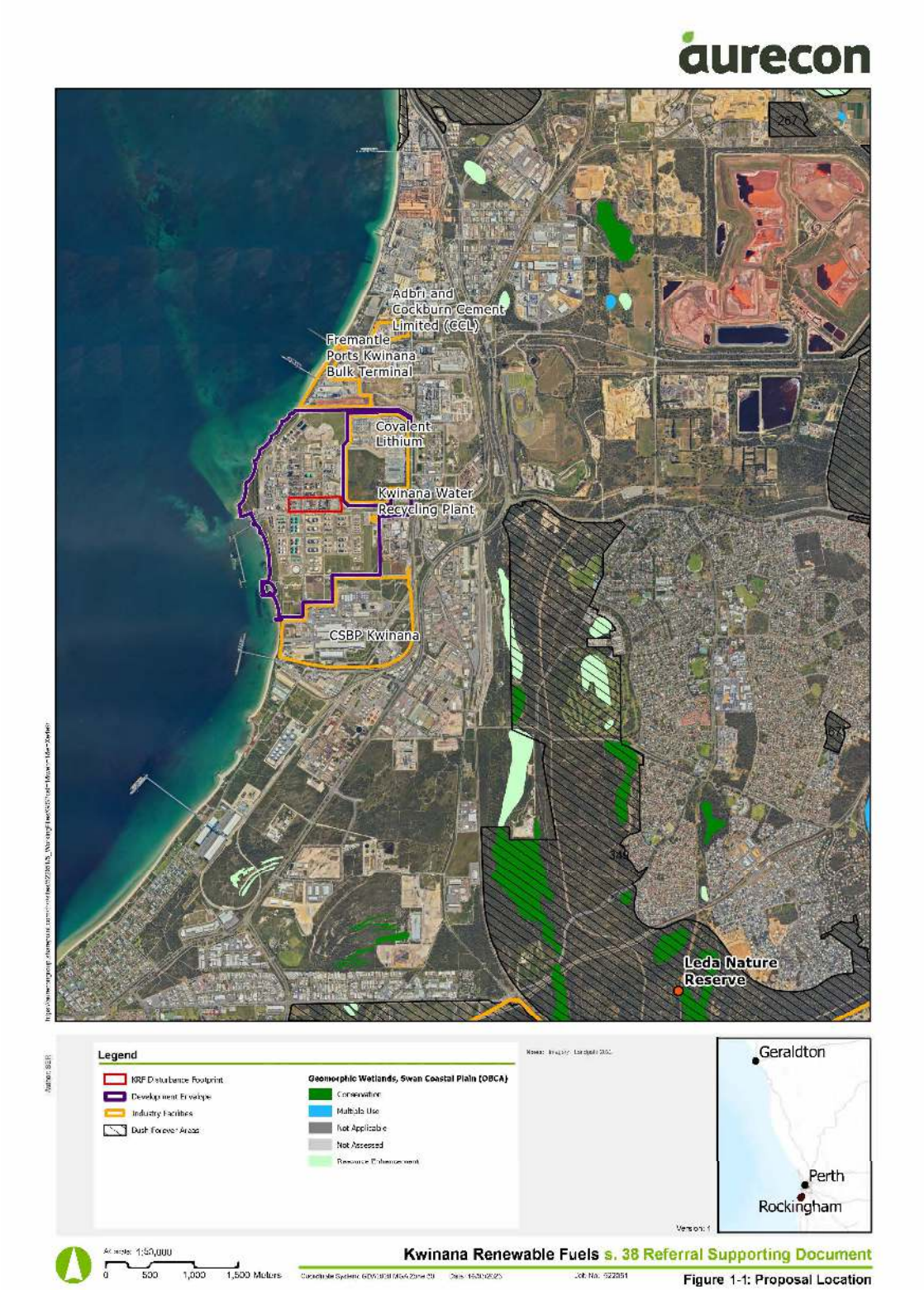

Figure 1-1 Proposal location

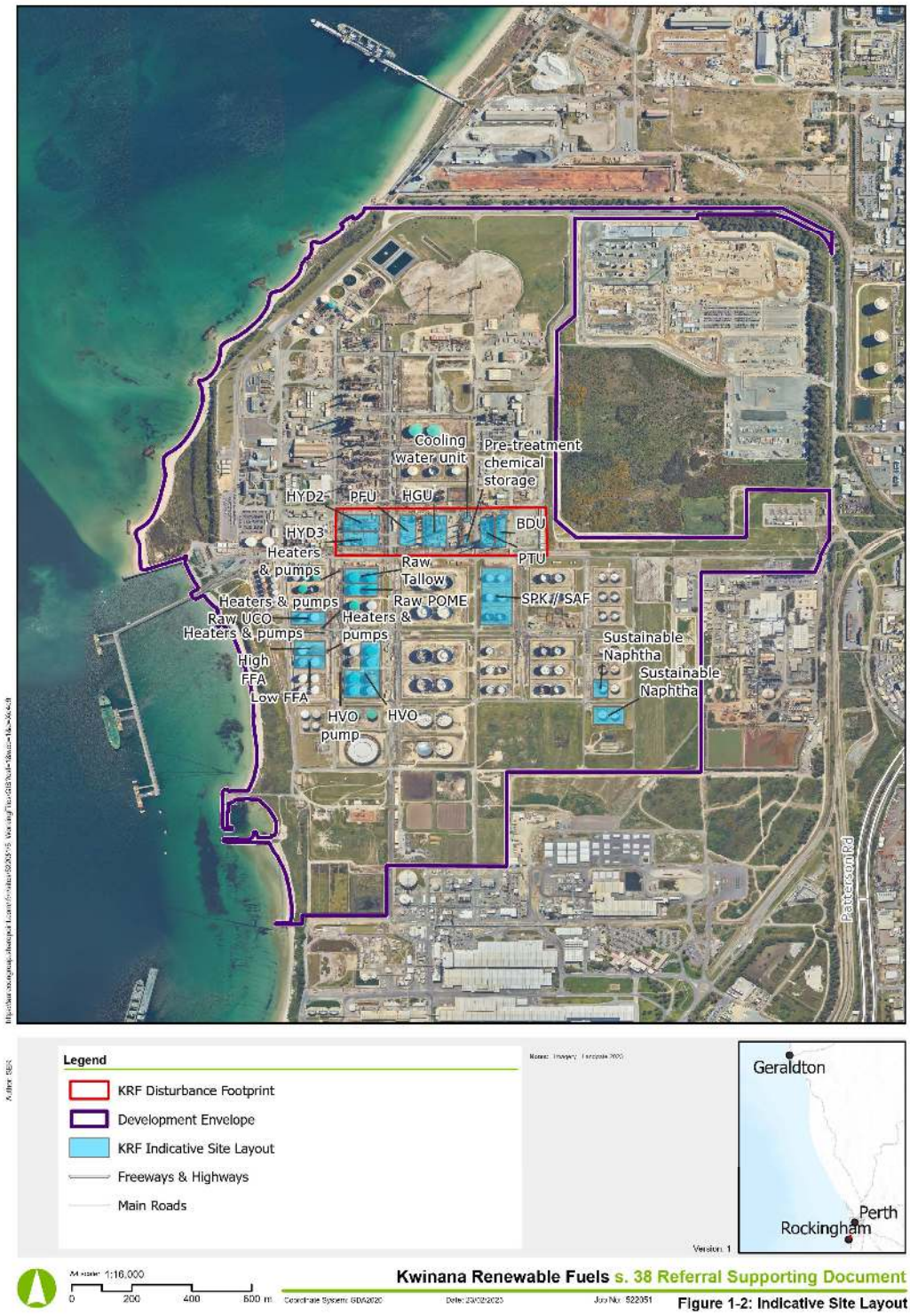

Figure 1-2 Indicative site layout

1.2 Proposal Content

Table 1-1 and Table 1-2 present summaries of the Proposal content and elements in accordance with *Instructions and template: How to identify the content of a proposal* (EPA, 2021c). The Proposal comprises

- New infrastructure within the KRF footprint (Figure 1-2), including;
  - Pre-treatment Unit (PTU) to remove impurities in feedstock
  - Hydrogen Generation Unit (HGU) (integrated with renewable fuel production by using offgases as the feedstock to generate hydrogen)
  - Waste handling facility (Bio-Digester Unit (BDU) and infrastructure) to process PTU waste streams
  - Product Fractionation Unit (PFU)
  - Required supporting infrastructure such as electricity, stormwater and wastewater management, control systems and emergency response equipment
- Reuse of existing infrastructure from the former oil refinery within the PDE (Figure 1-2), including:
  - Revamp of two diesel hydrofining units (HYD2 and HYD3). It should be noted that HYD2 was approved as part of MS 161 in July 1991
  - Repurpose of storage tanks (at the Kwinana Terminal) for storage of feedstock (raw and treated), LPG and hydrogen, slops, and end-product fuels. Tanks are routinely overhauled and the modifications required to repurpose the tanks will be undertaken as part of this routine maintenance. The feedstock tanks will require minor new build equipment (i.e. heaters and pumps) which will be installed in the tankfarm
  - Re-use of existing utilities: flare, LPG vessels, wastewater treatment plant (WWTP), roads, buildings and other utilities. These utilities may undergo small modifications to ensure suitability and reliability for this Proposal
  - Re-use of external pipelines: Several pipelines are currently in operation at bp Kwinana which will be utilised for this proposal. This includes the existing pipeline that runs from bp Kwinana to Kewdale terminal and various supply pipelines such was water, nitrogen and natural gas. No modifications are expected for these pipelines.

The site is accessible by an existing external road network including Rockingham Road and Mason Road, which provides access to the northern portion of the site. There is an existing internal road network throughout the site. No changes are proposed to existing access, car parking or movement on site.

Table 1-1 General Proposal content description

Proposal title	bp KRF
Proponent name	bp
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Table 1-2 Proposal Content Elements

Proposal element	Location / description	Maximum extent, capacity or range
Physical elements		
Tanks (existing Tanks – these tanks are already part of the terminal and will be overhauled as per bp's maintenance program)	Figure 1-2	Existing infrastructure approved under existing licence L5938/1967/12. 29 tanks containing raw feed, treated feed, bio-naphtha, sustainable aviation fuel (SAF) and renewable diesel with a combined total tank capacity < 200ML.
Hydrofiner 2 (HYD2) (existing unit that will be revamped for the new proposed activities)		4,000 klpd feed
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Hydrogen Generation Unit (HGU) (new build)		65 TPD Hydrogen
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Cooling tower (new build)		2,572 tph recirculation rate
Existing utilities such as steam and wastewater treatment		Existing Utilities covered under existing licence L5938/1967/12. These utilities are currently operational supporting terminal operations.
Construction elements		
Laydown areas, workshops, crib rooms and carparks	Existing Infrastructure as shown in **Figure 1-2.**	Existing facilities onsite are being used, however several new areas will be developed on existing bp plot. No clearing will occur as part of these activities.
Dewatering		Several sewers, including stormwater drains, will be constructed below ground and dewatering activities may occur. Should this be required after detailed designs have confirmed that groundwater has been reached, and where water abstraction activities cannot be undertaken under the current GWL60605(6) licence, application will be made under the Rights in Water and Irrigation Act 1914. Should dewatering capacity be less than 25,000 KL, dewatering exemption may apply under the RIWI Act.
Operational elements		
Natural gas supply		5,556 kg/hr Natural gas usage will range from 4,897 kg/hr when the facility is maximising SAF production to a maximum of 5,556 kg/hr when maximising renewable diesel production
Water supply		Water will be supplied from the Kwinana Water Reclamation Plant (KWRP) at a rate of 86 tonnes per hour water.

Proposal element	Location / description	Maximum extent, capacity or range
Solid waste		Solid waste will be produced from the BDU as a sludge at a rate of up to 37 tonnes per day. Solid waste will comprise organics such as bentonite, sludge. Given that the solid waste produced is considered organic, bp is planning to reuse the waste stream via either composting or in the waste to energy incinerators via third party operators. The waste is expected to be non-hazardous and not a controlled waste. It is expected that all hydrocarbons will be fermented into biogas in the BDU and therefore the sludge will mainly be bentonite and organics.
Wastewater effluent		An average of 150 kL/day of effluent are expected to be produced from the Proposal and will be treated at the existing wastewater treatment plant. The existing wastewater treatment plant is licensed under the existing Prescribed Premises Part V DWER Licence (L5938/1967/12) for 7.93ML/day therefore has sufficient capacity to treat the Proposal wastewater streams.
Power generation		Internal generation of 2.3 MW from BDU gas engines.
Emissions to air		There are several combustion stacks and flares from the new processing units that will create air emissions. Air quality modelling is progressing, and considered to be well within ambient air quality standards from comparison with the oil refinery modelling. Sulphur Dioxide emissions to air from stack emissions has been estimated to be approximately 150,000 kg/year. Oxides of Nitrogen (NOx) emissions to air from stack emissions has been estimated to be approximately 150,000 kg/year. Minimal dust is expected from construction as the plot is a brownfields site and dust suppression will be managed in the Construction Management plan.
Odour		Odour is expected from the renewable feedstocks storage tanks, PTU and BDU operation. Management of the odour will be via devices such as caustic odour scrubber fitted to the PTU and managerial controls such as ensuring feedstocks are processed in a timely manner. A consultancy has been engaged to undertake a detailed odour assessment for the proposal with reference to *Guideline: Odour Emissions* (DWER, 2019). The odour risk assessment showed that the proposed activities will have low residual impacts regarding odour.
Noise		The noise from the proposal has been modelled and shows predicted noise levels are; • at least 7dB below assigned noise levels at any time of day for the nearest sensitive receptors • below 65 dB(A) for neighbouring industrial premises
Proposal elements with greenhouse gas emissions		
Construction elements:		
10,000 tpa	Scope 1	
Operation elements:		
120,000 tpa	Scope 1	

Proposal element	Location / description	Maximum extent, capacity or range
144,000 tpa	Biogenic CO_2 emissions Biogenic emissions are expected to be reported under *National Greenhouse and Energy Reporting Act* 2007 but separate to Scope 1 emissions (aligned with the reporting requirements of IPCC reporting guidelines for national inventories and practice.	
71,400 tpa	Scope 2 unmitigated GHG emissions	
0 tpa	Scope 2 mitigated GHG emissions	
Rehabilitation		
Upon completion of operations, the site will be remediated and rehabilitated to ensure the premises are left in a safe, stable, and non-polluting condition. This project is at an early stage in its development. A decommissioning & rehabilitation plan will be submitted prior to the cessation of operations. Timeframe for submission of the decommissioning & rehabilitation plan will be further discussed with the EPA.		
Commissioning		
Commissioning of the proposed activities is planned to commence in 3Q 2025. Commissioning plans are still being developed and will include mitigations to reduce environmental impacts (such as flaring and water use). The environmental commissioning plan will be submitted to DWER as part of the DWER Works Approvals application and assessment process under Part V of the EP Act.		
Decommissioning		
Upon completion of operations, the site will be remediated and rehabilitated to ensure the premises are left in a safe, stable, and non-polluting manner. This project is at an early stage and therefore a decommissioning & rehabilitation plan will be submitted prior to cessation of operations. Timeframe for submission of the decommissioning & rehabilitation plan will be further discussed with the EPA.		
Other elements which affect extent of effects on the environment		
Proposal time*	Maximum project life	Design life of 20 years
	Construction phase	18 months
	Operations phase	20 years
	Decommissioning phase	5 years

1.2.1 Biorefinery Process

A schematic of the proposed biorefinery process is shown in Figure 1-3. The biorefinery has been designed in a sustainable manner taking into consideration the re-use of waste as raw feedstocks as further described in Table 1-3.

Table 1-3 Biorefinery process for KRF

Process step	Additional detail
1. Renewable feedstocks (raw and waste fatty oils and greases, such as tallow, used cooking oil (UCO), palm oil mill effluent (POME), and other biowaste products) are sourced domestically or imported.	▪ Transport and storage of feedstocks utilises existing jetties/truck unloading facilities and tankage ▪ Re-use of existing storage tanks ▪ Feedstocks will be subject to bp's supply requirements, including certification of sustainable sourcing ▪ All feedstocks, chemicals and other products required for processing will be subject to bp's stringent safety requirements for storage and handling. Storage and handling will be managed under the proposed bp dangerous goods licence and Major Hazard Facility accreditation. bp has been operating under an existing DG and MHF licence

Process step	Additional detail
	▪ Odour of the renewable feedstock will be managed under odour management plan
2. Feedstocks (raw and waste fatty oils and greases) will be pre-treated to remove impurities (metals, acids and insoluble impurities) in the feedstock to protect the downstream catalyst	▪ Construction of new feed Pre-treatment Unit (PTU) ▪ Possible feedstocks are Used Cooking Oil (UCO), tallow, and palm oil mill effluent (POME). A caustic odour scrubber will be installed to reduce odour impacts ▪ Construction of waste handling facility (Bio-Digester Unit (BDU) and infrastructure) to produce offgas and electricity from PTU waste streams ▪ Waste solids from the BDU – bp is currently investigating alternatives to landfill, including composting and waste-to-heat incinerator technology with external third parties – If no alternatives are identified, waste material would be disposed of by truck at a licensed local landfill facility (landfill class III) in accordance with regulatory requirements. Utilises existing truck loading facilities. A site transport study was performed which determined the average truck movements for this proposal would be 4 trucks per day (average) and up to 9 trucks per day (peak), for feedstocks, consumables, and waste streams. This volume of traffic will not have a significant impact on the local Kwinana industry. – Should reuse of the waste solids onsite be proposed as an alternative, a Works Approval application for this activity will be submitted under Part V of the EP Act as impacts relating to this activity should not trigger EPA environmental factors requiring assessment under Part IV of the Act
3. Feedstock segregation to enable robust management of corrosive species, optimise pre-treatment unit design and maximise the available feedstock pool.	▪ Re-use of existing storage tanks
4. Pre-treated feedstock is processed through hydrofining unit (HYD2) to remove contaminants such as metals, oxygen and saturate.	▪ Re-use of existing hydrofining unit (HYD2) ▪ Fired heater required for startup only due to integration of heat transfer from reaction streams
5. Processed through revamped hydrofining unit (HYD3) to provide isomerization and hydrocracking activity. Produces on-spec Hydrotreated Vegetable Oil (HVO) and Synthetic Paraffinic Kerosene (SPK).	▪ Re-use of existing hydrofining unit (HYD3) ▪ Low NOx burners on fired heater
6. Processed though Product Fractionation Unit (PFU) to separate different product streams (bio-naphtha, jet fuel (bio-SPK fuel / SAF), and diesel (HVO Diesel / Renewable Diesel)) and mixed liquefied petroleum gas (LPG) and offgas, and stabilise if required	▪ Construction of PFU ▪ Re-use of existing storage tanks ▪ LPG and offgas will be utilised on-site as HGU feed
7. Hydrogen generation unit (HGU) uses offgases as the feedstock to produce low carbon renewable hydrogen required for the hydrofining units	▪ Construction of HGU ▪ HGU uses offgases from PFU as feedstock reducing the requirement for natural gas

Process step	Additional detail
8. PFU products are stored in tankage for supply to market (domestic or export)	▪ Transport and storage of PFU products utilises existing jetties/truck unloading facilities and tankage

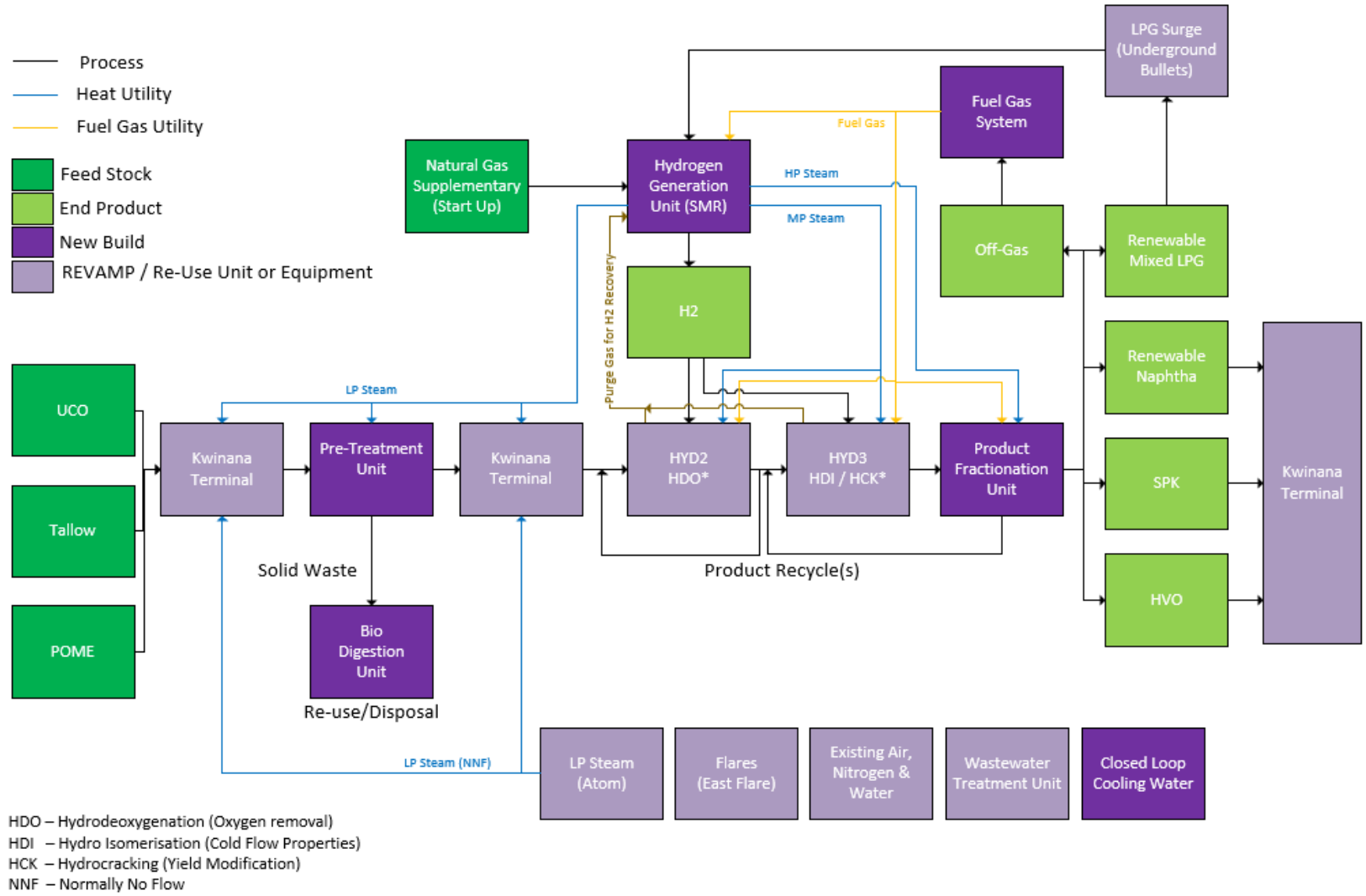

Figure 1-3 Schematic of biorefinery process

1.2.2 Site considerations not forming part of Proposal

For clarity, the following considerations are not included as elements of this Proposal as there are already appropriate approvals and management with regulatory oversight in place.

Decommissioning of Oil Refinery

Decommissioning and rehabilitation of the oil refinery is not an element of this Proposal. Ministerial Statement 161 (MS 161) was issued in 1991 for the 'Feed Flexibility Project – bp Refinery' and Condition 6 still applies as follows:

> *The proponent shall be responsible for decommissioning and removal of the plant and installations and rehabilitating the site and its environs, to the satisfaction of the Environmental Protection Authority. At least six months prior to decommissioning, the proponent shall prepare and subsequently implement a decommissioning and rehabilitation plan to the satisfaction of the Environmental Protection Authority.*

bp submitted the Decommissioning and Rehabilitation plan to EPA services and it was approved in January 2022.

Investigation and remediation of contaminated site

The premises is currently classified as 'contaminated – remediation required' under the *Contaminated Sites Act 2003* (CS Act). Site investigation, monitoring and remediation activities relating to residual contamination issues from historical activities on the premises continue to be managed under the CS Act in consultation with DWER – Contaminated Sites Department and external auditors. Further detail is provided in Table 7-1.

Re-purposing activities

Modification of storage tanks (within PDE) to accommodate Proposal requirements will be undertaken as part of routine maintenance of existing infrastructure. The tanks are routinely overhauled as part of scheduled maintenance to maintain their safe operation.

No changes in the approved infrastructure capacities and manufacturer's specifications are being proposed. The tanks are currently listed and operating under the DWER Part V Prescribed Premises Licence L5938/1967/12.

Wastewater Treatment

bp wastewater treatment infrastructure is currently approved to operate under Prescribed Premises Licence L5938/1967/12. Discharge of treated wastewater to the marine environment is permitted under L5938/1967/12 subject to quality and quantity thresholds.

Refer to Section 1.4.5 for further information.

1.3 Proposal Alternatives

1.3.1 Need for the Proposal

bp's Kwinana site has been in operation since 1955 and is considered a vital strategic asset for WA as it supplies a substantial volume of WA's fuel requirements and is a major employer in Perth's south metropolitan area (Government of WA, 2016). This economic value to the State is recognised by a State Agreement, the *Oil Refinery (Kwinana) Agreement 1952* (further information on the State Agreement is provided in Section 2.1.3). The site ceased operation as an oil refinery in 2021, when it commenced operations as an import terminal to ensure continuity of fuel supply for WA (Government of WA, 2020). In consultation with the State government, bp's long-term vision for the site is for an energy hub, where the

current import terminal operations would be integrated with plans including renewable fuel (this Proposal) and green hydrogen (H2Kwinana).

The Proposal would meet the following needs:

- Satisfy requirements of the *Oil Refinery (Kwinana) Agreement 1952* and associated variations, including Local Participation Plan requirements
- Continue bp's long-standing history of safe and reliable supply of fuel and energy products to the WA community
- Provide local jobs and opportunities, both directly during construction and operation and indirectly through supporting the Australian and global agri-energy sector and other feedstock development
- Support bp's commitment to renewables and global strategy to be net zero by 2050
- Position the proposed biorefinery as the first producer of renewable diesel and sustainable aviation fuel in Australia and the first producer for bp
- Produce lower carbon fuel products to support decarbonisation of hard-to-abate sectors including mining and aviation industries

H2Kwinana

The Proposal is also the potential foundation offtake for a proposed green hydrogen production facility, H2Kwinana (H2K), which is currently being developed by bp with WA government and Australian government support (to the value of $70M). The H2K project would provide green hydrogen generation as an energy source to decarbonise bp's site operations (including the Proposal) as well as producing green hydrogen to support decarbonisation of the Kwinana industrial area and for export and domestic distribution.

H2K is in the early stages of development and will be referred to the EPA after further development of the concept. H2K is not considered further within this supporting document.

1.3.2 Proposal siting

The Proposal has been developed specifically to maximise reuse of existing onsite infrastructure. Transitioning the site to an integrated energy hub and biorefinery offers social, economic and environmental opportunities not available at other locations, including:

- Brownfields status of site represents a significantly lessened environmental impact (when compared with a greenfields site)
- Utilising existing infrastructure from previous and current operations including:
  - Existing external pipeline from bp Kwinana site to the Kewdale terminal for aviation fuel supply
  - Existing operational site infrastructure (e.g. jetties, supply pipelines, repurposed tankage, WWTP, amenities and utilities)
  - Mothballed oil refinery infrastructure which can be repurposed for the Proposal
- Location within the KIA:
  - Well-buffered and appropriately zoned land
  - Serviced by major transport links, including port, freight and heavy rail
  - Recruitment of workforce from surrounding residential areas. It is anticipated that several hundred people will be employed in addition to the existing workforce
  - Industrial synergies with neighbouring heavy and secondary industry
- Existing stakeholder relationships, which are supportive of the integrated energy hub:
  - bp has received letters of support for the Proposal from the WA Deputy Premier, and a joint media release was made by the Premier and Deputy Premier welcoming the project's progression to FEED (front end engineering and design) phase

- No concerns have been expressed during stakeholder engagement for the Proposal
- The long-standing history of safe and reliable supply of fuel and energy products is acknowledged

For the reasons outlined above, bp has not investigated other potential sites for the biorefinery.

1.4 Regional Context

The bp Kwinana site is located in the south of WA, approximately 30 kilometres (km) south-southwest of the Perth CBD in the City of Kwinana. The site is located within the KIA and is surrounded by industry as shown in Figure 1-4, including:

- South boundary: CSBP's chemical and fertiliser manufacturing facility
- East boundary: Water Corporation's Kwinana Water Reclamation Plant (KWRP), and Covalent Lithium's lithium manufacturing facility (currently under construction)
- North boundary: Fremantle Ports Kwinana Bulk Terminal, and Adbri and Cockburn Cement Limited's cement production facility (expected to be commissioned mid-2023)

The Kwinana site is bounded to the west by the Cockburn Sound beachfront. To the east lies Bush Forever site No. 349 "Leda and Adjacent Bushland, Leda" which runs from Thomas Road south to Millar Road, and includes the Leda Nature Reserve. This one-kilometre well-vegetated dune corridor buffers the residential area of Medina from the industrial activity of the KIA.

Figure 1-4 Local and regional context

1.4.1 Climate

Kwinana has a temperate, Mediterranean climate characterised by hot, dry summers and mild, wet winters. Summer generally lasts from December to late-March, with February typically the hottest month. Kwinana receives an average annual rainfall of 618 mm, with the majority of rainfall received during June and July (see Table 1-4 and Figure 1-5). The last few decades show a trend of declining rainfall in the southwest (DEC, 2007). Climate data from the nearest open Bureau of Meteorology (BoM) station, Garden Island HSF (BoM Site No. 009256; longitude: 115.68 °E, latitude: 32.24 °S) is presented in Table 1-4 and Figure 1-5.

Table 1-4 Mean monthly climate statistics for BoM station Garden Island HSF from 2001 to 2022 (BoM, 2023)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum temperature (°C)	27.4	28.3 *max*	27.0	23.9	21.4	19.1	17.9 *min*	18.1	19.0	20.9	23.7	25.7	22.7
Mean minimum temperature (°C)	19.0	19.4 *max*	18.4	16.1	13.8	12.2	11.3	11.2 *min*	11.9	13.6	15.6	17.4	15.0
Mean rainfall (mm)	13.5	16.3	16.6	36.8	76.4	112.9	125.4 *max*	96.3	63.2	29.0	20.8	9.6 *min*	617.7

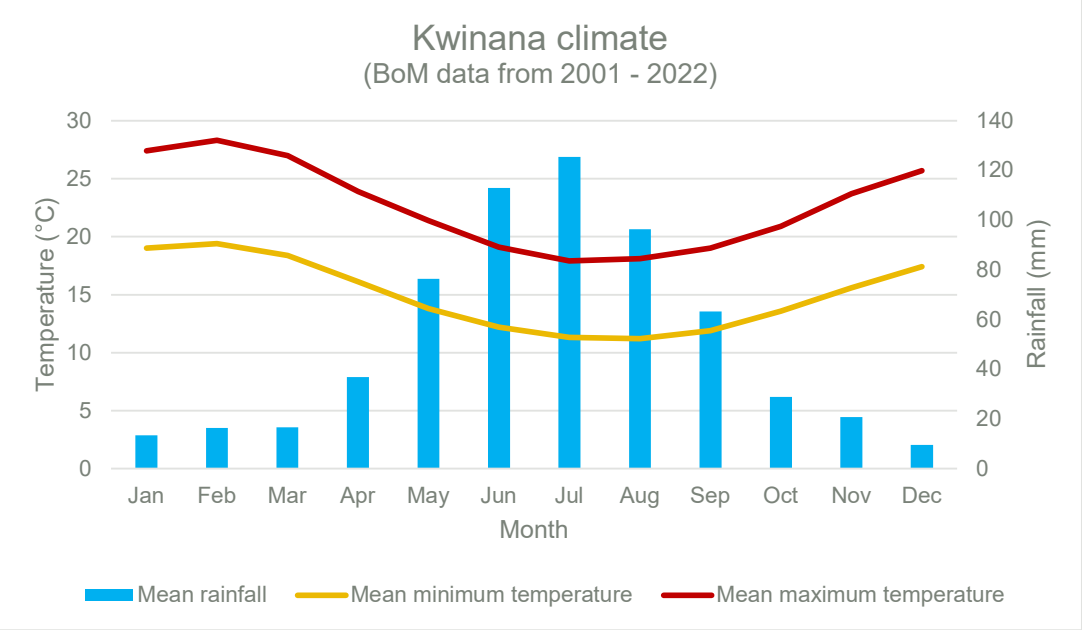

Figure 1-5 Mean temperature and rainfall for Kwinana (BoM, 2023)

The coastline has a diurnal sea breeze system, driven by the difference in air temperature over land and water. An easterly land breeze (offshore flow) prevails over the evening and early morning, shifting to a south to south-westerly sea breeze moving inland (onshore flow) over late morning to early afternoon (Masselink & Pattiaratchi, 2001). Sea breeze activity is stronger and more frequent over the summer.

The Cockburn Sound coastline has a variable wave climate due to the sheltering effect of Garden Island and outer reefs. Nearshore and foreshore processes are heavily influenced by local wind-generated waves; westerly to north-westerly storm waves are predominant in winter and southerly to south-westerly sea breezes are predominant in summer (Masselink & Pattiaratchi, 2001).

1.4.2 Landform, geology and soils

The PDE is in the Coastal Belt geomorphological unit of the Swan Coastal Plain geomorphological province in the Quindalup Dunes system (DoW, 2007) over the Rockingham – Becher Plain (City of Rockingham, 2015). The Quindalup Dunes consist of windblown lime and quartz beach sand which forms multiple dunes and sand ridges that are generally oriented parallel to the coastline (DoW, 2007). The Quindalup Dunes are underlain by the Safety Bay Sand formation, characterised by white medium-grained calcareous soils overlying limestone at a relatively shallow depth.

The geological profile is typical of coastal deposits in the area and consists of Safety Bay Sands over the Tamala Limestone, which together form a regional superficial aquifer (Section 1.4.4).

1.4.3 Topography

The PDE has a generally flat landform, with surface elevation varying between 2 and 6 m AHD (DPIRD, 2019). It has been mostly cleared of vegetation except a coastal strip.

1.4.4 Hydrogeology and groundwater

The PDE is located within the Murray River Basin and Cockburn/Kwinana Coastal Sub-catchment and within the Wellard subarea of the Cockburn Groundwater Area (CGA). The CGA was proclaimed under s. 26B(1) of the RIWI Act and a licence is required for the abstraction or use of groundwater. Use of groundwater resources in the CGA are guided by the non-statutory *Cockburn groundwater allocation plan* (DWER, 2021b).

bp holds an abstraction licence, GWL60605(6), under section 5C of the RIWI Act. The licence entitles bp to abstract up to 486,000 kL annually[1] for industrial processing purposes as well as for irrigation of up to 4.2 ha of lawns and gardens. Water restrictions apply to irrigation purposes so that established lawns and gardens are not watered during winter or between 9 am and 6 pm. Groundwater abstraction is in accordance with an operating strategy and subject to groundwater monitoring. The licence expires 21 August 2030.

Depth to groundwater in the PDE varies from 2.5 to 3.0 m Standing Water Level (SWL). An unconfined superficial aquifer overlies two freshwater confined aquifers, the Leederville aquifer and the deeper Yarragadee aquifer, as described in Table 1-5. Groundwater flows mainly in a westerly direction to discharge offshore (DoW, 2006). Some discharge also occurs to the overlying aquifers where confining layers are absent. The water table ranges from 0.3 m to 2.0 m AHD and has been recorded at depths of between 3 m and 5 m below the finished grade of the refinery (bp, 1997). Maximum water table levels are usually observed in August/September, and the lowest level typically recorded in March/April (bp, 1997).

Past reports of groundwater quality over the refinery area indicated it was ‘fresh’, with water immediately above the sands/gravel characterised by a distinct putrid odour and sweet taste (bp, 1997). Groundwater below the superficial aquifer was also typically fresh, with increasing saltiness as the distance to the coast decreased and depth increased. Deep coastal wells indicated the transition from fresh to salt water was sudden, over a depth range of 3m (bp, 1997).

[1] annual water year defined as 1 March to 28 February

Table 1-5 Aquifers of the Wellard subarea

Aquifer	Primary Usage	Hydrogeology
Wellard superficial aquifer (confined east of coast, unconfined where it intersects with the water table, locally open to the sea)	Industrial supply and recreational purposes	The superficial aquifer under the PDE consists mainly of Safety Bay Sand and Tamala limestone (leached sand and calcarenite) (DoW, 2007). These aquifers have varying hydraulic behaviour, with Tamala Limestone aquifer the more permeable of the two. Its transmissivity is typically higher as a result. Estimated velocity values are 270-565 m/year and 15-73 m/year for Tamala Limestone and Safety Bay Sand respectively (bp, 1997). The Tamala Limestone aquifer has a higher hydraulic conductivity as it is open to the sea in comparison to the Safety Bay Sand aquifer, which is higher in head as a result of surface recharge and low conductivity (bp, 1997). When the two aquifers are in hydraulic contact, changes in water table topography can occur. Representative analysis of both aquifers identified groundwater salinity of 600-860 mg/L total dissolved solids (TDS) for the Tamala Limestone aquifer and 830 mg/L for the Safety Bay Sand aquifer respectively (bp, 1997). The average saturated thickness of these sediments is around 20 m. Depth to groundwater under PDE was reported as 2 – 5 m in the early 1990s (bp, 1991); however water levels near the coast have shown a 0.5 m – 1 m decline at the coast over the last 30 years in response to decreased rainfall and ongoing water use (DWER, 2021b). The superficial aquifer is recharged mostly by rainfall infiltration and discharges into wetlands, the ocean, and by downward leakage into the Leederville aquifer, with a saltwater interface along the coast.
Leederville aquifer (confined)	Industrial supply	The Leederville aquifer consists of interbedded sandstone and shale. The Leederville aquifer is overlain by shale beds of the Osborne Formation throughout most of the Perth region and this acts as a confining layer (DoW, 2006). Where the Osborne Formation is absent, the aquifer is confined by the Kardinya Shale and Henley Sandstone members (DoW, 2007). The top of the aquifer (the Pinjar Member) may occur at 25 to 50 m below ground level with a thickness of about 200 m (DoW, 2007); however the whole aquifer may be found at depths greater than 200 m and has a maximum thickness of about 500 metres (DoW, 2006). The aquifer is recharged by downward leakage from the superficial aquifer along the central and eastern margins of the Swan Coastal Plain (outside of the Cockburn Groundwater Area) (DoW, 2007) where the Osborne Formation is absent. Groundwater discharges into the ocean some distance offshore (DoW, 2006) and also discharges upwards to the superficial aquifer in areas where the Osborne Formation is absent (DoW, 2007). Groundwater salinity is generally less than 3,000 mg/L TDS and is 500 – 2,000 mg/L in the upper Leederville. The aquifer is considered significantly poorer in comparison to overlying formations. It has a 'leaky' hydraulic basement, and conductivity was previously recorded in the area as less than or equal to 10m/day (bp, 1997).
Yarragadee aquifer (confined)	Industrial supply	The Yarragadee aquifer is confined beneath the South Perth Shale at depths of around 450 m below existing ground level. This depth increases towards the east **(DoW, 2007).** The aquifer consists of sandstones, siltstones and shale and is estimated as more than 2,000 m in thickness. Recharge occurs along the eastern margin of the Swan Coastal Plain (outside of the Cockburn Groundwater Area) and by downward leakage from the Leederville aquifer where the South Perth Shale is absent (DoW, 2007). The aquifer discharges offshore. Groundwater salinity is around 1,000–2,000 mg/L TDS.

The Safety Bay Sand aquifer is at water table level and is therefore most susceptible to contamination from above ground activities (bp, 1997). There is known groundwater contamination on site (see Table 7-1).

Industrial water use

The Water Corporation has several assets within the Western Trade Coast (WTC) area (see Section 1.4.7), including three WWTPs, a seawater desalination plant, and the Kwinana Water Reclamation Plant, which is co-located at the bp Kwinana site (Oughton, Anda, Kurup, & Ho, 2021). The KWRP converts a large volume of treated wastewater from the Woodman Point WWTP into water suitable for industrial processes (Kwinana Industries Council, 2023). KWRP water is currently used at the bp Kwinana Energy Hub for process operations and is planned as the water source for this project.

Industrial processes require large volumes of water either in the process itself, for the generation of electricity via steam, or for use through cooling towers. In Kwinana, the bulk of industrial process water is groundwater; extraction volumes are managed and capped by DWER and no new licences will be issued in the industrial core. The remaining water requirement is met by recycled wastewater, and some from Scheme (potable) water supplies.

1.4.5 Surface water and wetlands

There are no natural surface water courses or wetlands in the PDE. The porous nature of the sandy soils, where exposed, provides for rapid infiltration of rainwater, hence surface water runoff and pooling are minimal. The nearest wetland to the Proposal is sumpland (a seasonally inundated basin) located 1.9 km southeast of the KRF and 1.3 km east of the PDE. This sumpland is managed for “resource enhancement”, a categorisation for wetlands that have been partially modified and still support substantial ecological attributes and functions, with the management objective to protect, restore and improve its conservation value.

Within the bp Kwinana Energy Hub, the existing process areas are hardstand with runoff collected in the oily water sewers and directed to bp’s WWTP for treatment. The tankfarm is located in an area enclosed by earthen bunds (built to standards of the time in 1955). Treated wastewater is disposed of in accordance with Prescribed Premises Licence L5938/1967/12 via the Water Corporation’s Sepia Depression Ocean Outlet Landline (SDOOL), which discharges beyond Port Peron. Point Peron is approximately 8 km southwest of the KRF footprint. The outlet pipeline itself extends approximately 4 km from shore, discharging wastewater into the Sepia Depression. If discharge via SDOOL is unavailable, bp’s Cockburn Sound outfall discharge point may be used. Under existing operating wastewater treatment guidelines, any treated water that is off specification is retained in adjacent polishing ponds and reprocessed through the WWTP before discharge.

1.4.6 Marine environment

Cockburn Sound

Cockburn Sound is one of the most extensively used marine areas in WA and is a significant economic, environmental and social asset for the State. Cockburn Sound is sheltered from ocean swells by Garden Island, and the sheltered waters support recreational and commercial fishing and aquaculture, as well as extensive port facilities, a naval base, and marine maintenance shipyards. The extensive seagrass areas provide important nursery and spawning areas for fish (BMT, 2018). The hinterland of Cockburn Sound is home to varied (and sometimes competing) land uses including urban, rural, industrial, defence and environmental conservation.

The Cockburn Sound marine ecosystem has been heavily modified relative to pre-European development and the subsequent industrial discharges, contaminated land and groundwater inputs, coastal modifications and fishing pressures. Concerns were raised regarding the environmental heath of Cockburn Sound in the 1970s over the widespread loss of seagrass. Studies identified a deterioration in water quality attributable to industrial and municipal wastewater discharges and the industry responded by reducing contaminant and nutrient discharges, notably nitrogen. The improvement in water quality was short-lived as by the late 1980s

water quality had declined again, this time due to nitrogen-laden groundwater. Contaminated groundwater flows remain the main source of human-induced nutrient loads to Cockburn Sound and some 80% of the original seagrass extent has been lost (BMT, 2018).

Cockburn Sound requires careful environmental management and planning by all users, including industry, State Government and the community. As such, the Cockburn Sound Management Council (CSMC) was established in 2000 to coordinate environmental management and planning of Cockburn Sound and its catchment area to ensure a healthy marine ecosystem so that the economic, environmental and social values are balanced. The CSMC reports to the Minister for Environment and includes stakeholders from government, industry (including the KIC) and the community. In parallel to the formation of the CSMC, the EPA commenced drafting an Environmental Protection Policy (EPP) for Cockburn Sound (later revised as the *State Environmental (Cockburn Sound) Policy 2015* (Cockburn Sound SEP)) which provides a management framework that outlines environmental values, objectives and criteria for environmental impact assessment (EIA) of new projects and ongoing regulation of project-specific emissions, monitoring, management and offset conditions (BMT, 2018).

It is unlikely that Cockburn Sound will ever return to pre-European conditions; however, implementation of the management framework has resulted in improvements in water quality and habitat condition, stabilisation of seagrass loss, and improved understanding of hydrodynamics and coastal processes.

Present-day pressures acting on Cockburn Sound include (BMT, 2018):

- Contaminated land and groundwater inputs, including nutrient loading and other toxicants
- Marine vessel activities, including invasive marine species, biofouling controls and spills
- Commercial and recreational fishing
- Climate change, including effects associated with elevated water temperatures, sea level rise, reduced rainfall and more frequent extreme weather
- Cumulative impacts associated with future port, marina and industrial developments along the mainland coast

As per the existing MHF licence with DMIRS and adherence to EP Act, spills are managed through existing site procedures.

Sepia Depression

The Sepia Depression is a natural channel approximately 5 km wide and 20 m deep, running parallel to the shore and bounded by reef lines to the east and west (BMT Oceanica, 2014). The Sepia Depression is separated from Cockburn Sound by Garden Island, with the southern opening of Cockburn Sound providing a channel between the two. Offshore reefs and the Five Fathom Bank reef line attenuate the ocean swell to some extent, however the Sepia Depression has relatively high wave energy compared to most inshore waters near Perth. This higher wave energy limits the accumulation of detritus or fine, nutrient-rich sediments, and as a result the Sepia Depression has low biomass and species diversity.

Use of the SDOOL to dispose of up to 30 megalitres per day (ML/day) of industrial wastewater into the Sepia Depression was approved by the Minister for Environment under Ministerial Statement 665 (MS 665) in 2004. (Principal responsibility for compliance with MS 665 rests with Water Corporation). The *Sepia Depression Ocean Outlet Monitoring and Management Plan* (BMT Oceanica, 2014) addresses the requirements for monitoring and management of the SDOOL in accordance with MS 665, including remedial actions should water quality exceed identified standards.

1.4.7 Land use and industry groups

The PDE is zoned industrial under the Metropolitan Region Scheme (MRS) and is surrounded by industrial zoned land to the north, east and south (Figure 1-4). The site is a brownfields site, having operated as an oil refinery from 1955 to 2021. Current operations include an import terminal with utilities such as a steam generation area and WWTP.

Kwinana Industrial Area (KIA)

The Proposal is located within the KIA which covers an area approximately 8 km north-south and 2 km east-west on the eastern side of the Cockburn Sound. The KIA began with the bp Kwinana oil refinery in 1955 and became home to heavy industry including petroleum and minerals refineries, power stations, chemical plants and cement works with the associated industrial deep-water bulk materials port. The heavy industries are supported by a belt of secondary supporting industries which provide the fabrication, construction, engineering and maintenance requirements (Kwinana Industries Council, 2023). Many of the KIA industries are recognised as industry leaders in environmental management and environmental performance.

The KIA is noted by the Kwinana Industries Council (KIC) as being a world class example of the benefits of industrial-scale clustering with over 150 product, by-product and utility exchanges occurring. The benefits of clustering include:

- Industrial symbiosis (simultaneous and continuous exchanges between industries), offering increased options for local re-use and recycling of materials and by-products
- Attracting supportive secondary industries and skilled workers to the cluster
- Long-term strategic planning
- Garnering government support through provision of appropriately zoned and buffered land, efficient and scalable transport and pipeline corridors, utility provision to promote growth, and efficient, sensible and transparent development planning and industry regulation

Kwinana Industries Council (KIC)

The Kwinana Industries Council (KIC) is a not-for-profit incorporated business association with membership drawn from the major industries and businesses in the KIA. The KIC was incorporated in 1991 with the aim of promoting high standards of business ethics and practices, facilitating access to Kwinana industries, and liaising with stakeholders in relation to the environment, public health, safety and industrial development for the protection of Members' interests. The KIC also determines and collates data relating to environmental emissions as a result of industry activity. The KIC's industry promotion assists with garnering government support to remove bottlenecks in regulatory and land use planning.

The majority of the work carried out by KIC transpires in its specialist committees. Among these is the KIC Environment Committee, which provides technical information and advice based on rigorous scientific research, facilitates continual industry improvement in environmental management, and engages with stakeholders to achieve cooperative outcome-based approaches to environment and planning regulation.

bp has been a Full Member of the KIC since its inception and played a key role in its formation.

Western Trade Coast (WTC) Strategic Industrial Area

The KIA and its neighbouring industrial estates of the Rockingham Industry Zone, Latitude 32, and Australian Marine Complex are collectively known as the WTC Strategic Industrial Area (SIA) (Figure 1-6). The WTC is WA's premier heavy industrial area and has been developed to ensure strategically important industry has access to serviced, well-buffered and appropriately zoned land within the Perth metropolitan area. The WTC is located just 30 minutes south from Perth's CBD and is well-served by major transport links, including deep-water bulk port facilities, high-wide and dangerous goods freight routes, and heavy rail. Approximately two thirds of the workers employed within the WTC live within 15 km of the WTC. The WTC is surrounded by a buffer zone that protects the WTC from residential land encroachment and ensures residents of the suburbs of Rockingham, Kwinana and Cockburn are not adversely impacted by health and amenity issues that can be attributed to industrial emissions.

Its designation as a SIA means that a certain set of rules and protections apply, including what industry types are permitted, so that the strategic significance of the area for the State is maintained. SIAs are administered by the Department of Jobs, Tourism, Science, and Innovation (DJTSI) and DevelopmentWA (DevWA). When an industrial area is identified by SIA status it is then afforded protection under either of two high level Statutory Planning tools.

Global Advanced Industries Hub Ministerial Taskforce

bp is also part of the Global Advanced Industries Hub Ministerial Taskforce Industry Reference Group. The Ministerial Taskforce was established in 2021 to support transformation of the WTC into a global advanced industries hub to increase WA's economic resilience and growth. It is chaired by the Deputy Premier and Minister for State Development, Jobs and Trade, Hydrogen Industry, Tourism and Science, the Hon. Roger Cook MLA, and brings together representatives from across local and State government, industry, the Australian Manufacturing Workers' Union, and local Aboriginal representatives.

The Ministerial Taskforce will oversee the development of an economic framework for the hub with a focus on industry development, attraction and diversification; coordinated land and infrastructure, and skills and workforce development, among other opportunities.

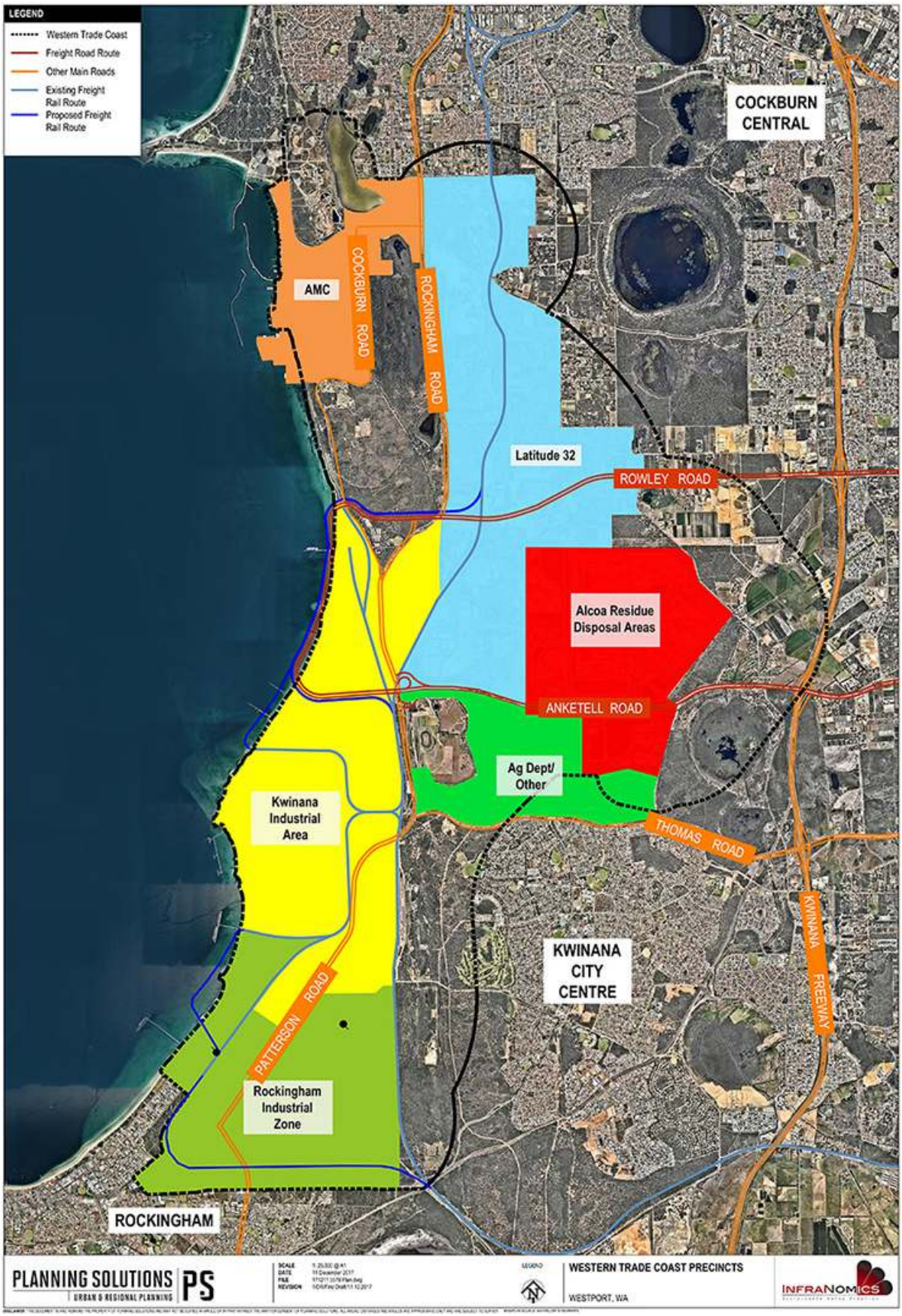

Figure 1-6 Industrial precincts within the Western Trade Coast (https://kic.org.au/wp-content/uploads/2019/11/KIC-Westport-Existing-Precincts-Map.jpg)

1.4.8 Sensitive receptors

The nearest sensitive receptors to the Proposal are detailed in Table 1-6 and shown in Figure 1-7. Of these, the nearest is Wells Park, a large public foreshore park with a playground and amenities, approximately 2.2 km south of KRF. The adjacent beach (Kwinana Beach) is the only designated swimming beach in the Town of Kwinana and features the wreck of the S.S. Kwinana and a short jetty and boat ramp. Both Wells Park and the S.S. Kwinana wreck are heritage listed (non-statutory) by the City of Kwinana. The nearest residential receptor to KRF is in Medina, approximately 3 km east of the KRF footprint and separated from the KIA by a vegetation buffer (Figure 1-7).

Table 1-6 Nearest sensitive receivers to the Proposal

Receptor		Proximity to Proposal	
Name	**Type**	**KRF**	**PDE**
Wells Park	Recreation & heritage	2.2 km south of KRF	0.9 km south of PDE
Perth Motorplex	Recreation	2.2 km northeast of KRF	1.4 km northeast of PDE
Thomas Oval	Recreation	2.5 km east southeast of KRF	1.7 southeast of PDE
Nearest residence (Medina)	Residential	3 km east of KRF	2.5 km east of PDE
Kwinana Golf Course	Recreation	3.2 km southeast of KRF	2.5 km southeast of PDE
Colour Me In Family Daycare	Childcare	3.3 km east of KRF	2.5 km east of PDE
Medina Primary School	School	3.5 km east southeast of KRF	3 km east of PDE
Kwinana town centre	Commercial	4.6 km southeast of KRF	4 km southeast of PDE
Leda Nature Reserve	Recreation	5.4 km southeast of KRF	4.5 km southeast of PDE

All of the sensitive receptors identified in Table 1-6 are at least 2 km from the KRF footprint. This aligns with the *Separation Distances between Industrial and Sensitive Land Uses* (EPA, 2005) which stipulates a 2.0 km separation distance for premises under Category 34: Oil or Gas Refining. This category was applied as it is conservative and discussions with DWER will be required to understand what prescribed premise the biofinery will be licenced as. This generic separation distance is based on the experience of the Department of Environment (now the Department of Water and Environmental Regulation (DWER) and other regulatory authorities to protect sensitive land uses from unacceptable impacts on amenity from industrial activities, emissions, and infrastructure. Impacts associated with oil refineries considered by the guidance includes gaseous and particulate emissions, noise, odour, and risk (accidental injury).

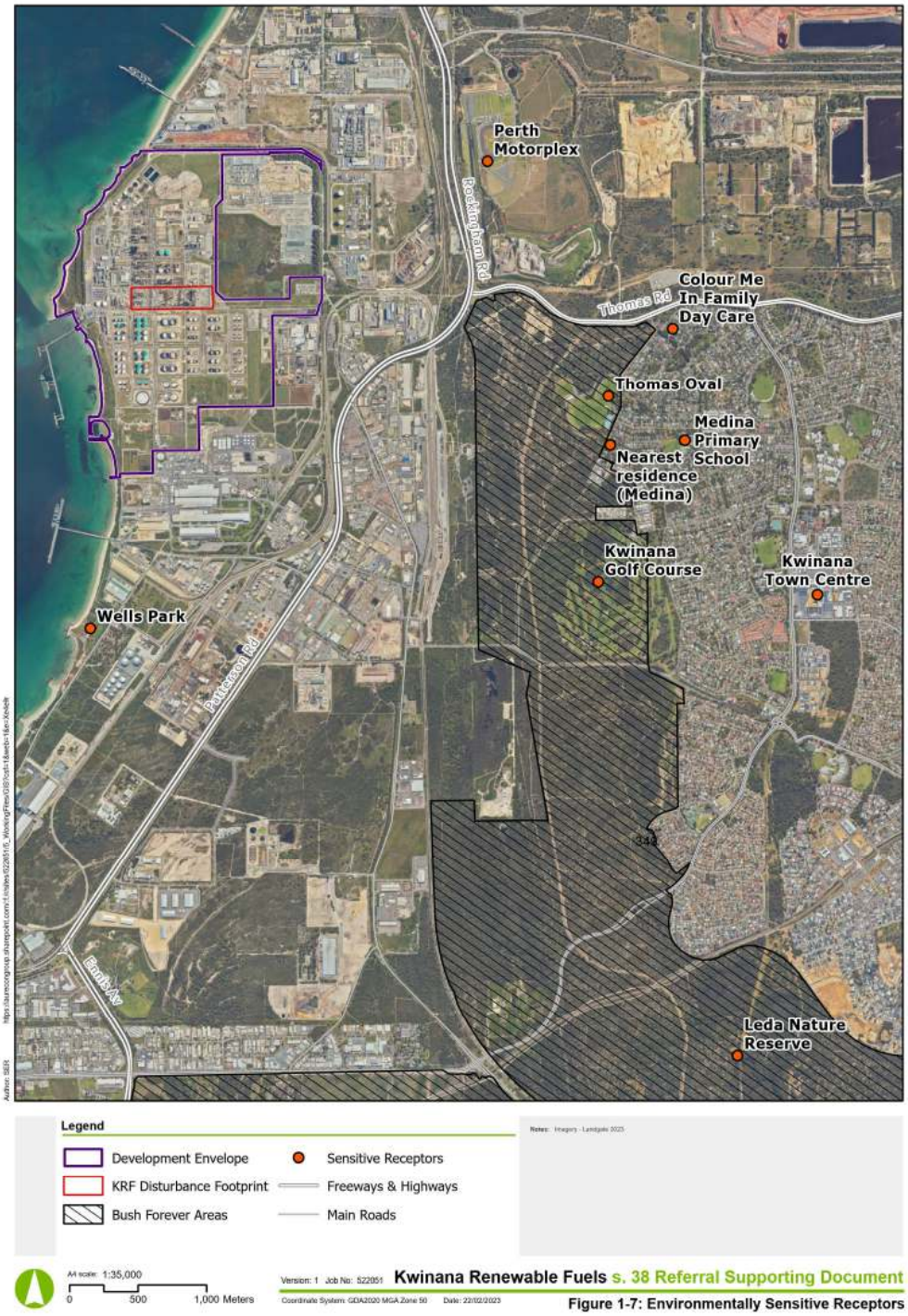

Figure 1-7 Sensitive receptors

1.4.9 Heritage

Aboriginal heritage

A search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal Heritage Inquiry System (AHIS) (DPLH, 2023) on 26 January 2023 showed no Aboriginal heritage places within the KRF footprint or the PDE. The nearest registered site (assessed as meeting the legislated criteria for an Aboriginal heritage site) is Thomas Oval, approximately 2.5 km east southeast of the KRF footprint and 1.7 km southeast of the PDE (Table 1-7).

It should be noted that Aboriginal heritage in WA is currently managed under the *Aboriginal Heritage Act 1972* (AH Act), under the transitional provisions of the *Aboriginal Cultural Heritage Act 2021* (ACH Act). It is scheduled to be repealed and replaced by the ACH Act in mid-2023. An extensive co-design process is currently underway to prepare for implementation of the ACH Act.

bp and its contracting partners have established processes to meet its obligations under the *Aboriginal Heritage Act* for site operations and all transition activities (including this Proposal). bp has received guidance from the Department of Planning, Lands and Heritage in relation to the Gnaala Karla Booja Indigenous Land Use Agreement and has sought to, and will continue to seek to, connect with the relevant Corporations. bp has discussed its site transition, including the proposal, with a Board member of the Gnaala Karla Booja Aboriginal Corporation and with Kwinana elders at the Medina Aboriginal Cultural Centre. bp remains committed to developing and maintaining its relationship with the Corporation and members of the local Aboriginal community in relation to its site use and in support of executing its Reconciliation Action Plan. Due to the brownfields use of the site and legacy operations, a cultural survey is not planned. This was endorsed by the Board member, noting the site's current and long running operational history and the extent of industrial development, including the existing facilities in place where this development is planned.

Table 1-7 Nearest Aboriginal heritage sites to the Proposal

Place ID	Name	Status [Note 1]	Type	Proximity to Proposal	
				KRF	PDE
3710	THOMAS OVAL	Registered Site	Camp	2.5 km east southeast of KRF	1.7 southeast of PDE
3776	INDIAN OCEAN	Stored Data / Not a Site	Mythological	380 m southwest of KRF	Overlaps western boundary of PDE
4148	NATGAS 127	Stored Data / Not a Site	Artefacts / Scatter	2.1 km east of KRF	1.3 km east of PDE
3698	CHALK HILL CAMPS	Stored Data / Not a Site	Camp	2.5 km southeast of KRF	1.7 km southeast of PDE
3690	MANDURAH ROAD TREES	Stored Data / Not a Site	Camp, Other: TREES	2.9 km south southeast of KRF	2 km south southeast of PDE
3689	EAST ROCKINGHAM CEMETERY	Stored Data / Not a Site	Skeletal Material / Burial	3.1 km south southeast of KRF	2.3 km south southeast of PDE

[Note 1]: As required under s. 38 of the AH Act, the DPLH maintains a Register of Aboriginal Sites for recording all areas, materials and sites to which the AH Act applies. The status of each heritage place is assessed by the Aboriginal Cultural Materials Committee (ACMC) against the criteria of s. 5 of the AH Act which defines what constitutes an Aboriginal site. 'Registered Sites' meet the criteria, 'Lodged Places' are yet to be formally assessed, and 'Stored Data' are places that do not meet the criteria.

Other heritage

There are no World, National or Commonwealth heritage places within 2 km of the PDE. The nearest State heritage area is the "Kwinana Signal Box" of the Kwinana Railway marshalling Yards (Place Number: 3112) located approximately 800 m and 1.6 km east-southeast of the PDE and KRF respectively.

The nearest local heritage areas are Wells Park (Place Number: 12101) and the wreck of the S.S. Kwinana (Place Number: 12109), approximately 0.9 km and 2.2 km south of the PDE and KRF respectively. Both areas are heritage listed by the City of Kwinana on its local heritage survey (LHS) (formerly known as local

heritage inventories or municipal inventories). The LHS identifies local heritage values but has no statutory role.

1.4.10 Biodiversity

The nearest Department of Biodiversity, Conservation and Attraction's (DBCA) legislated land/water is the Leda Nature Reserve located 5.4 km southeast of the KRF footprint and 4.5 km southeast of the PDE. The reserve is also listed on the City of Kwinana's LHS (Place Number: 4468). Leda Nature Reserve gazetted as an 'A' class reserve for the conservation of flora and fauna, notably the Tuart, Jarrah/Banksia woodlands and wetland communities and fauna including Quenda, Western Brush Wallaby and Echidna.

The nearest Bush Forever site is 'Leda and Adjacent Bushland' (Bush Forever site No. 349). The site is part of a regionally contiguous bushland / wetland linkage. Its landforms include open water, vegetated wetland, vegetated uplands and dune crest.

2 Legislative Context

2.1 Environmental Impact Assessment Process

Environmental impact assessment (EIA) in WA is conducted under the EP Act for matters within the WA jurisdiction and under the EPBC Act for 'matters of national environmental significance' (MNES).

2.1.1 Environmental Protection Act 1986

The EP Act is the primary environmental legislation in WA. The EP Act provides for the prevention, control and abatement of pollution and environmental harm and for the conservation, protection, enhancement and management of the environment. The EP Act also establishes the EPA, outlines the responsibilities and functions of the EPA and the WA Minister for Environment, provides for pollution control, licensing and enforcement, and specifies procedures for the EIA of proposals as well as the appeals process.

Part IV of the EP Act provides for the consideration and assessment of proposals that may, or will, have a significant impact on the environment. The Part IV process is administered by EPA Services Unit of DWER. The EPA is required to have regard to the principles of the EP Act (see Section 4) when assessing and reporting on proposals referred under the EP Act. The EPA has prepared administrative procedures in relation to EIA under Part IV, the *EIA (Part IV Divisions 1 and 2) Administrative Procedures 2021* (EPA, 2021a), and provides more detailed guidance on the EIA process and procedures in *EIA (Part IV Divisions 1 and 2) Procedures Manual: Requirements under the EP Act* (EPA, 2021b).

The EPA has also developed a series of instructions, forms and templates designed to streamline the EIA process and to provide advice related to specific steps in the process. This Referral Supporting Document has been prepared in accordance with the following guidance:

- Instructions: Referral of a proposal under section 38 of the Environmental Protection Act 1986 (EPA, 2021e)
- Instruction and template: How to identify the Content of a Proposal (EPA, 2021c)
- Instructions: How to prepare an Environmental Review Document (EPA, 2021d)
- Statement of Environmental Principles, Factors and Objectives (EPA, 2021f)

This Referral Supporting Document has been prepared with the intent of providing the EPA with sufficient information regarding the potential environmental impacts to enable EIA of the Proposal.

Additional applications of the EP Act to the Proposal are discussed in Section 2.1.2.

No clearing of native vegetation will occur as part of this proposal.

2.1.2 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Australian Government's principal environmental legislation. It provides a legal framework for the Commonwealth to protect and manage 'matters of national environmental significance' (MNES) and for States /Territories to have responsibility for matters of state and local significance. There are currently nine MNES:

- World heritage properties
- National heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Nationally threatened species and ecological communities
- Migratory species (protected under international agreements)
- Great Barrier Reef Marine Park

- Nuclear actions (including uranium mining)
- Commonwealth marine areas
- Water resources in relation to coal seam gas development and large coal mining development

Any proposal that is likely to have a significant impact on MNES or the environment of Commonwealth land must be referred to the Minister for the Environment and Water for determination as to whether the action requires formal assessment and approval as a 'controlled action' under the EPBC Act. Environmental approvals under the EPBC Act are administered by the DCCEEW on behalf of the Minister for the Environment and Water.

The Proposal will not have a significant impact on any MNES or Commonwealth land (see Section 9). It has not been referred to the DCCEEW for assessment under the EPBC Act.

Bilateral agreements

To minimise duplication in the environmental assessment and approval process, Chapter 3 of the EPBC Act provides for agreements between the Commonwealth and a State/Territory to be made for Commonwealth accreditation of the processes of the State/Territory (and vice versa). These are termed bilateral agreements.

As the Proposal is not being referred for assessment under the EPBC Act, bp is not requesting that EIA be undertaken as a bilateral assessment.

2.1.3 State Agreement

State Agreement Acts are contracts between the Government of WA and proponents of major resources projects, which are ratified by an Act of State Parliament. They specify the rights, obligations, terms and conditions for development of the project and establish a framework for ongoing relations and cooperation between the State and the project proponent. State Agreements are administered by the Department of Jobs, Tourism, Science and Innovation (DJTSI).

bp's Kwinana Energy Hub is considered a vital strategic asset for WA as it supplies a substantial volume of WA's fuel requirements, including essential aviation fuel to Perth Airport, and is a major employer in Perth's south metropolitan area (Government of WA, 2016).

The Kwinana Energy Hub operates under the *Oil Refinery (Kwinana) Agreement Act 1952*. Subsequent amendments include conditions relating to the procurement of WA labour, suppliers, materials, plant, manufacturers and contractors. The State Agreement was modified in 2020 to allow the closure of the oil refinery and phased transition to import-only, ensuring continuity of fuel supply for WA (Government of WA, 2020). During discussions with the State Government, bp indicated its intent to explore opportunities for lower carbon energy production at the site.

bp is engaging with DJTSI and relevant WA government bodies in relation to its obligations under the State Agreement with respect to the Proposal.

2.1.4 Other Approvals and Regulation

Table 2-1 provides a summary of the regulatory approvals required for the Proposal and the associated decision-making authorities. It is to be noted that the site is located within the following areas:

- State Environmental (Cockburn Sound) Policy 2015
- Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999
- Environmental Protection (Kwinana) (Atmospheric Wastes) Regulations 1992

Key environmental legislation and associated approvals applying to the Proposal are identified in Table 2-1.

Table 2-1 Other approvals

Decision-making authority	Legislation or Agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?
Environmental			
DWER	EP Act (Part V)	Works Approval	**Yes.** A Works Approval is required for the construction and operation of the new proposed prescribed activities. On completion of construction and commissioning activities, an amendment to the existing Part V Prescribed Premises Licence will be required to support the operation of these premises. Provided that DWER regulates impacts associated with construction activities and operations by ensuring proposed infrastructure is constructed in accordance with industry standards and environmental controls to meet licence requirements over the life of operations, it is expected that environmental impacts can be adequately assessed by DWER.
DWER	EP Act (Part V)	Prescribed Premises Licence	**Yes.** As part of the Licence application, DWER undertakes an environmental risk assessment with a focus on any point/non-point sources of emissions and discharges to the environment including air, water, and land. The risk assessment considers potential source-pathway, receptor linkages and the proposed proponent's suggested mitigation controls. Where controls are considered critical to maintain an acceptable level of risk, these are incorporated into the Part V Licence as regulatory controls. Where controls are not deemed sufficient, additional regulatory controls may be imposed by DWER. bp intends to submit an amendment to its current Part V Licence to include the new proposed activities. ■ Refer to Section 2.1.6 for more information on current Part V licence The prescribed premise licence will also address any requirements from *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999.*
DWER	*Contaminated Sites Act 2003*	NA	**Yes.** While not directly relevant to the Proposal as an approval, it is to be noted that the site has been classified as 'Contaminated - Remediation required' by DWER under the CS Act. bp has been continuously working with DWER's Contaminated Sites Department to address contaminated sites issues. Detailed Site Investigations (DSI) are currently underway (see Table 7-1).
DWER	*Rights in Water and Irrigation Act 1914*	26D and 5C	**No.** New 5C and 26D licences are not expected to be required. Water abstraction activities will occur in accordance with current groundwater abstraction licence GWL60605(6). Should groundwater be abstracted to support construction activities such as installation of sewer systems, this will be carried out under the DWER Dewatering Exemption.
DWER	Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Clearing Permit	**No**. No clearing of native vegetation will occur as part of this proposal.

Decision-making authority	Legislation or Agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?
Water Corporation	N. A	Effluent Services Agreement for disposal of treated refinery process wastewater via SDOOL	No additional approvals will be required.
DCCEEW	*Environment Protection and Biodiversity Protection Act 1999*	EPBC Referral	**No**. Proposal activities will not impact on MNES or the environment of Commonwealth land, and therefore referral to the Commonwealth is not required.
Planning			
DJTSI	State Agreement *Oil Refinery (Kwinana) Agreement Act 1952*	Notice of Proposal / Ministerial consent under State Agreement	**Yes**. The bp Kwinana site has an active State Agreement. Engagement with DJTSI as lead agency and in relation to necessary approvals as defined within the Agreement has been ongoing.
DPLH	*Planning and Development Act 2005*	Development Application (JDAP)	**Yes.** Development Application required under the Metropolitan Region Scheme (MRS) and City of Kwinana Local Planning Scheme No.2 (LPS2) through the Metro Outer Joint Development Assessment Panel (JDAP). Policy Area 15 - Kwinana Industrial Strip of LPS2 sets out broad land use objectives in relation to future decisions concerning subdivision, development, and zoning in the Kwinana Industrial Strip. The encouraged use within the Policy Area is general industry, provided that there is no adverse impact on nearby businesses and residents. The Proposal will comply with the objectives for development within the Policy Area by: ▪ Maintaining site access from Rockingham Road and Mason Road and the established internal road network ▪ Maintaining landscaping / streets and public places in accordance with established management plans agreed between businesses and the City of Kwinana ▪ Ensuring noise, vibration, groundwater pollution, airborne emissions and odours, do not adversely affect nearby businesses or residents ▪ Where practicable, implementing improvements to the landscape quality and minimising visual impact to the local area Conditions of approval are informed by advice from referral agencies, community consultation and the broader planning assessment. Standard conditions typically applied to development include: ▪ Waste Management Plan ▪ Landscape Master Plan ▪ Construction / Demolition (if required) Management Plan ▪ Water Management Plan ▪ Lighting Plan ▪ Public Art

Decision-making authority	Legislation or Agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?
			▪ The *Position Statement: Renewable energy facilities* from Western Australian Planning Commission (WAPC) will be relevant and the several relevant policy measures will be addressed in DA; ▪ *Consultation* – encourages early consultation with key stakeholders to ensure the proposal is compatible with existing land uses on and near the site ▪ *Environmental impact* – consider impact on flora and fauna and demonstrate how the proposal minimises impact to endangered or threatened communities, remnant native vegetation and clearing ▪ *Visual and landscape impact* – consider visual and landscape assessment in sensitive landscapes which have significant public amenity and community values ▪ *Noise impact* – consider acoustic impacts of proposal to nearby sensitive land uses ▪ *Public and aviation safety* – management of public access near the renewable facility, and impact to any public buildings, roads, or pathways, as well as bushfire risk. Ensure proposals do not impact aviation safety ▪ *Heritage* – Assessment to consider impact to natural, historic or Aboriginal heritage sites ▪ *Construction impact* – ensure appropriate construction management plans are in place to minimise site disturbance, minimise environmental emissions, and ensure appropriate vehicle and machinery access and movement
Dangerous Goods			
Department of Mines, Industry Regulation and Safety (DMIRS)	*Dangerous Goods Safety Act 2004*; Dangerous Goods Safety (Major Hazard Facilities) Regulation; and Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007	Major Hazard Facility Dangerous Goods Site Licence	**Yes.** A Major Hazard Facility application and a Dangerous Goods Licence are currently being prepared for the site. The bp Kwinana Energy Hub is still a licensed MHF with an assigned case officer. Early engagement on the proposal, including compliance strategy for the operate phase, will commence in May.
Heritage			
DPLH	*Aboriginal Heritage Act 1972* or *Aboriginal Cultural Heritage Act 2021*	Consent to disturb Aboriginal Heritage Sites	**No.** No aboriginal sites are proposed to be disturbed and therefore approvals to disturb aboriginal heritage sites are not required.

2.1.5 Land tenure and Zoning

The Proposal is within the existing bp Kwinana Oil Refinery and Terminal located at 1 Mason Rd (Lot 18 on Plan 17311), Kwinana Beach WA, within the LGA of the City of Kwinana (Figure 1-1). Property details are provided in Table 2-2. The proposed biorefinery and all supporting infrastructure will be contained within Lot 18 (the PDE).

The PDE and adjacent land parcels are zoned industrial under the MRS and are within the KIA.

Table 2-2 Property details

Street address	Legal description	Area (ha)	Proprietor	Registered
1 Mason Rd, Kwinana Beach WA	Lot 18 on Plan 17311	249.8811	B.P. REFINERY (KWINANA) PTY LTD	4 October 1995

2.1.6 Existing Approval - Prescribed Premises Licence

The bp Kwinana site currently operates under a Prescribed Premises Licence, L5938/1967/12, under Part V of the EP Act. This licence applies to the prescribed premises categories for a liquid waste facility, bulk chemical storage, metal coating and fuel burning as detailed in Table 2-3. New prescribed premises categories will be required to be included in an amendment to the licence. Discussions still need to occur with DWER to understand what the prescribed premise for the biorefinery will be.

Table 2-3 Prescribed premises category descriptions for L5938/1967/12

Prescribed premises category description (Schedule 1, Environmental Protection Regulations 1987)	Assessed production capacity
Category 61: Liquid waste facility Premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	200,000 tonnes per year
Category 73: Bulk storage of chemicals Premises on which acids, alkalis or chemicals that – (a) contain at least one carbon to carbon bond and (b) are liquid at STP (standard temperature and pressure), are stored.	1,000,000 m^3 in aggregate
Category 81: Metal coating Premises on which metal products (excluding vehicles) are spray painted, powder coated or enamelled.	10,000 litres per year
Category 87: Fuel burning Premises on which gaseous, liquid or solid fuel with a sulfur content of less than 0.25% is burnt in a boiler for the supply of steam or in power generation equipment.	948 kg per hour in aggregate

The licence also allows for discharges to air of combustion gases from burning of natural gas, sulphur dioxide emissions within the *Environmental Protection (Kwinana) (Atmospheric wastes) Policy 1999* area and discharge of treated process water from liquid waste facility into the State Environmental (Cockburn Sound) Policy 2015 area (the ocean). The licence comprises monitoring conditions to ensure discharges are not polluting the environment.

Under Part V of the EP Act, any construction activities associated directly or indirectly with a Prescribed Activity as described under the EP Regulations require a Works Approval application to be submitted. Post construction activities, a Licence application or amendment to existing licence would be required to allow for full scale operations.

Conditions under current licence[2] include:

- Maintenance and operational requirements for infrastructure and equipment
- Waste acceptance and processing
- Permitted discharges to air and water
- Monitoring of discharged wastewater and ambient groundwater quality
- It is expected that the proposed new operations will not trigger significant changes in the licence limits nor significant increase in pollution as further explained in Sections 6 and 7

The Part V Licence is expected to effectively regulate bp's controls that manage the following impacts:

- Noise emissions
- Dust emissions
- Air quality Impacts
- Odour Impacts
- Storage of controlled waste, feedstocks material, end products, waste products emissions and discharge impacts to the environment

Based on the preliminary risk assessment undertaken by bp, the EPA factors air quality and social surroundings are likely to be managed through this decision-making process.

Additionally, impacts relating to emissions and discharges from containment infrastructure to land and water and therefore the EPA Factors inland waters and terrestrial environmental quality, are likely to be managed through this decision-making process.

Ongoing consultations with DWER-Environmental Regulations team continue, as further discussed in Section 3.

[2] Licence was amended in June 2022 to remove refining conditions and represent terminal operation

3 Stakeholder Engagement

3.1 Key Stakeholders

Stakeholders have been identified based on the Proposal location, surrounding land use, preliminary advice from the EPA, elements potentially of significant interest to non-government organisations and community groups, and the potential impacts and risks. A comprehensive list of key stakeholders is provided in Table 3-1.

Table 3-1 Key stakeholders

Stakeholder	Stakeholder	Area of interest
State government and agencies	Environmental Protection Authority (EPA)	▪ Administration of the EP Act Part IV Impact Assessment ▪ Proposal impacts on key environmental factors
	Department of Water and Environmental Regulation (DWER)	▪ Administration of the EP Act Part V Works Approval Applications and Licences ▪ Existing licence/s ▪ Impacts relating to emissions and discharges to the environment from construction and operational activities
	Department of Mines, Industry Regulation and Safety (DMIRS)	▪ Dangerous Goods requirements ▪ Major Hazard facilities requirements ▪ Existing licence/s ▪ Impacts to dangerous goods stored on the premises to human health ▪ Pipelines carrying hazardous material
	Department of Jobs, Tourism, Science and Innovation (DJTSI)	▪ bp State Agreement's regulator ▪ State significant project
	Office of the Premier and Deputy Premier	▪ Socio economic benefits of the Proposal.
	Minister for Energy (and key advisors)	▪ Sustainability of the Proposal
	Minster for Hydrogen (and key advisors)	▪ Proposal sustainability and state decarbonization ▪ Future for H2K project
	Advisors for the Minister for Environment	▪ Environmental Impacts and sustainability
	Cockburn Sound Management Council	▪ Environmental impacts on Cockburn Sound
	Fremantle Port Authority (FPA)	▪ Negotiating a seabed lease (required by bp under the State Agreement amendment) (outside Proposal scope) ▪ Cockburn Sound shipping movements ▪ Use of port infrastructure (road and rail transport infrastructure)

Stakeholder	Stakeholder	Area of interest
	Westport (integrated team across State Government)[3] - Department of Transport and associated agencies)	The Westport Program is developing a business case for a transition from the Inner Harbour in Fremantle to the Outer Harbour in Kwinana (located north of the Proposal at the end of Anketell Road). Interests: ▪ Cockburn Sound shipping movements ▪ Utilisation of existing public infrastructure (e.g. roads) ▪ Cumulative impacts
	Water Corporation	▪ Future plans for the KWRP (located on bp's land)
	Main Roads Western Australia (MRWA)	▪ Use of public roads for logistics during construction and product transportation
	Synergy / Western Power	▪ Energy requirements for site current and proposed operations
	Department of Fire and Emergency Services (DFES)	▪ Emergency services ▪ Fire breaks ▪ Fire reduction
Federal government	Federal government (including Federal Member for Brand)	▪ Socio economic benefits of the proposal
Local government	City of Kwinana	▪ Use of public roads and infrastructure ▪ Development Approval (and consultation process) for the Proposal
Industry bodies	Kwinana Industries Council	▪ Promotion and support of industries in the KIA ▪ Coordination of intra-industry activities, including water quality, air quality, monitoring and emergency management ▪ Liaison with neighbours, local communities, Government and agencies ▪ Utilisation of KIC's Community Information Forums
Local community	Kwinana and Western Australia	▪ Awareness of project ▪ Jobs and opportunity
Aboriginal groups and indigenous land use agreement	South West Aboriginal Land and Sea Council/ Gnaala Karla Booja Aboriginal Corporation/ Medina Aboriginal Cultural Centre	▪ Understanding of site plans, history of operations ▪ Long standing operation of site (more than 65 years) and associated impacts to land known ▪ Opportunity for reconciliation outcomes from site transition and proposal ▪ Welcome to Country and other cultural events

[3] the Westport Program sits within the Department of Transport (DoT). Key agencies that are working with Westport to deliver parts of the program include: Department of Jobs, Tourism, Science and Innovation (DJTSI), Department of Planning, Lands and Heritage (DPLH), Department of Primary Industries and Regional Development (DPIRD), DoT, Department of Water and Environmental Regulation (DWER), Fremantle Port Authority, Main Roads Western Australia (MRWA) and Public Transport Authority (PTA).

3.2 Stakeholder Engagement Process

The majority of bp's engagement with respect to the Proposal has been part of the overall engagement strategy for the site's transition from oil refinery to import terminal to an integrated energy hub. bp has operated at its Kwinana site since 1955 and has established processes for community and stakeholder engagement, including a dedicated site Communications Manager. Closure of the oil refinery (announced 30 October 2020) generated significant interest from stakeholders and local community. At the time of the announcement, bp indicated it would explore opportunities for clean energy solutions for the site's reuse. Following closure of the oil refinery, bp has delivered a comprehensive stakeholder engagement program. The primary goal of the stakeholder engagement process is to ensure key stakeholders are provided with first-hand information and given the opportunity to identify concerns and opportunities regarding the Proposal and the site's transition. The outcomes of the consultation strategy are recorded in a Stakeholder Consultation Register.

The Proposal has been regularly discussed with stakeholders since September 2021, when the KRF was in early development. Stakeholder engagement involving the Proposal has included:

- Briefings
- Site tours
- Media releases and engagement
- Sharing of site milestones
- Regular development updates to existing workforce (approximately 350 personnel, comprising bp staff and contractors). Many live locally
- Establishment of a dedicated website and contact email for the integrated energy hub. These are managed by the Communications Manager. Website and contact details has been promoted in project collateral and bp and stakeholder social media posts
  - Website: **www.bp.com.au/kwinanaenergyhub**
  - Email: **kwinananergyhub@bp.com**
- Sharing of site transition plans with the KIC and KIC's Board, Public Affairs Committee, Kwinana Industries Mutual Aid (KIMA), Human Resources Committee, and Environmental Committee
- Presentations to industry/ government/ community throughout 2022 at events among which include:
  - WA Energy Club
  - Pilbara Summit
  - Mid West Major Projects Forum
  - Industry Leadership Forum
  - UWA Future of Energy Networking Event
  - Kwinana Industries Council Quarterly Update Forum and Community and Industries Forum
- Discussion of Proposal in relation to the Westport project for the Global Advanced Industries Hub Ministerial Taskforce
- Engagement with Aboriginal representatives, including:
  - Site attendance (July 2022) by local elders for delivery of Cultural Awareness training, as well as discussion of site transition milestones and opportunities for advancing reconciliation
  - Site tour and information sharing by Gnaala Karla Booja Aboriginal Corporation Board member Cheryl Martin and members of family – 27 March 2023 following engagement of Cheryl to design artwork and consult on bp Reconciliation Action Plan
  - Attendance by site leadership at Medina Aboriginal Centre elders meeting July 2022 to discuss site transition and opportunities for bp to work with local Aboriginal groups

- South West Settlement (Department of Premier and Cabinet)

bp is committed to ongoing stakeholder identification, communication, engagement and consultation through the planning, assessment phase, construction, operation and closure phases of the Proposal.

3.3 Stakeholder Consultation Outcomes

Table 3-2 presents a summary of stakeholder consultation conducted to date. The Proposal has been well-received by stakeholders with advocacy and support for the energy transition. Most enquiries related to employment and contract opportunities, and no concerns have been raised by the community.

Further consultation is proposed as outlined in Table 3-3.

Table 3-2 Stakeholder consultation

Stakeholder	Date	Issues /topics raised	Proponent response / outcome
Fremantle Port Authority	16/07/2021	Tour of Kwinana facility and briefing to Senior Managers and Executives regarding: ■ Site transition and future plans ■ Jetties and marine infrastructure	Ongoing engagement per operations and licenses
	Ongoing	Discussion around jetty utilisation and shipping forecasts for the Proposal	bp is engaging with Fremantle Ports on a range of operational port matters
Kwinana Industry Council	02/09/2021	bp briefing to Director: ■ Proposal in the context of site transition to an integrated energy hub ■ Opportunity to decarbonise industry (biofuels) ■ Site utilisation KIC was supportive of Proposal and requested regular engagement in relation to Proposal development and value-adding to the KIA.	Stakeholder to be kept updated
	15/11/2021	bp briefing to Director: ■ Proposal update and H2Kwinana feasibility	
Federal Member for Brand Madeleine King	20/09/2021	bp briefing to Minister (Federal) regarding site transition plans and the Proposal. Minister expressed interest in local opportunities.	Stakeholder to be kept updated
Department of Fire and Emergency Services (DFES)	7/10/2021	Site tour and briefing to Acting Superintendent, Chief Science Officer, Acting District Officer and Operational firefighters. Briefing covered site transition plans and emergency response (post refinery closure). Feedback: bp to engage as part of site emergency response planning throughout transition (including Proposal construction and operation).	bp will engage with DFES throughout the transition (including construction and operation) regarding emergency response planning for the site.
General community (Kwinana Industry Council Community Information Forum)	21/10/2021	Public community information event for industry, community, and local government. bp discussed site transition plans (including Proposal). Questions were raised regarding: ■ Biofuels (use of, process for refining) ■ Jobs	All questions addressed at event with no concerns or follow ups. bp contact information provided to community for more information as needed.

Stakeholder	Date	Issues /topics raised	Proponent response / outcome
		▪ Support for the integrated energy hub	
	28/03/2023	Public community information event where bp Energy Hub Manager presented an update to the community on the bp site and more detail on the Kwinana Renewable Fuels Project. About 30 community, Industry and local government representatives were in attendance Questions raised were regarding ethical issues on sourcing of feedstocks and how bp was managing these	All questions addressed at event with no concerns or follow ups. bp contact information provided to community for more information as needed
Department of Water and Environmental Regulation (DWER)	30/11/2021	bp briefing to industry regulator regarding: ▪ Update on site activities, including the transition to import terminal ▪ Discussed current licence and prescribed premises and what amendments required to reflect the operation as an import terminal ▪ Introduction to upcoming projects for the Kwinana Energy Hub DWER requested early engagement for projects.	bp will engage early with the DWER for the energy hub projects and keep DWER updated with the Proposal progression.
	26/08/2022	bp briefing to DWER licensing branch regarding the Proposal and environmental issues and concerns were raised. Outcomes of the meeting were: ▪ DWER were fully supportive of the Proposal and understood its importance to fuel security and sustainability ▪ Advised that there is a process for strategic projects Integrated Assessment Team (IAT) to streamline approvals and DWER will gauge on application whether KRF meets the requirements ▪ Discussion on environmental impacts and conversation on approval pathways ▪ Recommended a meeting with DWER's Air Quality branch to approve bp's scope of works for odour and air dispersion modelling before commencing the work ▪ Further scoping meeting required with EPA services to discuss referral	Meeting to be held with Air Quality branch to discuss scopes of work. Meeting to be held with EPA services once environmental emissions have been estimated to discuss EPA referral pathway.
	13/12/2022	bp briefing to industry regulation and EPA Services discuss the Proposal and potential environmental impacts in detail. The EPA Services Unit requested: ▪ bp to present proposal to EPA Chair ▪ Part V feedback was that works approval is achievable by bp's timeframes provided sufficient quality and detail in the submission. It was also possible to have parallel	bp confirmed in the meeting that there is no marine scope as part of this proposal. The existing jetty and pipeline facilities do not require upgrading. Site visit with EPA Chair, board and EPA officers scheduled for 21/02/2023.

Stakeholder	Date	Issues /topics raised	Proponent response / outcome
		processing of Part IV and V to minimise delays ▪ EPA Services requested information on what was the marine scope of this Proposal ▪ Ongoing engagement up to Works Approval submission (under Part V of the EP Act) ▪ EPA Services Unit mentioned that referral will be through the new system Environmental Online and that bp should familiarise itself with the system to avoid additional delays	
	17/01/2023	bp briefing to the Air Quality Branch (industry regulation). Discussed the Proposal and presented the scope of works for the odour modelling and air dispersion modelling. Air Quality Branch indicated it would review the proposed scope of works and provide feedback.	Scope of Work for odour was accepted with no comments. The air dispersion modelling scope was accepted with comments to include two additional metrological data sets for the modelling.
Environmental Protection Authority (EPA)	21/02/2023	bp hosted a site visit for the EPA chair and board members and representatives of EPA services Discussion and visit included ▪ Site visit of existing operations ▪ Discussion of Kwinana site transition in terms of skills, technology ▪ Overview of this proposal and its environmental impacts ▪ Overview of other bp potential projects in Western Australia Outcomes ▪ EPA agreed that the proposal like to be a single factor assessment ▪ EPA provided bp with information to provide in referral documents	EPA perspective was that the Proposal is likely to trigger a single factor for assessment which is GHG and could anticipate its submission within the coming weeks
(Former) Governor of Western Australia Hon Kim Beazley	9/12/2021	Site tour and briefing to Governor (former) and key staff. Discussion included: ▪ Fuel security ▪ Decarbonisation opportunities from biofuels Feedback was supportive of the proposed energy hub, with high interest in the site transition and renewable fuels production.	Noted
Office of Minister for Mines, Petroleum, Energy and Office of the Deputy Premier	16/12/2021	Briefing to Senior Policy Advisor(s) and Energy Advisor regarding: ▪ Opportunities for the State ▪ Transition of bp Kwinana site (in accordance with State Agreement obligations)	Proposal milestones shared and ongoing engagement throughout Proposal planning and development

Stakeholder	Date	Issues /topics raised	Proponent response / outcome
		No concerns raised. High interest in jobs/ decarbonisation opportunities for State and being kept updated on the Proposal.	
City of Kwinana	9/06/2022	Site tour and Proposal briefing to Council and Management (CEO, Director, Mayor, Elected members, and Executive Manager). Feedback received: ■ Interest in local jobs, skills and training ■ Opportunities for the City's netzero targets for biofuels ■ Supportive of Proposal ■ Questions regarding waste management ■ Keen interest in being updated and involved	Meeting to be held with the City's Planning and Environmental Services team
	16/08/2022	Preliminary meeting (online) held with the City confirmed: ■ Support for JDAP Approval Pathway ■ DA to be presented to Council to provide opportunity for alternative recommendation prior to being forwarded to JDAP ■ Proposed development likely to be classified as "General Industry" use ■ City likely to advertise DA concurrently with referral to relevant authorities ■ Design review not required, only assessment against 10 Design Principles in SPP 7.0 required Development Application to address: ■ City's Planning Framework and relevant State Planning Policies ■ Bushfire prone impact assessment ■ City of Kwinana Coastal Adaption Plan ■ Noise and cumulative risk associated with development including waste and airborne emissions ■ Impact to adjacent pipelines ■ Transport and access movements and issues Conditions of approval likely to include: ■ Requirement for Public Art ■ Others as informed by referral agency comments Development likely to be exempt from requiring building permit under the	Continue to liaise with City as design progresses and DA preparation commences to confirm: ■ Land use designation ■ Implications of any changes in design since initial engagement ■ Any updates in policy requirements Briefing with Council to inform recommendations forwarded to JDAP

Stakeholder	Date	Issues /topics raised	Proponent response / outcome
		Building Act however, to confirm with building surveyor. Beneficial to brief Councillors on the Proposal. Continue to liaise with City through DA preparation and consideration stages.	
DJTSI and Energy Policy WA	14/06/2022	Site tour and briefing for the Executive Directors (multiple), Directors (multiple), and Principal Policy Adviser. Discussion focussed on: ■ Site transition, including Proposal and the H2Kwinana project ■ Infrastructure and jobs/ skills to support future site requirements ■ Security of fuel supply	Subsequent conversations and data sharing regarding electrical infrastructure (not pertaining to Proposal) and site transition plans
DJTSI - Project Facilitation Branch	22/11/2022	bp briefing to Director (x 3) and Officer. Briefing included: ■ Proposal overview ■ Discussion on requirements under State Agreement ■ Confirmation of lead agency status Feedback received: ■ bp to commence Notice of Intent Proposal as part of approvals ■ Support for Proposal given value to State and decarbonisation opportunities from products	Subsequent conversations to align on process and timing
DJTSI - Project Facilitation Branch and Westport Project	10/02/2023	Site tour and briefing for the Director and Senior Advisor. Briefing included: ■ Site transition update ■ Discussion on biorefinery ■ Supportive of project and agreeance of process for engagement per state agreement	Engagement per State agreement and lead agency status
Westport Program (Department of Transport (and associated agencies))	21/07/2022	Meeting with the Westport Project Managing Director, Principal Program Delivery Manager, Project Manager, and Stakeholder Manager. Meeting discussed: ■ Proposal overview ■ Site utilisation ■ Renewable fuel production and potential use in marine transport/ supply chain decarbonisation ■ Cockburn Sound shipping forecasting ■ Impact on roads as result of Proposal Westport requested bp provide data and information on future plans to studies being completed in 2023/2024.	Subsequent discussions with relevant project groups and provision of data where applicable

Stakeholder	Date	Issues /topics raised	Proponent response / outcome
WA Marine Science Institute (WAMSI)	19/01/2023	Co-briefing to the CEO, Board member, and Information Management Director. ▪ Briefing by bp RE bp's future plans (including Proposal) ▪ Briefing by WAMSI on research on Cockburn Sound ▪ Subsequent discussion covered marine infrastructure and potential environmental impacts WAMSI requested information including forecast shipping movements.	bp shared requested information.
Media and community	17/02/2023	Deputy Premier announced project into FEED. Premier made comments in media statement.	Attracted broad media interest and coverage – all positive
	11/03/2023	Hosted a stall at the City of Kwinana's Children's Festival (estimated attendance: up to 10,000 local community members). The event is promoted by the City of Kwinana. bp was gold sponsor of event and featured in City lead promotion. Project featured in discussions	High community attendance. No concerns raised. High interest in jobs and biofuels opportunities to decarbonise hard to abate sectors.
	21/03/2023	Present at KIC Quarterly Roundtable – about 40 attendees from local businesses. Discussion on feedstocks, carbon reduction opportunities from products, discussion on waste management	Committed to keeping KIC members updated and follow up conversations with some interested parties

Table 3-3 Proposed future engagement

Stakeholder	Proposed engagement	Proposed date
City of Kwinana	Briefing to Mayor and Council. Future engagement with the City on site details and proposed design will inform likely conditions of DA approval. It is also important to liaise with the City during their consideration of the DA, particularly following the referral and advertising period, to inform the recommended conditions of approval.	3 April 2023
Cockburn Sound Management Council	Sharing proposal information	5 May 2023
MRWA	Briefing to support the initial engagement already underway.	May 2023
DJTSI	Ongoing discussion in relation to bp's obligations under the State Agreement.	Ongoing
All	Continue to work collaboratively with stakeholders	Ongoing

4 Object and Principles of the EP Act

The object of the EP Act is to protect the WA environment with regard to the following five principles:

- The precautionary principle
- The principle of intergenerational equity
- The principle of the conservation of biological diversity and ecological integrity
- Principles relating to improved valuation, pricing and incentive mechanisms
- The principle of waste minimisation

An assessment of the Proposal against these principles is provided in Table 4-1.

Table 4-1 Object and principles of the EP Act

Principle	Consideration
1. The precautionary principle Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by: ■ Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment ■ An assessment of the risk-weighted consequences of various options	The Proposal is being developed through a detailed process of review to ensure impacts to the environment are minimised. bp is using existing environmental data for the region supplemented with site specific baseline and targeted data to inform long term risk mitigation strategies. A prefeasibility assessment was undertaken where potential risks to EPA key environmental factors were assessed. MNES were also assessed as part of the prefeasibility assessment. bp KRF site was chosen as the Proposal site as it is already occupied by bp operations, has existing infrastructure to support the Proposal, such as an aviation fuel pipeline to the airport, and is located within land zoned for industrial use, with surrounding heavy industrial operations. As such, the site is deemed suitable and presents a low risk of significant pollution to the surrounding environment.
2. The principle of intergenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.	bp aims to be net zero by 2050 and is transitioning its former oil refinery to a renewable and clean energy production hub. bp Kwinana supplies a substantial volume of WA's fuel requirements, including aviation fuel to Perth Airport. Production of sustainable fuel for the WA market will aid the State's decarbonisation strategy. The Proposal is going to recycle waste into fuel which supports the renewable energy sector and helps to promote reduction of waste via re-use. Renewable fuel production (the Proposal) is an important part of the energy transition as it provides a reduced carbon fuel source for hard-to-abate sectors, including heavy industry, aviation, mining and transport. The Proposal can be implemented without significant impacts on the health, diversity or productivity of the environment. Development of this Proposal will establish a facility that can provide jobs, economic value and contribute to the sustainability of future generations. The Proposal is expected to bring benefit to nearby businesses and communities. Mitigation measures will be in place to prevent direct and indirect impacts to the environment arising from the construction and operations of the facility.
3. Principles relating to improved valuation, pricing, and incentive mechanisms	bp will be responsible for funding the cost of measures to avoid, reduce, mitigate, and manage environmental impacts and where necessary provide offsets for residual impacts as detailed in the referral.

Principle	Consideration
(a) Environmental factors should be included in the valuation of assets and services. (b) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement. (c) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste. (d) Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.	bp is currently working on a GHG Management Plan for the Kwinana Energy Hub that will demonstrate its pathway to net carbon zero emissions by 2050. Initial Proposal design has taken into consideration engineering controls such as stack designed to reduce emissions and new containment infrastructure designed with spill controls in place.
4. The principle of the conservation of biological diversity and ecological integrity Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Conservation of biological diversity and ecological integrity has been a fundamental consideration in the assessment of this Proposal, including: ■ Utilising existing oil refinery infrastructure where possible (revamped or modified to accommodate the biorefinery) ■ Locating new-builds in the footprints of previous oil refinery infrastructure (i.e. no vegetation clearing required) ■ Use of KWRP water (treated wastewater) ■ Locating the Proposal within the KIA, which is home to heavy industry and a busy industrial deep-water bulk materials port The PDE is predominantly clear of native vegetation and the KRF footprint is completely cleared. As such, implementation of the Proposal will not threaten biological diversity or ecological integrity.
5. The principle of waste minimisation All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	Waste will be minimised by adopting the hierarchy of waste controls: avoid, minimise, reuse, recycle and safe disposal. The Proposal maximises use of existing infrastructure from the former oil refinery to prevent decommissioning of existing infrastructure that has not reached end of life. The proposed biorefinery has been designed to utilise re-cycled waste products to produce sustainable fuel. bp is currently investigating disposal alternatives for waste solids from the bio-digester, including composting and waste-to-heat incinerator technology using third party facilities.

5 Environmental Factors and Objectives

Environmental factors are defined in the EPA's Administrative Procedures and are used by the EPA as a systematic approach to organising environmental information for the purpose of EIA (EPA, 2021f). Each environmental factor comprises a number of environmental values and has an environmental objective aimed towards ensuring the objects and principles of the EP Act are achieved. The EPA has regard to these objectives when determining whether the environmental impact of a proposal may be significant.

Table 5-1 summarises the environmental factors and objectives as relevant to the Proposal. Only Greenhouse Gas Emissions has been identified as a key environmental factor (see Section 6). All other environmental factors are discussed in Section 7 and MNES are considered in Section 9. Consideration of the factors has used the following classifications:

- Significant: considered to be a key preliminary environmental factor (see Section 6)
- Not Significant: impacts upon factor are considered not significant and/or managed under other approvals (hence 'other' environmental factors) (see Section 7)
- Not relevant: no significant impact given the location and nature of the Proposal

Holistic and Cumulative impact assessments are addressed in Sections 10 and 11, respectively.

Table 5-1 EPA Environmental Factors

Theme	Factor	Objectives	Classification	Consideration
Sea	Benthic Communities and Habitats	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.	*Not relevant*	The KRF footprint is located approximately 350 m northeast of the coastline and there are no proposed discharges to Cockburn Sound or altered coastal processes. As such, the Proposal will not directly or indirectly impact benthic communities and habitats.
	Coastal Processes	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	*Not relevant*	There is no marine scope of works for the Proposal (existing jetty facilities do not require upgrading for the Proposal). As such, the Proposal will not result in any changes in the coastline or seabed that might affect geophysical processes.
	Marine Environmental Quality	To maintain the quality of water, sediment and biota so that environmental values are protected.	Not significant – other factor -	Treated wastewater and stormwater from the Proposal will be discharged to the marine environment via SDOOL effluent pipework in accordance with bp's Prescribed Premises Licence L5938/1967/12. The combined Proposal wastewater effluent to be treated at the existing wastewater treatment plant is 150kL/day. The existing wastewater treatment plant is licenced for 7.93ML/day hence has sufficient capacity to treat the Proposal's wastewater stream. The contaminants of the effluent are expected to be the same as outlined in the current licence and within the licence wastewater discharge limits. bp will not be seeking an amendment to the Part V Prescribed Premise licence for process wastewater stream as part of this Proposal. This factor has been assessed as not significant, as the existing wastewater treatment plant is designed for this type of

Theme	Factor	Objectives	Classification	Consideration
				wastewater and has sufficient capacity to process it. bp have proved that the current controls in place have been effective at meeting our discharge limits.
	Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	*Not relevant*	There will be incoming/outgoing vessel movements to support the operations and it is expected these shipping movements will be similar to current shipping operations. No marine infrastructure or disturbance is required for the proposal. bp is engaging with WA government on Cockburn Sound shipping forecasts (Westport project)
Land	Flora and vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Not significant – other factor	No clearing of native vegetation is proposed. The KRF footprint is already cleared and there will be no indirect impacts to remnant vegetation in the PDE or neighbouring properties.
	Landforms	To maintain the variety and integrity of distinctive physical landforms so that environmental values are protected.	*Not relevant.*	The Proposal is located on a brownfield site and the PDE encapsulates previously disturbed site with existing infrastructure. The Proposal is also located within an industrial area and is surrounded by heavy industry. Reuse of the former oil refinery site for the Proposal will not impact the variety or integrity of landforms.
	Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	*Not relevant*	No deep excavational works anticipated. No evidence of subterranean fauna in the area.
	Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	Not significant – other factor	The PDE has been used as an oil refinery for 65+ years, is predominantly cleared areas and hardstand, and is classified as “Contaminated Land” under the CS Act. Investigations are being undertaken by bp in consultation with DWER Contaminated Sites Branch. The Proposal will not expand beyond areas of existing disturbance. Wastes produced from the Proposal can be managed using existing infrastructure and procedures and adherence to conditions attached to other approvals (e.g. dangerous Goods Licence). Excavation of contaminated spoil material will be managed under a construction management plan. Offsite disposal of contaminated spoil material is expected to be to the nearest approved landfill. No impacts to terrestrial environmental quality are expected beyond those already occurring from historic operation within the PDE.

Theme	Factor	Objectives	Classification	Consideration
	Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	Not significant – other factor	No fauna habitat in the KRF footprint and limited habitat within the PDE. No clearing of native vegetation is proposed and indirect impacts to native fauna are expected to be similar or less than during the site's previous use as an oil refinery.
Water	Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	Not significant – other factor	Potential impacts include minor changes to surface water flows due to altered infrastructure placement. Stormwater from hardstand and wastewater from the Proposal will be collected and treated at the existing WWTP on-site. Water resource for the proposal is industry recycled water KWRP, hence groundwater usage will be minimal. Groundwater will be used for construction and hydrotesting purposes but will be well within our licenced allocation. The Proposal is not installing additional product and feed tanks, hence the risk of a spill and response remains unchanged onsite and is covered by existing response procedures.
Air	Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	Not significant – other factor	The Proposal is likely to produce air emissions from combustion of natural gas and process offgas such as sulphur dioxide (SO_2) and nitrogen oxides (NO_x). bp has historically emitted SO_2 as part of its stack emissions within its allocated threshold limits as approved under Part III of the EP Act and managed under DWER Part V Prescribed Premises Licence. bp is currently undertaking ambient air quality modelling for this Proposal and is confident that this proposal will meet the NEPM thresholds by comparison with the previous bp crude oil refinery modelling. bp understands air quality can be monitored and managed by DWER Part V air quality branch as has happened historically within the Kwinana air shed.
	Greenhouse Gas Emissions	To reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.	**Significant**	The Proposal is likely to exceed the Scope 1 emissions threshold limit of 100,000 tonnes per annum. The estimated Scope 1 emissions are 120,000 tpa slightly above the threshold. bp are developing a GHG Management Plan to demonstrate how the bp Kwinana Energy Hub will reach netzero by 2050.
People	Social Surroundings	To protect social surroundings from significant harm.	Not significant – other factor	Odour and noise from the proposal have been identified as potential impacts to the social surroundings. The renewable feedstocks can be odorous and the design has taken into account how to abate odour emissions. The PTU will have a

Theme	Factor	Objectives	Classification	Consideration
				caustic odour scrubber to reduce odour impacts and an odour management plan will outline any procedural controls. A detailed odour analysis has been undertaken by a specialist odour consultant which concluded that the residual odour from the Proposal was deemed low risk with the proposed controls in place (Ramboll, 2023). Noise is generated by the numerous items of equipment onsite and has the potential to impact bp's neighbours and sensitive receptors. bp has undertaken noise modelling of the proposal which has concluded that the proposal achieves full compliance to the Noise Regulations at the site boundary and sensitive receptors. The Proposal is not a significant noise contributor at the KIC sensitive noise receptors (AES, 2023).
	Human Health	To protect human health from significant harm.	*Not relevant*	Human Health impacts from this Proposal can result from air discharges, noise and odour. These factors are considered in detail under Air Quality and Social Surroundings. The Proposal will not store, process or manage radioactive material on site.

6 Environmental factor: Greenhouse Gas

The environmental factor of greenhouse gas (GHG) associated with the Proposal is addressed in this section in the following format, consistent with *Instructions on how to prepare an Environmental Review Document* (EPA, 2021d):

- Statement of EPA objective
- Discussion of relevant policy and guidance, and summary of how this guidance has been addressed
- Description of the receiving environment relevant to the environmental factor
- Definition of potential direct and indirect impacts on the environmental values for the environmental factor
- Description of mitigation, including application of the mitigation hierarchy (i.e., avoid, minimise, rehabilitate and offset)
- Assessment of the extent and significance of residual impacts to the environmental values of the environmental factor
- Description of the predicted environmental outcome as assessed against the EPA's objective for the environmental factor

6.1 EPA Objective

The EPA's current objective for the environmental factor Greenhouse Gas (GHG) emissions is:

> *"To reduce net greenhouse gas emissions to minimise the risk of environmental harm associated with climate change".*

6.2 Relevant Policy and Guidance

The current guidance is to reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.

Proposals will be considered where they are reasonably likely to exceed:

- As per current and draft GHG Guideline - 100,000 tonnes CO2-e of scope 1 emissions in any year; or
- As per Draft GHG Guideline - 100,000 tonnes CO2-e of scope 2 emissions in any year

The EPA's view is that there should be 'deep and substantial reductions' in WA's emissions this decade and achievement of net zero by 2050, along a linear trajectory from 2030. The current guidance requires proponents to contribute to aspirations of net zero by 2050. bp can confirm that the company is working with its global team to decarbonize its assets.

There are a range of considerations that can be considered to ensure 'deep and substantial reductions' for a proposal. These are best established on a case-by-case basis.

The EPA will have regard to its guideline when considering new proposals, changes to existing proposals (including expansions) and changes to existing implementation conditions.

The EPA may take other laws and statutory decision-making processes into account that can mitigate the potential impacts on the environment when deciding whether to assess a proposal or recommend conditions. This is reflecting recent amendments to the EP Act.

Proponents are expected to take best practice measures to avoid and reduce their scope 1 emissions. This draft guidance now includes applying best practice design and operations which will generally be subject to peer review. Proponents are also expected to take all reasonably practicable steps to reduce their scope 2 emissions and consider what measures they can take to reduce scope 3 emissions. Table 6-1 below aims to describe the policies and guidelines relevant to GHG.

Table 6-1 Policy and guidance for the Greenhouse Gas Emissions environmental factor

Policy and guidance (Title, Author, Year)	Explain how the EPA policy and guidance has been considered
Statement of Environmental Principles, Factors and Objectives (EPA, 2021f)	Defines the key objective for Greenhouse Gas and address the EPA mitigation hierarchy.
Environmental Factor Guideline: Greenhouse Gas Emissions (EPA, 2020b)	This guidance describes that Proposals will be considered where they are reasonably likely to exceed: ■ 100,000 tonnes CO2-e of scope 1 emissions in any year ■ The Proposal is likely to exceed the 100,000 tonnes of CO2-e of scope 1 emissions per annum and therefore, based on this guidance, it has been determined that GHG may be considered as a key environmental factor provided that bp is likely to emit the following: Scope 1: 120,000 tonnes per annum without any GHG mitigation strategy.
Draft revised Environmental Factor Guideline - Greenhouse Gas Emissions (EPA, 2022)	The draft GHG Guideline considers Scope 2 emissions in addition to scope 1 emissions with the following threshold limits: ■ 100,000 tonnes CO2-e of scope 1 emissions in any year or ■ 100,000 tonnes CO2-e of scope 2 emissions in any year Scope 2 emissions are expected to be 71,400 tonnes per annum without any GHG mitigation strategy. It is understood that: ■ The EPA may apply this guideline ■ The Proposal is likely to exceed: 100,000 tonnes CO2-e of Scope 1 emissions in any year; or 100,000 tonnes CO2-e of Scope 2 emissions in any year ■ Scope 2 emissions are likely to be zero once GHG mitigations are in place, such as solar panel installation, BDU power generation and sourcing of a green power purchase agreement ■ A GHG Management Plan (GHG MP) should be developed to demonstrate the decarbonization strategy of the Proposal to abate Scope 1 and Scope 2 emissions

In accordance with the National Greenhouse Reporting Scheme (NGER) scheme, Scope 1 and 2 emissions are reported on the Clean Energy website along with net energy consumption. bp has been reporting their carbon emissions on an annual basis to satisfy this requirement.

6.3 Receiving Environment

Emission of greenhouse gases in the atmosphere can lead to climatic impacts and changes including global warming. bp considers the receiving environment here as the global atmosphere even though the EPA GHG guidance is restricted to the State of WA.

WA climate projections summary report published by the State in 2021 (WA Gov, 2021) concluded the following:

Year 1910 - 2021

- Average temperature increase by approximately 1.3 degrees celcius
- Decrease in rainfall intensity in far west and southwest areas
- Increase in rainfall intensity over most of Western Australia
- Increase in bushfire events

Year 2021 - 2050

- Further increase in average temperature by 2 degrees celcius
- Increase in number of very hot days and an increase in extreme temperatures of above 40 degrees Celcius.
- Longer fire seasons in Western Australia expected
- Temperature rise by about 2 to 4 degrees along the WA coast.
- Reduced frequency of tropical cyclones
- Extreme rainfall events and very dry years are expected.

6.3.1 Existing GHG emissions

Previously bp Kwinana operated as a crude oil refinery and reported GHG emissions under the *National Greenhouse and Energy Reporting Act 2007* (NGER Act). The safeguarding baseline was 739,256 tCO2e/annum. In 2021, the crude oil refinery was shutdown and two steam boilers were installed to provide steam supply to the import terminal. The two main sources of Scope 1 emissions in current operation result from natural gas combustion in the two steam boilers and diesel use in stationary and mobile equipment onsite. In 2022 reporting year, bp Kwinana Scope 1 emissions were 23,505 t CO2e and Scope 2 emissions were 17,065 t CO2e. These emissions are ongoing and this proposal's emissions will be in addition to these.

bp Kwinana Energy Hub is committed under bp's strategy for all operations to be net zero by 2050. bp is exploring plans for the installation of solar panels to produce renewable power onsite.

6.4 Potential environmental impacts

6.4.1 Estimated GHG emissions

Estimated emissions during construction

The direct (Scope 1) GHG emissions during the construction phase of the Proposal will be predominantly related to the combustion of diesel by stationary and mobile equipment. An estimated 10,000 tonnes/annum CO_2e will be emitted over the 18-month construction period. Construction emissions are made up entirely of Scope 1 emissions from combustion of diesel for mobile and stationary equipment. Power requirements are expected to be small but are difficult to calculate at the current project stage. Estimates will be made and refined as the Proposal is progressed and construction details are known.

Estimated emissions during operations

The proposal will generate Scope 1 GHG emissions through the combustion of natural gas. The Proposal supports bp's strategy and EPA's guidelines to be net zero on an absolute basis from 2050 or earlier. This Proposal is also aligned to reducing to net zero the carbon intensity of products sold by 2050 or earlier. Specifically, the Proposal supports expansion and capability shift towards advanced biomass feeds and provides a decarbonisation offer to the market.

The main sources of GHG direct point source emissions are the combustion furnaces and fired heaters in the processing units. These sources are:

- Two revamped furnaces HYD2 & HYD3
- Two new furnaces PFU and HGU furnace
- Two new incinerators for electrical generation from biogas
- Reuse existing refinery flare and an additional flare for biogas

There are two types of CO_2 generated from point sources: black CO_2 from the combustion of natural gas and biogenic CO_2 from the combustion of the offgases from the process. Natural gas is imported by pipeline through the existing refinery natural gas line. When processing the renewable feedstocks, offgas containing light hydrocarbons is generated. The operation has been optimised to reuse this offgas as feed for hydrogen production and also as a fuel source for heating. As this offgas stems from a renewable source, the CO_2 generated is biogenic CO_2 and is exempt from Scope 1 emissions.

It is expected to be reported under the *National Greenhouse and Energy Reporting Act 2007* (NGER) and separate to Scope 1 emissions (aligned with the reporting requirements of the IPCC reporting guidelines for national inventories and practice).

Figure 6-1 shows bp Kwinana Energy Hub's GHG profile from a crude oil refinery to a biorefinery. The biorefinery emissions have significantly decreased by 87% compared to 2020 levels (the last full year the crude refinery was operated).

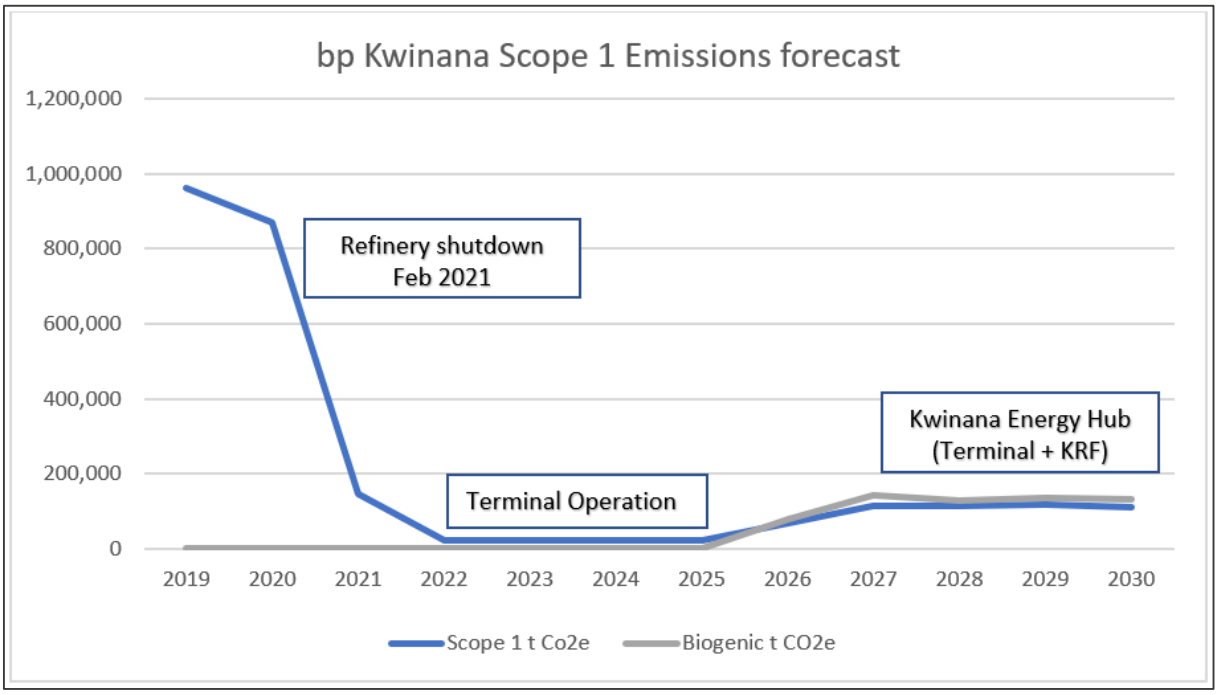

Figure 6-1 Predicted Scope 1 GHG emissions from the Proposal compared with Terminal operation (current use) and oil refinery (previous use)

An estimate of the GHG emissions is presented in Table 6-2 with Scope 1 emissions expected to be 120,000 t CO2e/annum and biogenic CO2 emissions estimated at 144,000 t CO2e/annum. The operating emissions are the proposed emissions bp expects in the future based on proposed feedstocks and also product demand. Different feedstocks have a different hydrogen demand which then alters the operation of the HGU and also the offgas generation. The hydrofiners can run in two operating modes, one to produce maximum renewable diesel and the other maximum SAF, both which have differing H_2 demand and different GHG emissions. This means product demand also affects the GHG emissions from the Proposal.

Scope 2 emissions are estimated to be 71,400 t CO2e/annum for the Proposal (Table 6-2, Figure 6-2) without any GHG mitigation strategy. The anaerobic digestor in the BDU will generate biogas which will be burnt in gas engines generating approximately 2.3 MW of power for the site. The Kwinana Energy Hub also plans to generate a portion of its own power through solar panels onsite, in addition to sourcing a green

power purchase agreement to ensure that external electricity demand will be from a renewable power source. Hence Scope 2 emissions are expected to be zero.

The products from the proposal have a lower carbon intensity than traditional fossil refined products, with the potential to reduce emissions by up to 80% relative to fossil fuels. The Scope 3 emissions associated with the products synthetic paraffinic kerosene (SPK) and hydrotreated vegetable oil (HVO) are proposed to be approximately **~600,000** t CO_2e/annum, subject to production mode of the facility. Other Scope 3 emissions will be validated through engagement with a GHG consultant.

Table 6-2 Estimated GHG emissions for KRF

Proposal stage	Type of emission	t CO2e/annum	Source
Construction Emissions	Estimated Scope 1 emissions	10,000	Diesel fuelled vehicles and equipment
Operating Emissions	Estimated Scope 1 emissions	120,000	Combustion of natural gas in the fired furnaces and reboilers
	Estimated Biogenic CO_2 emissions	144,000	Combustion of process offgas in the hydrogen generation unit
	Estimated Unmitigated Scope 2 emissions	71,400	Electricity demand for the proposal was calculated at 71,400 t CO2e/annum. With the generation of power from the BDU and the sourcing of a green power purchase agreement it is expected Scope 2 emissions will be zero.

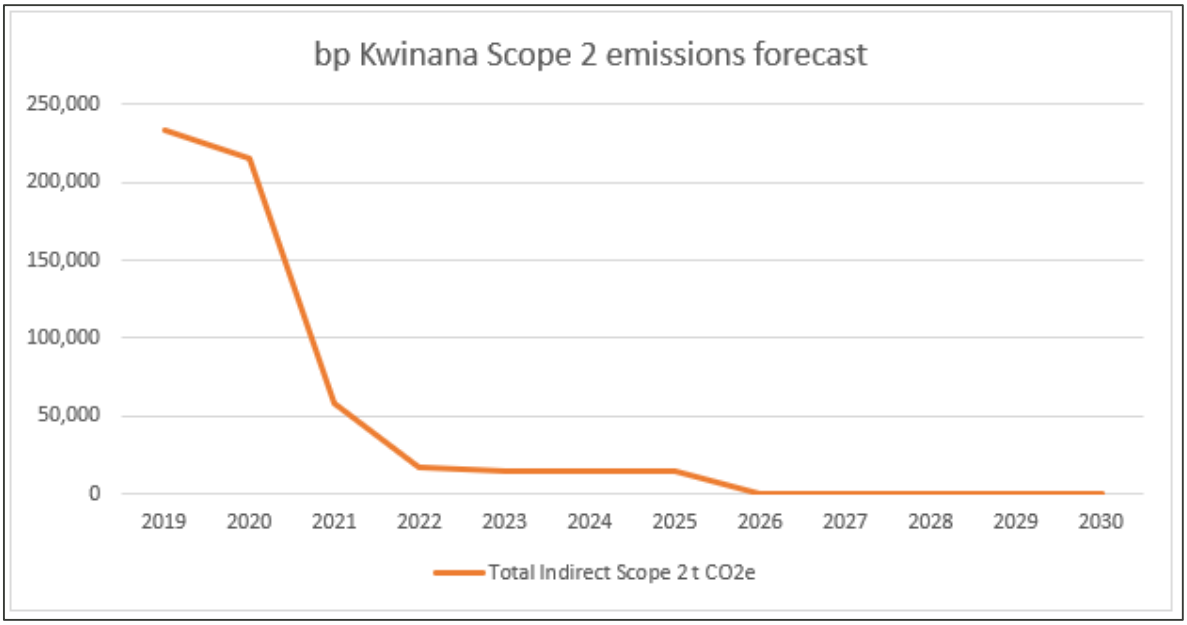

Figure 6-2 Predicted Scope 2 GHG emissions from the Proposal compared with Terminal operation (current use) and oil refinery (previous use)

6.5 Mitigation

bp is currently preparing a Greenhouse Gas Management Plan (GHG MP) for the Proposal which will demonstrate how bp plans to progressively decrease its net zero carbon emissions at the Kwinana Energy Hub by 2050. The GHG MP will cover the existing terminal operations and proposed bio-refinery operations.

- The EPA mitigation strategy will be adopted in the development of the management plan in the following order:
  - Avoidance – Biorefinery operations designed to avoid emissions where possible. A benchmarking exercise with similar operational industries will be undertaken to ensure emissions and energy intensities are minimised as far as practicable at this stage. A GHG consultant has been engaged to aid with the benchmarking study as the biorefinery is a new industry and difficult to current benchmark.
  - Reduction – Progressive reduction in emissions over life of operations such that a net carbon zero emission is achieved by 2050
  - Offset – Should avoidance and reduction not be possible, bp will propose an offset strategy to offset the residual emissions
- bp is committed to working with the EPA and State towards achieving the commitment under the Paris Agreement of limiting warming to well below two degrees Celsius (°C) above pre-industrial levels

Energy efficiency and greenhouse gas abatements have been adopted throughout the design of the facility. New technology will be installed that ensures the efficiency of the equipment meets best practice. Table 6-3 identifies the abatement opportunities that bp is planning to adopt.

Table 6-3 GHG Abatement Opportunities

Area	Abatement Opportunities
Choice of best available technology	■ Variable Speed drives ■ Higher efficiency motors ■ Burner control systems ■ Waste Heat recovery equipment ■ Over the years, as more advanced technology becomes available, bp will look at upgrading its assets to more sustainable technologies. The GHG MP will aim to further address this point
Location of Site	■ Existing site in industrial area leading to re-use of infrastructure ■ No clearing required therefore no additional scope 1 emissions ■ No export transport emissions as Kwinana site has a direct pipeline to Perth Airport ■ Reuse of existing refinery equipment and utilities ■ While not considered by EPA as a carbon mitigation strategy, re-use of existing infrastructure leads to the following: – Proposal infrastructure that has not reached its end of life can be used until failure and therefore the cradle to grave principle applies, where product use is maximised – An indirect reduction in GHG emissions due to new equipment not being manufactured and transported to site. – Also, existing equipment not needing to be decommissioned and therefore salvaged to nearby landfill. As a consequence, an initial reduction in Scope 1, 2 and 3 emissions can be expected ■ Decrease in transportation costs leading to decline in scope 1, 2 and 3 emissions (depending on the party responsible)
Hydrofiners (HYD2 and HYD3)	■ Repurposing the existing hydrofiners from refining operation, and in the process, reducing the Scope 1, 2 and 3 emissions that would arise from manufacturing, transportation and installation costs associated with new infrastructure ■ Only using HYD2 fired heater at startup, as preheat heat exchangers use the heat of reaction. This is considered an optimisation of engineering equipment to minimise GHG emissions ■ Catalyst selected to prefer the hydrodeoxygenation reaction over decarboxylation reaction which produces more water instead of carbon monoxide and carbon dioxide

Area	Abatement Opportunities
	▪ HYD3 fired heater designed to be energy efficient with preheat exchangers to maximise furnace inlet temperature, variable speed balance drives and an air preheater leading to a desired efficiency of 90% ▪ HYD3 receives feed directly from HYD2, ensuring that the feed is hot to minimise heating requirements
Product Fractionation Unit (PFU)	▪ Counter current heat exchanger network for energy recovery and to minimise reboiler requirements ▪ Fired boiler design incorporates energy efficiency equipment such as air preheaters and heat recovery ▪ Fractionation columns designed to have the optimal number of distillation trays to maximise fractionation efficiency and minimise reboiler requirements ▪ Fractionation columns are reboiled with steam where possible. This steam is generated via the waste heat system in the HGU and hence reduces natural gas requirements
Hydrogen Generation Unit (HGU)	▪ HGU will be the largest carbon dioxide emitter in the facility and has been designed taking into account GHG reduction technologies. The design also includes future installation of a carbon dioxide removal system. Due to lack of CO_2 sales outlet or CO_2 sequestration facility, it is currently not economic to pursue these options ▪ HGU has been designed to use the offgas (LPG stream) from the PFU as the feed, reducing the requirement to use natural gas as a feedstock ▪ Extensive flue gas waste heat recovery network producing steam ▪ High Temperature Shift reactor selected over a Medium temperature shift reactor as it generated lower CO_2 emissions ▪ Future projects in development onsite include green hydrogen which would be used as a feedstock to hydrotreaters, reducing demand and CO_2 emissions from HGU
Bio-digestor Unit (BDU)	The PTU waste streams are fermented in anaerobic digestor producing biogas. The biogas is combusted in gas engines creating power for the Kwinana Energy Hub.
Flaring	Flares are required for safety scenarios such as overpressure, however during normal operation the flare will not be operational. This is in-line with world and bp's no flaring policies. Should technologies be available prior to 2050 that could replace flaring, bp will investigate the feasibility of such technologies.

bp's intent is for this Proposal and the Kwinana Energy Hub to reach net zero by 2050 or earlier. The following technologies and projects are being explored and will be implemented if they are technically and financially feasible;

- Installation of solar panels on vacant refinery plot
- Exploring the feasibility of using the biogas generated in the anaerobic digestor (BDU) as a feed and or fuel to the HGU
- Future project work at Kwinana Energy Hub to produce green hydrogen (H2Kwinana) which could be used as a feedstock to hydrofiners, reducing demand and CO_2 emissions from HGU
- Design of the HGU to include future tie in points to retrofit a carbon dioxide removal system (carbon capture unit (CCU)) if a CO_2 sales outlet is available or a local CCS sequestration facility is constructed
- Offsetting of residual carbon emissions

6.6 Assessment and significance of residual impact

As the biorefinery is a new industry, bp have engaged a GHG consultant to provide guidance on the industry, perform benchmarking assessments and aid in the development of a GHG MP that meets EPA and the

latest Clean Energy Regulations. bp acknowledges that the GHG management plan is in development, with expected completion mid 2023. Detailed Scope 3 GHG emissions calculation will be undertaken during this engagement and abatement opportunities will be further assessed. The GHG MP will be developed taking into consideration the EPA mitigation hierarchy. The GHG MP will be peer reviewed prior to submission to the EPA or relevant authority.

Should there be residual impacts after application of the avoidance and minimisation elements, offsets of the GHG will be explored and documented in the management plan.

bp will also investigate the feasibility of progressive decarbonisation by 2050 and document in the MP how the operation will decarbonise its assets. Interim targets for the proposed reductions will be set in the GHG MP in accordance with EPA guidance.

6.7 Environmental outcomes

The expected GHG emissions from the proposal are 87% lower than when the Kwinana Energy Hub operated at as a crude oil refinery. bp is committed to net zero across its operations by 2050 and to meet this requirement bp is:

- Incorporating several GHG emission abatements in the KRF design
- Planning on using green hydrogen directly rather than generate it from the HGU
- Investigating CCU and CCS if these options become feasible

As the bp Kwinana Energy Hub is committed to net zero and developing a GHG MP with mitigation methods and reduction targets, it is considered that the EPA's objective for Greenhouse gas emissions will be met.

7 Other Environmental Factors or Matters

Environmental factors considered relevant to the Proposal but unlikely to experience a significant impact include:

- Marine Environmental Quality
- Flora and vegetation
- Terrestrial Environmental Quality
- Terrestrial Fauna
- Inland Waters
- Air Quality
- Social Surroundings

A summary assessment of how these other environmental factors have been considered for the Proposal is provided below (Table 7-1).

The factors of ‘Coastal Processes’, ‘Benthic Communities and Habitats’, ‘Marine Fauna’, ‘Landforms’, ‘Subterranean Fauna’, and ‘Human Health’ were not considered relevant to the Proposal (see Table 5-1) and are not addressed.

Table 7-1 Assessment of other environmental factors

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
Theme: Sea				
Marine Environmental Quality	Objective: *To maintain the quality of water, sediment, and biota so that environmental values are protected.* Guidance: *Environmental Factor Guideline: Marine Environmental Quality* (EPA, 2016g)	Cockburn Sound is adjacent to the PDE and is one of the most extensively used marine areas in WA and is a significant economic, environmental and social asset for the state. Cockburn Sound is sheltered from ocean swells by Garden Island, and the sheltered waters support recreational and commercial fishing and aquaculture, as well as extensive port facilities, a naval base, and marine maintenance shipyards. Refer to section 1.4.6. The Cockburn Sound marine ecosystem has been heavily modified relative to pre-European development and the subsequent industrial discharges, contaminated land and groundwater inputs, coastal modifications and fishing pressures. The CSMC were established to coordinate environmental management and planning of Cockburn Sound and its catchment area to ensure a healthy marine ecosystem so that the economic, environmental and social values are balanced. In parallel, the EPA released *State Environmental (Cockburn Sound) Policy 2015* which provides a management framework that outlines environmental values, objectives and criteria for EIA of new projects and ongoing regulation of project-specific emissions, monitoring, management and offset conditions. (BMT, 2018) The Sepia Depression Ocean Outlet Monitoring and Management Plan (BMT Oceanica, 2014) addresses the requirements for monitoring and management of the SDOOL in accordance with MS 665, including remedial actions should water quality exceed identified standards. The Water Corporation's *Compliance Assessment Report 2021-22 Ministerial Statement 665*	**It is considered that the EPA's environmental objective for Marine Environmental Quality will be met**, given that: ■ Treated wastewater and stormwater from the Proposal will be discharged to the marine environment via SDOOL effluent pipework in accordance with bp's Prescribed Premises Licence L5938/1967/12. ■ The Proposal's design has used the current licence thresholds as the design basis, hence the effluent from the Proposal will meet the licence conditions. bp will not be seeking an amendment to the Part V Prescribed Premise licence for process wastewater stream as part of this Proposal. ■ The combined Proposal wastewater effluent to be treated at the existing wastewater treatment plant is 150kL/day. The existing wastewater treatment plant is licenced for 7.93ML/day hence has sufficient capacity to treat the Proposal's wastewater stream. ■ The contaminants of the effluent are expected to be the same as outlined in the current licence and within the licence wastewater discharge limits. Wastewater will be generated from all processing units (HYD2, HYD3, HGU, PTU, PFU and BDU). Water reuse has been considered where possible in the design to reduce the quantity of effluent.	■ Proposal design is using current Licence limits as design basis. ■ Existing wastewater treatment plant can treat contaminants in Proposal's effluent and has sufficient capacity for this additional streams ■ Operating procedures

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
		reports that the Environment Quality Criteria for Maintenance of Ecosystem Integrity were all met for the period and hence the risk is low to the marine environment from the combined industry effluent discharge to SDOOL. (Water Corporation, 2022)		
Theme: Land				
Flora and vegetation	Objective: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained.* Guidance: *Environmental Factor Guideline: Flora and Vegetation* (EPA, 2016a)	The PDE is predominantly cleared areas and existing hardstand from some 65 years of oil refinery operation. A strip of remnant coastal vegetation runs along the western boundary of the PDE; however, this is approximately 300 m west of the KRF. There are no environmentally sensitive areas within the PDE. The KRF footprint has been completely cleared. Any conservation significant flora species that may be present in remnant vegetation of the PDE and surrounds has no habitat available in the KRF footprint (Appendix A).	**It is considered that the EPA's environmental objective for Flora and Vegetation will be met**, given that: ▪ The Proposal does not involve any clearing of native vegetation ▪ Potential indirect impacts to native vegetation through smothering (fugitive dust during construction), and introduction and dispersal of weed species within the PDE through plant, vehicle and personnel movement during construction and operation, will be managed by a construction management plan and existing operational management plans ▪ Hardstand around KRF plant areas collects runoff which is treated at the WWTP	▪ Dust will be managed through the construction management plan.
Terrestrial Environmental Quality	Objective: *To maintain the quality of land and soils so that environmental values are protected.* Guidance: *Environmental Factor Guideline: Terrestrial Environmental Quality* (EPA, 2016e)	<u>Contaminated sites</u> The premises is currently classified as 'contaminated – remediation required' under the *Contaminated Sites Act 2003* (CS Act). Residual contamination issues from historical activities on the premises continue to be managed under the CS Act in consultation with DWER – Contaminated Sites Department. Current information indicates that hydrocarbons and metals may be present in soils across the site and PFAS substances within soils associated within the fire training facility. The extent of any impacts in soil is	**It is considered that the EPA's environmental objective for Terrestrial Environmental Quality will be met**, given that: ▪ bp is currently investigating alternative disposal options for waste material from the bio-digester. A specialist has been engaged to investigate options for composting the waste material, or use of third-party waste-to-heat incinerator technology is also being considered. As a last resort, waste material would be disposed of by truck at a licensed	▪ Waste hierarchy through design and investigating reuse options where feasible ▪ Dedicated waste storage and treatment areas that met standards ▪ Waste management plan

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
		unknown. bp is currently undertaking a Detailed Site Investigation (DSI) for the site in consultation with DWER. It is anticipated that the DSI shall be completed in Q2 2023, and a MAR presented to DWER in Q3 2023. ■ Site investigation, monitoring and remediation activities are covered by the CS Act and Prescribed Premise Licence L5938/1967/12). which are ongoing for the site and not affected by the refinery closure or the Proposal. bp is in regular communication with DWER and external auditors Initial meeting with DWER determined that Contaminated Sites is unlikely to be considered as a key factor provided that the site is already known to have historical site contamination issues and that DWER contaminated sites department is currently overlooking the site contamination issues on the site. <u>Waste material</u> Infrastructure and processes for general waste and process wastes such as catalyst are already in existence from the site's previous use as an oil refinery.	local landfill facility (Class III landfill) in accordance with regulatory requirements ■ The Proposal will likely store hazardous chemicals that could potentially be released to the environment. This will be managed under Part V – Works Approval Application where the infrastructure would be assessed for its structural integrity. Part of the assessment would also be covered under the Dangerous Goods Licence ■ The proposed KRF will have a workforce comparable to when the site operated as an oil refinery and will utilise existing infrastructure and waste management procedures Potential impacts of the Proposal include: ■ Construction: – The Proposal would generate construction wastes such as packaging, scrap metal, oils/lubes and general wastes which could impact terrestrial environmental quality if waste storage, treatment, transport and disposal processes are not appropriate ■ Operation: – Generation of waste streams including: ■ Solid waste from the bio-digester ■ Bag or cartridge process filters ■ Process wastes such as catalysts or packing that would be replaced at major maintenance events	■ Construction plan ■ Commissioning / start-up procedure ■ Operating Procedures ■ Inventory management

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
			▪ General waste from workforce and site offices which would be no different to previous refinery operation – Spills / leaks arising from: ▪ Chemical use, storage and pipework associated with the PTU (caustic and citric acid) ▪ Feedstock ▪ Storage, treatment, transport and disposal of BDU digestor sludge (37 TPD) ▪ Hydrocarbons from plant and vehicle operation and maintenance/refuelling	
Terrestrial Fauna	Objective: *To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.* Guidance: *Environmental Factor Guideline: Terrestrial Fauna* (EPA, 2016f)	The KRF footprint is completely cleared and is largely hardstand areas. Patches of remnant vegetation within the PDE and surrounding land parcels may provide suitable habitat for Quenda. Other conservation significant fauna that could plausibly occur in the KRF include the Peregrine Falcon, which can be found on coastal cliffs and high city buildings, and the Perth Slider which may inhabit loose sand beneath bulldozer soil and discarded rubbish. Eucalypt trees that could support foraging and roosting of Carnaby's Cockatoo are present in the eastern boundaries of neighbouring land parcels but there is no habitat for them in the KRF footprint. Pest management for the site is contracted to a local pest control company. See Section 1.4.10 for further information on conservation significant fauna and fauna habitats.	**It is considered that the EPA's environmental objective for Terrestrial Fauna will be met**, given that: ▪ The Proposal will not remove or directly impact fauna habitat ▪ Quenda, Peregrine Falcon and Perth Slider could possibly occur in the KRF footprint, but the Proposal would not impact upon their conservation status ▪ Indirect impacts in the form of construction or operational noise and increased personnel on site are not anticipated to be any greater than when the site was used as an oil refinery ▪ bp will continue to manage pest species on site	▪ Existing waste management plans onsite ▪ Construction Management Plan
Theme: Water				

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
Inland Waters	Objective: *To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.* Guidance: *Environmental Factor Guideline: Inland Waters* (EPA, 2018)	<u>Surface water</u> There are no natural surface water courses or wetlands in the PDE. The porous nature of the sandy soils provides for rapid infiltration of rainwater. The PDE is adjacent to the coastline of Cockburn Sound and its management framework the *State Environmental (Cockburn Sound) Policy 2015*. <u>Groundwater</u> The PDE is located within the Murray River Basin and Cockburn/Kwinana Coastal Sub-catchment and within the Wellard subarea of the RIWI Act-proclaimed Cockburn Groundwater Area. bp holds an abstraction licence, GWL60605(6), with an allocation of 486,000 kL annually for industrial processing purposes. Groundwater abstraction is in accordance with an operating strategy and subject to groundwater monitoring. GWL60605(6) expires 21 August 2030. <u>Current management of site surface water</u> Process unit areas that have hardstand will collect site surface water in the sewer system where it will be directed to the WWTP for treatment. The tankfarm consists of earthen bunds built to the standard at the time. Spills and leaks are managed under existing management plans for the site. Further background on Inland Waters is provided in Section 1.4 for hydrogeology and and groundwater (Section 1.4.4), surface water and wetlands (Section 1.4.5) and existing contamination (Table 7-1).	**It is considered that the EPA's environmental objective for Inland Waters will be met**, given that: ■ Water use hierarchy has been applied, with water resources required for operation and maintenance of the KRF to be predominantly reclaimed plant water from the KWRP ■ No discharge to inland waters is proposed ■ New process units will be hardstand connected to the oily water sewer system which is directed to the WWTP for treatment ■ The Prescribed Premises licence will be amended as appropriate by a Works Approval submitted to DWER (see Table 2-1) Potential impacts of the Proposal include: ■ Construction impacts: – Bulk earthworks leading to minor impacts – Management of wastewater discharges from construction works (sewage) – Spills and leaks of hydrocarbons from plant and vehicle operation and maintenance ■ Operational impacts: – Water resources required for KRF operation need to be appropriately managed to prevent resource loss. Proposed water resource use includes: ■ Approximately 86 tonne/h of KWRP water is required for cooling tower makeup water, washwater and boiler	■ Water use hierarchy by using KWRP as main source of water for the proposal. Potable water will only be used in situations where KWRP is unavailable ■ Wastewater will be collected, treated at onsite WWTP, and disposed of in accordance with the existing Prescribed Premises licence. Recycling washwater and steam condensate where possible ■ Washwater optimisation through control systems ■ Adherence to existing spill and leak management plans for the site ■ Dewatering licence for depths > 2m ■ Water use flowmeter monitoring and reporting ■ Construction Management Plan containing

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
			feed water for the proposal. Design has indicated only KWRP water required so far. If groundwater is required, it is expected to be minimal and well within the threshold allocated in abstraction licence GWL60605(6) – Spills / leaks of: ▪ Renewable feedstocks, chemicals and hydrocarbons	hydrotesting and flushing plan to reuse water where possible ▪ Groundwater abstraction not to exceed existing GWL60605(6) allocation ▪ Maintenance programs ▪ Commissioning /start up procedures to ensure water minimalisation ▪ Operating procedures ▪ Maximising air coolers as preferred heat exchange equipment where feasible
Theme: Air				
Air Quality	Refer to Section 7.1 below			
Theme: People				
Social Surroundings	Objective: *To protect social surroundings from significant harm.* Guidance: *Environmental Factor Guideline: Social Surroundings* (EPA, 2016d)	<u>Noise</u> General information regarding the sensitive receptors has been provided in Section 1.4.8. Noise management in WA is implemented through the Environmental Protection (Noise) Regulations 1997 (Noise Regulations). The Noise Regulations set noise limits which are the highest noise levels that can be received at noise-sensitive, commercial and industrial	**It is considered that the EPA's environmental objective for Social Surroundings will be met**, given that: ▪ Noise can affect community livelihoods (e.g. temporary or permanent physical or economic resettlement, disruption to ecosystem goods & services). Potential noise impacts of the Proposal include noise from construction of	▪ The noise from the proposal has been modelled and achieves full compliance with the noise regulations ▪ Construction management plan to require outlining that

<table>
<tr><th>Factor</th><th>EPA Objective and Guidance</th><th>Receiving environment</th><th>Assessment of potential impact</th><th>Proposed mitigation</th></tr>
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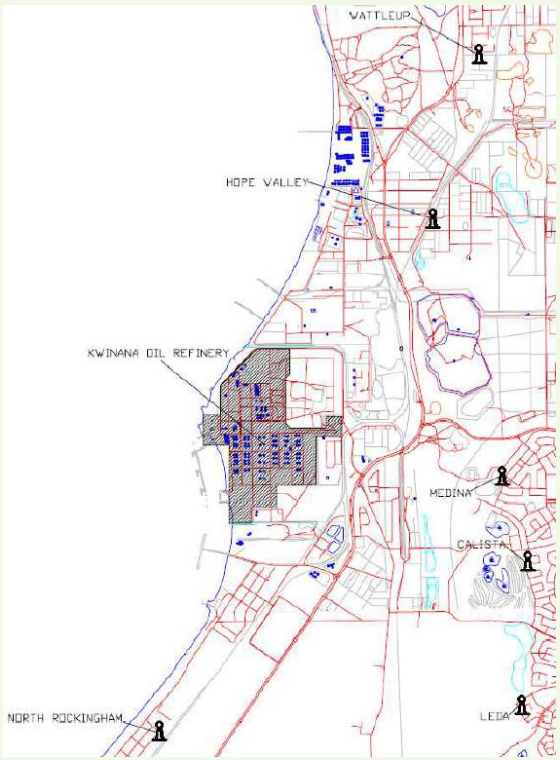
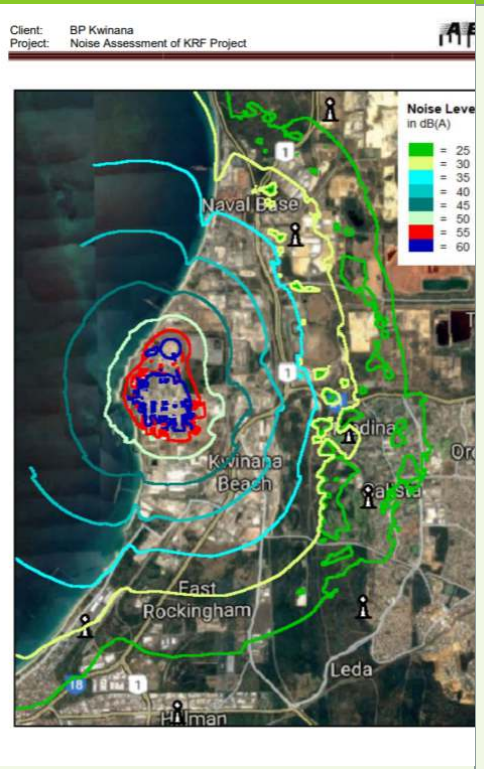
<td>premises. These noise limits are defined as ‘assigned noise levels’ at receiver locations and there are different assigned noise levels for different time periods with night-time being the lowest. Under the Noise Regulations, noise emissions must not exceed or significantly contribute to noise exceeding the assigned level. A noise emission significantly contributes where it is <5dB below the assigned level.

The KIC has selected seven noise sensitive receivers to represent the worst-case noise-sensitive receivers for the residential areas near the KIA: North Rockingham, Hillman, Leda, Calista, Medina, Hope Valley, and Wattleup (Figure 7-1). The assigned noise levels for these receivers are stated in the 2006 KIC Update Report B and shown below:

<table>
<tr><td>Receiver</td><td colspan="3">Assigned noise Levels L_{A10} in dB(A)</td></tr>
<tr><td></td><td>Day (7am-7pm, Mon-Sat)</td><td>Evening (7-10pm) & Sun / PH (9am-7pm)</td><td>Night (10pm-7am (9am on Sun / PH))</td></tr>
<tr><td>Calista</td><td>46</td><td>41</td><td>36</td></tr>
<tr><td>Hillman</td><td>55</td><td>50</td><td>45</td></tr>
<tr><td>Hope Valley</td><td>52</td><td>47</td><td>42</td></tr>
<tr><td>Leda</td><td>45</td><td>40</td><td>35</td></tr>
<tr><td>Medina</td><td>49</td><td>44</td><td>39</td></tr>
<tr><td>North Rockingham</td><td>50</td><td>45</td><td>40</td></tr>
<tr><td>Wattleup</td><td>55</td><td>50</td><td>45</td></tr>
<tr><td>Industrial premises in KIA</td><td>75</td><td>75</td><td>75</td></tr>
</table>
</td>
<td>the plant, vehicles and biorefinery operational noise

Noise from the Proposal has been modelled and has shown that bp Kwinana operations (including the Proposal) achieves full compliance to the regulations at the site boundary and sensitive receptors (AES, 2023). The Proposal is not a significant noise contributor at the KIC noise sensitive receptors. Two scenarios were modelled - the first with proposed units online and the second with the addition of a flaring event during abnormal operation.

Figure 7-2 below demonstrates that the worst case 65dB(A) noise contours are kept within the bp site.</td>
<td>noisy work to be completed in dayshift
■ Commissioning management plan
■ Stakeholder engagement Plan for affected community / industry
■ All equipment has to meet engineering design specifications of 85 dB at 1 m</td>
</tr>
</table>

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
		 Figure 7-1 KIC-selected noise-sensitive receivers to KIA (Hillman not shown (further south)) Noise assessment of terminal operations A baseline noise study of the terminal operations has been completed and shows that terminal operations is not a significant noise contributor and achieves full compliance with the noise regulations (AES, 2023).	 Figure 7-2 Worst case noise contours	

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
		Odour Current potential sources of odour from the PDE include: ■ WWTP ■ Waste Management Area (or Land Farm) which still receives biosolids (spent bugs) from the WWTP and centrifuge oily solids from tank sludges ■ Intermittent hydrocarbon odours from: – Deconstruction activities (northern section of PDE) – Hydro blasting zone (where infrastructure is high-pressure cleaned) (east of the WWTP) – Storage tanks filled with petrol, diesel, jet fuel and fuel oil, as vents may bring hydrocarbon odour to ground level	With the introduction of organic feedstocks, it is expected that the Proposal may result in different odours being generated at the Kwinana Energy Hub. Potential sources of odour associated with the Proposal include: ■ Feedstock storage (tanks equipped with vents) ■ PTU for the feedstock (fitted with a caustic odour scrubber) ■ BDU operation (odour abatement controls) It is considered unlikely that the liquid waste stream at the WWTP will vary due to the Proposal and hence the odour profile of WWTP will remain as per current operations. Treated feedstocks are not expected to be sources of odour during the hydrotreatment, distillation and production processes. An odour specialist consultancy has been engaged to undertake a detailed odour analysis for the Proposal with reference to *Guideline: Odour Emissions* (DWER, 2019) and its recommended tools. The odour risk assessment has shown that the new proposed activities for KRF will have low residual impacts regarding odour (Ramboll, 2023). The scope of works for the analysis was presented to the DWER Air Quality Branch on 17 January 2023 and accepted with no comments (Table 3-2). The odour risk assessment concluded: ■ The location review shows that there are no critical aspects related to the terrain, neighbourhood or meteorological conditions that would likely increase the risk of odour impacts. Sensitive receptors were located	■ Odour abatement systems and controls included in the design, to minimise nuisance odours ■ Raw feedstocks managed to ensure they are processed in a timely manner ■ PTU fitted with a caustic scrubber system to absorb any odour before release to the atmosphere ■ Annual odour monitoring to occur at the stack exhaust to measure odour concentration and verify that odour abatement systems are working ■ Sampling of the caustic scrubber by operations to ensure optimal pH is maintained ■ Odour management plan

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
			beyond 1,500m and several close industrial receptors are themselves odour emitters. ■ From analysis of the current odour surveys and future operations, the future odour footprint is likely to be similar to the current one. The whole site including the Proposal should be considered low risk from an odour point of view	
			<u>Fugitive dust</u> The Proposal involves some earthworks and excavations for the new-build items including setting foundations and sewer replacement. Minimal dust is expected to be generated during these construction activities, however dust suppression will be used if this is identified as an issue. The PTU spent bleaching earth and filter aid loading systems can generate fugitive dusts. Pneumatic conveying systems for these materials have dust filtration systems on the receiving silos to remove dust from the conveying air prior to discharge.	■ Construction management plan, including dust management ■ Design and installation of dust filtration systems on receiving silos
		<u>Aboriginal heritage and culture</u> General information regarding Aboriginal heritage has been provided in Section 1.4.9. There are no known Aboriginal heritage places within the KRF footprint or the PDE. The nearest registered site is Thomas Oval, approximately 2.5 km east southeast of the KRF footprint and 1.7 km southeast of the PDE.	The Proposal is unlikely to result in any direct or indirect impacts to heritage. There are no heritage places within 500 m of the PDE and there is a very low likelihood of unexpected finds given the disturbed nature and existing infrastructure of the KRF footprint.	■ bp engaging per Reconciliation Action Plan and stakeholder engagement plan

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
		The Proposal is located within the Southwest Settlement Native Title Determinant Area. <u>European heritage</u> General information regarding Aboriginal heritage has been provided in Section 1.4.9. There are no World, National or Commonwealth heritage places within 2 km of the PDE. The nearest State heritage area is the "Kwinana Signal Box" of the Kwinana Railway marshalling Yards (Place Number: 3112) located approximately 800 m and 1.6 km east-southeast of the KRF and PDE respectively.		
		<u>Economic</u> bp's Kwinana site has been in operation since 1955 and is considered a vital strategic asset for WA as it supplies a substantial volume of WA's fuel requirements and is a major employer in Perth's south metropolitan area (Government of WA, 2016). This economic value to the State is recognised by a State Agreement, the *Oil Refinery (Kwinana) Agreement 1952* (further information on the State Agreement is provided in Section 2.1.3). The site ceased operation as an oil refinery in 2021 with a phased transition to import-only to ensure continuity of fuel supply for WA (Government of WA, 2020). Closure of the oil refinery (announced 30 October 2020) generated significant interest from stakeholders and local community. At the time of the announcement, bp indicated it would explore opportunities for clean energy solutions for the site's reuse. To date, most of the enquiries received during stakeholder engagement for the Proposal related to employment and contract opportunities.	The Proposal will provide local jobs and opportunities, both directly during construction and operation and indirectly through supporting the Australian and global agri-energy sector and other feedstock development.	None proposed. The Proposal is considered of economic benefit to the local and regional areas as well as the State.

Factor	EPA Objective and Guidance	Receiving environment	Assessment of potential impact	Proposed mitigation
		Traffic The PDE is accessible by an existing external road network including Rockingham Road and Mason Road, which provides access to the northern portion of the site. There is an existing internal road network throughout the site.	The Proposal is unlikely to have a significant impact on road infrastructure or traffic, given that: ■ Additional traffic during construction phase will be managed under a Traffic Management Plan ■ No changes are proposed to existing access, car parking or movement on site. Site access from Rockingham Road and Mason Road and the established internal road network will be maintained ■ Operational traffic is anticipated to be less than former refining impacts	■ Traffic Management Plan ■ Stakeholder Engagement Plan to involve discussion with Main Roads to understand impact and also affected community / industry

7.1 Air quality

The EPA's (EPA, 2020a) current objective for the environmental factor air quality is to:

> "*maintain air quality and minimise emissions so that environmental values are protected.*"

7.1.1 Receiving environment

Current receiving environment for air quality is the Kwinana Air Space legislated under Part III of the EP Act and managed under Part V of the EP Act. The Proposal is located in the KIA and the local airshed receives pollutants from various industry sources. In addition to the National Environment Protection Measures (NEPMs), the air shed is also regulated through the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999* and Environmental Protection (Kwinana) (Atmospheric Wastes) Regulations 1992. Previously bp has been allocated air shed space within the Policy area. bp's current Part V Licence monitors air quality emissions.

The sensitive receptors are shown in Figure 1-7 Sensitive receptorsand include nearby parks, school and childcare facilities and residential developments. DWER have air quality monitoring sites around the KIA to monitor industrial air shed quality and monitor photochemical oxidants (ozone), oxides of nitrogen and sulphur dioxide. The Ambient air quality standards for those analytes were not exceeded in 2021 as discussed in *2021 Western Australian Air monitoring report* compiled annually by DWER.

Under current operations at the Kwinana site, two gas-fired steam boilers (installed under works approval W6563/2021/1 (granted September 2021) to support fuel import activities) are the only point source of emissions to air from the premises. Air dispersion modelling for these steam boilers were presented to DWER as part of the Works Approval and showed that the ground level concentrations of nitrogen oxides beyond the site boundary were well below the guidelines.

Currently, air quality arising from the Kwinana operations is being managed under the Prescribed Premises Licence – L5938/1967/12 under Condition 21 and 22. Several air quality conditions were removed from the Prescribed Premises Licence once oil refining operations ceased onsite.

7.1.2 Potential environmental impacts and proposed mitigation

It is expected that air emissions from the Proposal will be addressed by amendment of the Part V Licence. Odour modelling has been completed and air dispersion modelling will be undertaken and provided to DWER with the Part V works approval application.

Modelling studies are currently being undertaken by bp for air quality. The air quality consultant has been commissioned to investigate the following:

1. Air quality emission impacts to the Kwinana air shed space
2. Comparison of proposed air quality emissions compared to previous refinery operations
3. Cumulative impact assessment

During crude oil refining operations (2010) bp completed air dispersion modelling that demonstrated emissions from operations at the time were under NEPM guidelines for NO_x and SO_2.

This proposal's emissions are much lower than oil refinery emissions, as such it would be expected that these emissions are well within the NEPM guidelines. This will be confirmed when the ambient air quality assessment is completed. bp has discussed this assumption and its planned assessments with DWER Air Quality that confirmed it was adequate.

bp is currently allowed to emit sulphur dioxide in the atmosphere in accordance with Part III of the EP Act which is being managed by DWER Part V Air Quality branch. Initial investigations have determined that proposed emissions are unlikely to exceed current approved threshold limits for bp operations.

Provided that DWER Part V Air Quality branch has been the decision-making authority to monitor emissions by bp in the Kwinana Industrial Area, bp has assumed that DWER Part V Air Quality branch will regulate the new proposed emission.

Potential impacts of the Proposal on air quality include:

- Construction:
  - Exhaust from plant and vehicles
  - Dust from earthworks and vehicle movements
- Operation:
  - Air emissions resulting from the combustion of natural gas or process offgas in the fired furnaces, reboilers and the HGU. The NPI guide for combustion of natural gas in boilers indicates that it is likely to have these emissions - carbon monoxide, particulates, volatile organic compounds, polycyclic aromatic hydrocarbons, sulfur dioxide, oxides of nitrogen, dioxins and furans and various metals
  - Initial calculations indicate that air quality emissions from the Proposal will not exceed the allocated limits; however further air quality modelling is required to understand impacts from all air emissions from the various stacks and their dispersion profile.
  - Emissions during commissioning are expected to be higher than during normal operation due to excess flaring
  - Odour impacts from emissions from odour abatement stacks, renewable feedstock tank vents and storage. The odour risk assessment has concluded that the new operations from this proposal will have low residual potential impacts regarding to odour and should be considered low risk
  - Release of particulates and water vapour from cooling tower plume (potentially impacting human health)
  - Dust/particulates from PTU clean bleaching earth unloading system are expected and the design includes installation of dust filtration systems on receiving silos
  - Fugitive leaks (VOCs) reducing local and regional air quality (potentially impacting human health). Additional emissions are likely to occur during start-up / shutdown and maintenance activities, including:
    - Venting of offgas (NO_x and SO_x, VOCs) to the flare due to safety/unit issues, such as during operational startup processes (estimated to occur once every 2 years)
    - Vessel venting in preparation for maintenance activities.

Mitigation for emissions includes:

- Commissioning and start-up procedures
- Design controls (for the burner, cooling tower, clean bleaching earth system)
- Burner maintenance
- Operating procedures to ensure complete combustion (e.g. excess O_2 control) and optimal operation
- Truck unloading/system management
- Maintenance programs
- Flare & Unit startup, Operational procedures and Maintenance procedures

Predicted emissions during normal operation are detailed for NO_x and SO_2 below.

NO_x

The majority of NO_x generated in the Proposal is thermal NO_x resulting from the combustion of air with fuel gas to generate heat for the process. There are very small amounts of nitrogen in the renewable feedstocks

and hence a small amount of fuel NO_x is generated. NO_x generation is considered relatively constant as it is not expected to differ with varying feedstocks.

As an oil refinery, NO_x emissions were dependent on crude slate and operation of several combustion furnaces, and NO_x emissions ranged between 25g/s and 30g/s. The proposed KRF biorefinery is expected to have much lower NO_x emissions, estimated at less than 10g/s (Figure 7-3). Air dispersion modelling for NOx for the former oil refinery showed that the NO_x was well within the NEPM air quality standard for normal operation at closest sensitive receptors and it is expected that this proposal will also be within the thresholds. The air dispersion modelling currently being undertaken by the consultant will confirm this and also confirm that the NOx emissions will conform to the future reduction in the NEPM NOx standards.

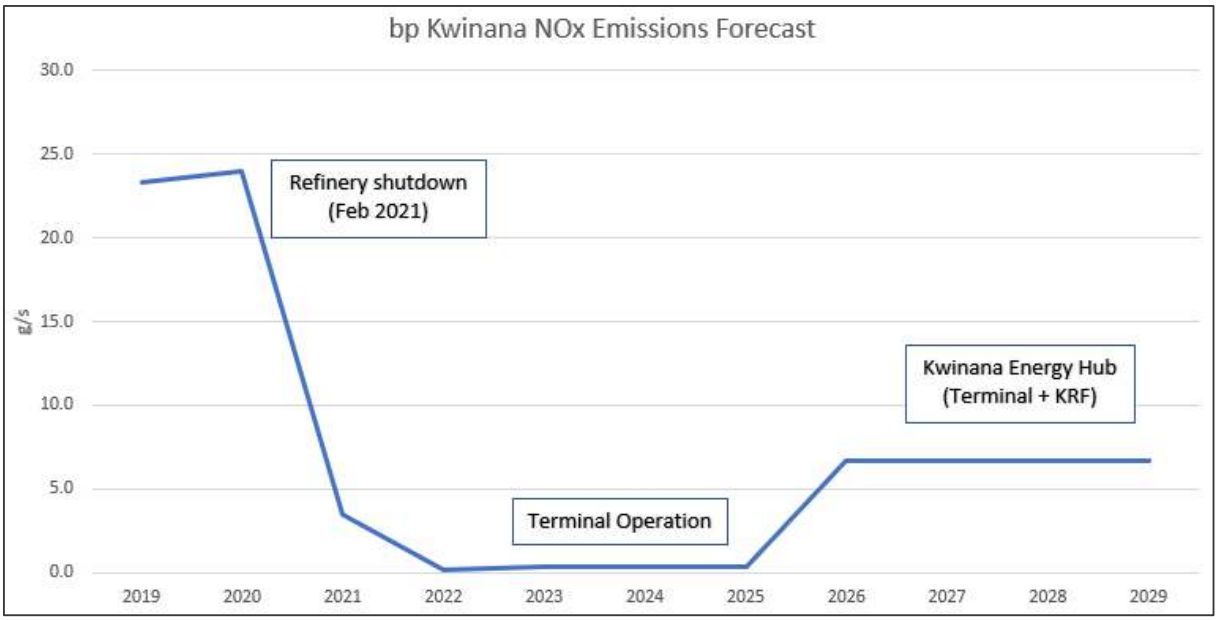


Figure 7-3 Predicted NOx emissions from the Proposal compared with Terminal operation (current use) and oil refinery (previous use)

The biorefinery will employ the following technology to control NOx emissions

- Low NOx burners installed on new build furnaces
- Installation of online process monitoring on the largest NOx point source, the HGU stack, to alert operations of upset conditions and also allow optimization
- Burner Management Systems installed on the combustion furnaces to optimize combustion
- Routine stacktesting will be conducted to monitor emissions, verify any online analysers and ensure emissions are within expected range

SO_2

The majority of SO_2 generated in the biorefinery is from combustion of process off-gases. These off-gases contain hydrogen sulphided (H2S), produced from the dimethyl disulphide that is injected into the HYD2 feed to maintain the HYD2 catalyst in a sulphided state". The H_2S migrates downstream to end up as feed and fuel for the HGU, where it is combusted in the reformer and SO_2 is produced. The sulphur content in the renewable feedstocks is very low and only marginally contributes to the SO_2 emissions.

SO_2 emissions from the proposed KRF biorefinery are expected to be within approximately 4% of bp's maximum permissible allocation. This is a significant reduction when compared to the former oil refinery (Figure 7-4). Redetermination of the maximum permissible quantities for the Kwinana region should not be necessary as SO_2 emissions from the Proposal and bp's future operations are anticipated to be significantly below their current allocation.

SO_2 emissions are controlled by bp's DMDS injection dosing and online control systems will alert operations if overdosing occurs. As such, it expected that the level of SO_2 emissions would be fairly constant over time and will depend on processing rate, rather than feedstock variability.

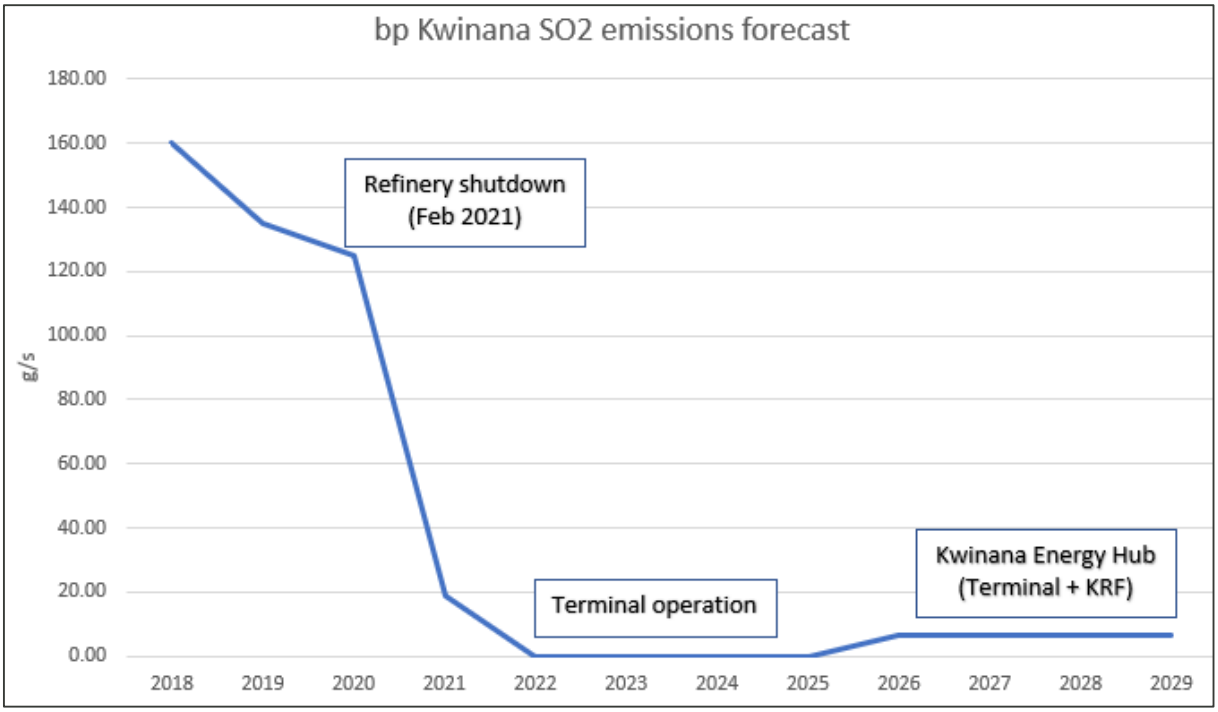


Figure 7-4 Predicted SO2 emissions from the Proposal compared with Terminal operation (current use) and oil refinery (previous use)

7.1.3 Environmental outcomes

The air dispersion modelling assessment is expected to indicate that the emissions of NO_x and SO_2 will be within the latest NEPM guidelines and also conform to the future reduction in NEPM guidelines. The expected emissions from the proposal may be managed with reference to existing controls as regulated under Part V of the EP Act by DWER and in accordance with the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999.*

It is considered that the EPA's objective for emissions and air quality will be met.

8 Offsets

No biodiversity offsets are proposed for this Proposal. After application of the mitigation hierarchy, should there be any residual greenhouse gas emissions, the GHG is planned to be offset.

The GHG MP will detail the offset strategy in relation to this factor.

9 Matters of National Environmental Significance

A MNES assessment was undertaken to determine whether any MNES may occur within the KRF footprint and PDE, and if so, whether the Proposal may potentially impact that MNES (Table 9-1). This assessment has been informed by the DCCEEW's EPBC Act Protected Matters Search Tool (PMST) (DCCEEW, 2023) for a 2 km buffer of the PDE (Appendix B) and a likelihood of occurrence assessment for threated and migratory species identified as potentially occurring in the PDE (Appendix A). The MNES assessment concluded that the Proposal is unlikely to have a significant impact on any MNES and so the Proposal has not been referred to the DCCEEW for assessment under the EPBC Act.

Table 9-1 Assessment of MNES likelihood of occurrence and potential impact of the Proposal

MNES	Potential presence within PDE and KRF footprint
World heritage properties	None present
National heritage places	None present
Wetlands of international importance	At its nearest point, the Forrestdale and Thomsons Lakes are approximately 8 km northeast of the PDE and 8.2 km northeast of the KRF footprint.
Nationally threatened species and ecological communities	A likelihood of occurrence assessment (Appendix A) did not identify any nationally threatened species as 'possible' or 'likely to occur within the KRF. Some threatened species are known from the coastal area along the western boundary of the PDE, including Fairy Terns (listed Vulnerable under the EPBC Act and BC Act), which were known to nest in the dunes in years past but have not been sighted in years; Fairy Terns are known to move to new breeding locations if breeding fails in another areas. Potential foraging and roosting habitat for Carnaby's Cockatoo (listed Endangered under the EPBC Act and BC Act) and Forest Red-tailed Black Cockatoo (listed Vulnerable under the EPBC Act and BC Act) occurs on the eastern boundaries of land parcels to the east (Covalent Lithium, 2020) and south (CSBP, 2022) of the PDE. There are no Proposal-related disturbances to these areas. Indirect impacts through operational noise, air and GHG emissions from the Proposal are likely lower than for the former oil refinery.
Migratory species (protected under international agreements)	A likelihood of occurrence assessment (Appendix A) did not identify any migratory species as 'possible' or 'likely to occur within the KRF. Migratory shorebirds may utilise the coastal area along the western boundary of the PDE, including an Osprey who was enticed to nest on a bp purpose-built platform, rather than nesting at Jetty 3 and preventing its use. There are no Proposal-related disturbances to this area and indirect impacts through operational noise, air and GHG emissions from the Proposal are likely to be lower than for the former oil refinery.
Great Barrier Reef Marine Park	Not present
Nuclear actions (including uranium mining)	Not applicable
Commonwealth marine areas	None present
Water resources in relation to coal seam gas development and large coal mining development.	Not applicable

10 Holistic Impact Assessment

A holistic impact assessment considers the connections and interactions between impacts, and the overall impact of the proposal on the environment as a whole (EPA, 2021e).

This supporting document provides information on the Proposal, the existing receiving environment, and the anticipated direct and indirect impacts on the key environmental factor (GHG emissions) and the other environmental factors outlined in Table 5-1 EPA Environmental Factors and the controls in place to minimise those impacts.

There is interaction between the identified relevant factors and these relationships have been explored for the Proposal in Table 10-1.

The mitigation hierarchy (avoid, reduce, mitigate) has been and will continue to be applied to all potential environmental impacts by the Proposal in order to meet the EPA's objectives for the individual factor and holistic impacts.

It is acknowledged that whilst the Proposal may have a direct and indirect impact on several environmental values and factors, the impacts are not significant or can be adequately/are being managed under existing regulatory processes (Table 7-1).

Table 10-1 Holistic Impacts of Relevant Factors

Theme	Potential impacts	Relevant Management and Mitigation	Predicted outcome
Sea	The main activity under marine environmental quality is the discharge of the wastewater stream to the marine environment through the SDOOL line. Changes to the marine environment then could impact the biodiversity and ecosystems within Cockburn Sound	The discharge is regulated by Prescribed Premise licence L5938/1967/12 The Water Corporation's *Sepia Depression Ocean Outlet Monitoring and Management plan* ensures that both the ecological and social values for marine waters in the vicinity of the SDOOL are maintained.	Implementation of the Proposal is unlikely to have significant impacts on the receiving environment with the current controls in place which have proved effective through oil refinery operation
Land	The Proposal is not clearing any vegetation hence is not directly impacting any flora or fauna. Any impact to Terrestrial Environmental Quality onsite, has the potential to impact the marine environment as the groundwater flows to the ocean.	The Proposal will be constructed on hardstand with appropriate drainage to prevent runoff to soil. Current spill response and emergency procedures are existing	bp Kwinana Energy Hub continues to monitor and remediate where possible historic land contamination. This Proposal will not change the level of existing contamination and design and controls have been put in place to prevent ingress to the land.
Air	Air emissions can impact human health and also biodiversity and ecosystems.	Air emissions have been designed to be as low as practically possible through	Implement of this proposal is unlikely to have a significant

	NO_x emissions can cause human health issues through inhalation or skin absorption Greenhouse gas emissions can cause human health concerns but also affect biodiversity of sea and land.	adoption of latest technologies. Design has incorporated reuse of waste streams and heat recovery to lower emissions. bp will develop and implement GHG MP that aligns with EPA guidelines to minimise GHG emissions	impact to the local air shed.
People	Noise and odour impacts can affect the human health of industry and community. This Proposal also affects the likelihood of the community as there are opportunities to provide local jobs both directly during construction and operation and indirectly supporting the Australian and global agri-energy sector and other feedstock development	Noise modelling has been completed showing full compliance to the Noise regulations. An odour analysis has been completed based on current site odour surveys and assessment of odour controls for this Proposal and has deemed that the residual risk of odour will be low.	Specialised assessments have shown that noise and odour are low. Due to the location of the PDE in the KIA and that a conservative separation distance to the closest sensitive receptor is achieved, it is unlikely to have an significant impact.

11 Cumulative Environmental Impact Assessment

The cumulative impacts of the Proposal have been considered below, including commentary on mitigation measures, where applicable, to reduce potential cumulative impacts.

GHG emissions from the Proposal are expected to exceed EPA threshold limits; however, bp is preparing a GHG MP to abate GHG emissions. bp aims to be net zero by 2050 across its entire operations. Intent of the Kwinana Energy Hub to produce sustainable fuel and energy with net zero GHG emissions. Limited information is available at this stage on the types of technologies that these future projects would use. Industrial facilities neighbouring the Proposal are also likely to be emitting GHG and so the Proposal would be cumulatively contributing to net global carbon emissions; however, bp's production of lower carbon fuel product would support the decarbonisation of hard-to-abate sectors like mining and aviation.

Marine environmental quality could suffer cumulative impacts from the discharge of wastewater from multiple operations. All discharges via the SDOOL are subject to conditions of individual EP Act Part V licences which are set with consideration of the cumulative impacts of the overall SDOOL discharge. Discharge of wastewater associated with the Proposal will continue to adhere to the conditions of the site's currently licensed limits under Prescribed Premises Licence L5938/1967/12. The volumes of effluent discharged are much lower than the former refinery was operating at and hence the environmental impact should be less. Therefore, cumulative impacts to marine environmental quality are not expected to change through implementation of the Proposal. Impacts associated to discharges and emissions from the site are currently being regulated by DWER-Environmental Regulations. Marine vessels inflows and outflows within the Kwinana refinery is also expected to generate noise emissions within the Cockburn Sound Policy area. bp is engaging with WA government on Cockburn Sound shipping forecasts (Westport project) to understand the cumulative impacts. However, it is not expected that inflow/outflow will disturb the marine environment and that inflow/outflow traffic density will be similar to peak historical operations.

SO_2 emissions from the Proposal are expected to be within approximately 4% of bp's maximum permissible allocation. SO_2 emissions from the Proposal and bp's future projects at the energy hub are also expected to be significantly below bp's allocation. bp Air Quality studies will aim to provide a more detailed description around this. bp is aware that the National Environment Protection (Ambient Air Quality) Measure standards have been revised and are forecasted to be revised again in 2025. The *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999* sets ambient standards and limits on sulphur dioxide emissions from the KIA and ensures the cumulative effect of all SO_2 emitters are within these thresholds. bp has existing allocation through the EPP that covers this Proposal's emissions, indicating that cumulatively the impact of SO2 in the KIA from this proposal is meets the ambient standards and limits.

The noise assessment shows that the Proposal achieves full compliance to the Environmental Protection (Noise) Regulations 1997 and is not a significant noise contributor at the KIC noise sensitive receivers. The KIC has previously modelled the cumulative effect of noise from the KIA on sensitive receptors which using noise measurements from the previous oil refinery. (Herring-Storer, 2020). As this Proposal has shown its noise levels will be less than the previous oil refinery, it can be assumed that bp Kwinana Energy Hub contribution to the cumulative noise impacts from KIA has not increased through this implementation of this Proposal. bp will continue to work with KIC to provide information to update these cumulative models.

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Abbreviations, Definitions and Acronyms

Abbreviations	Definition
°C	degrees Celsius
ACH Act	*Aboriginal Cultural Heritage Act 2021* (WA)
AH Act	*Aboriginal Heritage Act 1972* (WA)
AHIS	Aboriginal Heritage Inquiry System
ALA	Atlas of Living Australia
BC Act	*Biodiversity Conservation Act 2016* (WA)
BDU	Bio-Digester Unit
BoM	Bureau of Meteorology (Commonwealth)
bp	BP Refinery (Kwinana) Pty Ltd
C-RR	Contaminated – Remediation Required
CAPEX	Capital Expenditure
CBD	Central Business District
CCU	Carbon Capture Unit
CCS	Carbon Capture and Storage (also known as Carbon Capture and Sequestration)
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer
CIF	Community Information Forum
CO_2	Carbon Dioxide
CO_2-e	'carbon dioxide equivalent'. Number of metric tons of CO_2 emissions with the same global warming potential as one metric ton of another greenhouse gas
C-RR	'Contaminated – Remediation Required' classification under the CS Act.
C-RU	'Contaminated – Restricted Use' classification under the CS Act.
CS Act	*Contaminated Sites Act 2003* (WA)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSM	Conceptual Site Model
CSMC	Cockburn Sound Management Council
dB	Decibel
DBCA	Department of Biodiversity Conservation and Attractions (WA)
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DevWA	DevelopmentWA
DFES	Department of Fire and Emergency Services
DJTSI	Department of Jobs, Tourism, Science and Innovation (Commonwealth)
DMDS	Dimethyl Disulphide
DMIRS	Department of Mines, Industry Safety and Regulation (WA)
DoT	Department of Transport
DG Act	*Dangerous Goods Act 2004* (WA)
DoW	Department of Water (WA) (now DWER)
DPIRD	Department of Primary Industry and Regional Development (WA)
DPLH	Department of Planning, Land and Heritage (WA)
DSI	Detailed Site Investigation
DWER	Department of Water and Environmental Regulation (WA)
EIA	Environmental Impact Assessment
EP Act	*Environmental Protection Act 1986* (WA)
EPA	Environmental Protection Authority (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPP	Environmental Protection Policy
FFA	Free Fatty Acid
FPA	Fremantle Port Authority

Abbreviations	Definition
GHG	Greenhouse Gas
GHG MP	Greenhouse Gas Management Plan
GWL	Groundwater Licence
H2K	bp Hydrogen Project at Kwinana
HGU	Hydrogen Generation Unit
HVO	Hydrotreated Vegetable Oil
HYD2	Hydrofiner #2
HYD3	Hydrofiner #3
IAT	DWER's Integrated Assessment Team
IBRA	Interim Biogeographic Regions of Australia
ILUA	Indigenous Land Use Agreement
JDAP	Joint Development Assessment Panel
b/d	Barrels per Day
kg	kilogram
KIA	Kwinana Industrial Area
KIC	Kwinana Industries Council
KIMA	Kwinana Industries Mutual Aid
KL	kilolitre
klpd	kilolitres per day
km	kilometre
KRF	Kwinana Renewable Fuels
KWRP	Kwinana Water Reclamation Plant
L_{A10}	A-weighted, sound level, exceeded for 10% of the measurement period
LHS	Local Heritage Survey
LPG	Liquefied Petroleum Gas
LPS	Local Planning Scheme
mAHD	metres Australian Height Datum
MAR	mandatory auditor's report
mg/L	Milligrams per litre
Mining Act	*Mining Act 1978* (WA)
ML	megalitre
MLA	Member of the Legislative Assembly
ML/day	megalitres per day
mm	millimetres
MNES	Matters of National Environmental Significance
MRS	Metropolitan Region Scheme
MRWA	Main Roads Western Australia
MS	Ministerial Statement
MW	megawatt
NGER Act	*National Greenhouse and Energy Reporting Act 2007* (Commonwealth)
NGER	National Greenhouse Reporting scheme
NO_x	oxides of nitrogen
OPEX	operating expenditure
PDE	Proposal Development Envelope
PFAS	perfluoroalkyl and polyfluoroalkyl
PFU	Product Fractionation Unit
POME	palm oil mill effluent
PTA	Public Transport Authority
PTU	Pre-treatment Unit
RIWI Act	*Rights in Water and Irrigation Act 1914* (WA)
RRU	'Remediated for Restricted Use' classification under the CS Act.
SAF	Sustainable Aviation Fuel

Abbreviations	Definition
SDOOL	Sepia Depression Ocean Outlet Landline
SEP	State Environmental Policy
SIA	Strategic Industrial Area
SO_2	sulphur dioxide
SPK	Synthetic Paraffinic Kerosene
SWL	Standing Water Level
SWMU	Solid Waste Management Units
TDS	Total Dissolved Solids
TPD	tonnes per day
t	tonne
tph	tonnes per hour
UCO	used cooking oil
WA	Western Australia
WAMSI	WA Marine Science Institute
WAPC	Western Australian Planning Commission (WA)
WWTP	Wastewater Treatment Plant
WTC	West Trade Coast

Appendices

Appendix A Conservation significant flora and fauna: Likelihood of occurrence assessment

State and Commonwealth-listed conservation significant species and ecological communities potentially occurring within the PDE were identified through a 2 km buffer search of the DCCEEW's EPBC Act Protected Matters Search Tool (PMST) (DCCEEW, 2023) and a 10 km buffer search of DBCA's NatureMap[4]. Conservation status is based on the risk of extinction at Commonwealth and State level (Table A).

Table A-0-1 Conservation code definitions

Conservation Code	Cth code	WA code	Description
CR: Critically Endangered	■	■	Facing an extremely high risk of extinction in the wild in the immediate future
EN: Endangered	■	■	Facing a very high risk of extinction in the wild in the near future
VU: Vulnerable	■	■	Facing a high risk of extinction in the wild in the medium-term future
CD: Conservation Dependent	■	■	Dependent on ongoing conservation intervention to prevent it becoming eligible for threatened status (CR, EN or VU)
MI: Migratory	■	■	Subject to international agreement for conservation as a migratory taxon
Marine	■	-	Taxon naturally occurs in a Commonwealth marine area and requires protection to ensure the long-term conservation of the species.
OS: Other specially protected species	-	■	Fauna otherwise in need of special protection to ensure their conservation (s.18 of the BC Act)
P1: Priority 1	-	■	Species known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small, on lands not managed for conservation, or are otherwise under immediate threat.
P2: Priority 2	-	■	Poorly known species. Species known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation
P3: Priority 3	-	■	Poorly-known species. Species known from several locations, and does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining suitable habitat.
P4: Priority 4	-	■	Rare, Near Threatened and other species in need of monitoring. (a) Rare. Sufficient knowledge is available; not currently in need of special protection but could be if circumstances change. Usually represented on conservation lands. (b) Near Threatened. Sufficient knowledge is available. Close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

[4] NatureMap was taken offline indefinitely on 17 December 2021 with the intention that its biodiversity information would become available through the Biodiversity Information Office (BIO) by mid-2022. The launch of Dandjoo does not include observations of threatened and priority species – this information is still required to be requested through DBCA's Species and Communities Branch, with a minimum buffer of 10 km around a single point or a minimum polygon area of 300 km^2.

The likelihood of these species to occur in the KRF and potential impact range of construction and operation works was informed by:

- Knowledge of the species distribution and habitat preferences from key ecology database searches (Table A)
- NatureMap records of occurrence;
- Review of comparable assessments undertaken in the area
- Type and condition of existing habitat in the KRF and surrounds

Table A-0-2 Key ecology database searches

Database	Description
FloraBase (WA Herbarium, 1998-2023)	Continually updated database with the current name and accepted classification, known distribution and conservation status of native and introduced plants, mosses, lichens, algae, fungi and protists.
Species Profile and Threats Database (SPRAT) (DCCEEW, n.d.)	Collated information of species-specific conservation advice and guidance material, population and distribution, habitat, feeding and reproduction for species and ecological communities listed under the EPBC Act.
Atlas of Living Australia (ALA) database (CSIRO, n.d.)	Collaborative, digital, open infrastructure that pulls together Australian biodiversity data from a wide range of organisations, websites, individuals, community groups, government departments and information systems.
Australian Museum's Animal Factsheets (Australian Museum, n.d.)	Includes information about population and distribution, habitat, feeding and reproduction, and links to the ALA species records.
National Conservation Values Atlas (DCCEEW, 2015)	Incorporates a range of national data on Australia's marine environment as well as specific information on the location and area of important marine habitats, ecological features, known breeding and feeding areas for protected species and other conservation values in the marine regions. Includes biologically important areas (BIAs) (areas where aggregations are known to display biologically important behaviours such as breeding, foraging, resting or migration).
Birdlife Australia database (Birdlife Australia, n.d.)	Australia's largest bird conservation non-government organisation, with species profiles for many of Australia's birds.

Likelihood was assessed as:

- **Likely:** species has records within 10 km of the PDE and suitable habitat is present within the KRF
- **Possible:** suitable habitat is present within the KRF, but there are no records of the species occurring within 10 km of the PDE, or there are records within 10 km however the habitat is not preferred. For the KRF, this includes fauna species which may opportunistically forage or transverse the site
- **Unlikely:** lack of suitable habitat and no recorded occurrences within 10 km of the PDE. This includes fauna species which may be present in the greater surrounds but are unlikely to transverse or utilise the KRF. For flora, while the KRF and immediate surrounds has been completely cleared, it indicates the species may have suitable habitat supported in the PDE or surrounds.
- **None:** habitat is not present or species does not occur in area (includes records that are likely erroneous)
- **Not considered further:** Not listed under the BC Act, and EPBC Act only applicable in regards to this species within a Commonwealth area or for actions undertaken by a Commonwealth agency (i.e. EPBC Act-listed only as 'Marine' or 'Cetacean')

In the tables below are likelihood assessments for:

- Birds (Table A)
- Terrestrial mammals, reptiles and invertebrates (Table A)
- Marine species (fish, sharks, sea snakes and cetaceans) (Table A)
- Plants (Table A)

Table A-0-3 Bird species potentially occurring within the Study area

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Status			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Actitis hypoleucos	Common Sandpiper	Species or species habitat likely to occur	-	■	■	MI	3	31	**Unlikely.** No suitable habitat in KRF area. Found along all coastlines of Australia and in many coastal or inland wetlands, both saline or fresh. Found mainly on muddy edges or rocky shores where it feeds on molluscs, crustaceans and insects.
Anous stolidus	Common Noddy	Species or species habitat may occur	-	■	■	MI	-	-	**None.** No suitable habitat in KRF area. At extreme southern end of range. Occurs in groups throughout the pelagic zone (open ocean) and foraging is mainly offshore (seldom observed close to shore).
Anous tenuirostris melanops	Australian Lesser Noddy	Species or species habitat may occur	VU	-	■	EN	-	1	**Unlikely.** No suitable habitat in KRF area. Breeds on the Houtman Abrolhos Islands, and during non-breeding periods tend to remain near breeding sites, although have been observed hundreds of kilometres over the open ocean.
Apus pacificus	Fork-tailed Swift	Species or species habitat likely to occur	-	■	■	MI	-	-	**Unlikely.** Almost exclusively aerial. Mostly occurs over inland areas, and occasionally in coastal areas.
Ardenna carneipes	Flesh-footed Shearwater	Foraging, feeding or related behaviour likely to occur	-	■	■	VU	-	3	**Unlikely.** No suitable habitat in KRF area. Breeds on islands off south-western WA and forage almost entirely at sea, 1-150 km offshore.
Ardenna grisea	Sooty Shearwater	Species or species habitat may occur	-	■	■	MI	-	-	**None.** No suitable habitat in KRF area. Breeds on islands off New South Wales and Tasmania. Forages in pelagic (open ocean) sub-tropical, sub-Antarctic and Antarctic waters. DBCA records do not show species as occurring in the Swan region.
Ardenna pacifica	Wedge-tailed Shearwater		-	■	■	MI	-	9	**Unlikely.** No suitable habitat in KRF area. Pelagic, generally foraging 10-300 km offshore. WA breeding populations on islands of Jurien Bay, North West Shelf, Houtman Abrolhos islands, and Rottnest Island.
Arenaria interpres	Ruddy Turnstone		-	■	■	MI	28	142	**Unlikely.** No suitable habitat in KRF area. Small distribution south of Perth and does not breed in Australia. Forages along foreshore.
Botaurus poiciloptilus	Australasian Bittern	Species or species habitat likely to occur	EN	-	-	EN	-	-	**Unlikely.** No suitable habitat in KRF area. Prefers freshwater wetlands with tall dense vegetation, particularly habitats with sedges, rushes, and reeds.
Bubulcus ibis	Cattle Egret	Species or species habitat may occur	-	-	■	-	-	-	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Calidris acuminata	Sharp-tailed Sandpiper	Species or species habitat likely to occur	-	■	■	MI	17	33	**Unlikely.** No suitable habitat in KRF area. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Status			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Calidris alba	Sanderling		-	■	■	MI	13	40	**Unlikely.** No suitable habitat in KRF area. Usually found on the coast on open sandy beaches exposed to open sea-swell and on exposed sandbars, where they forage in the wave-wash zone.
Calidris canutus	Red Knot, Knot	Species or species habitat known to occur	EN	■	■	EN	1	6	**Unlikely.** No suitable habitat in KRF area. Mainly inhabits intertidal mudflats, sandflats and sandy beaches of sheltered coasts, sometimes sandy ocean beaches. Forages in soft substrates exposed by low tide.
Calidris ferruginea	Curlew Sandpiper	Species or species habitat likely to occur	CR	■	■	CR	17	20	**Unlikely.** No suitable habitat in KRF area. Mainly occurs on intertidal mudflats in sheltered coastal areas in both fresh and brackish waters. Forages in bare mud at the waters edge or in shallow water.
Calidris melanotos	Pectoral Sandpiper	Species or species habitat likely to occur	-	■	■	MI	2	8	**Unlikely.** No suitable habitat in KRF area. Prefers shallow fresh to saline wetlands (coastal lagoons, estuaries, swamps, lakes, creeks, floodplains and artificial wetlands). Rarely recorded in WA.
Calidris ruficollis	Red-necked Stint	*NA - not returned by PMST search*	-	■	■	MI	40	112	**Unlikely.** No suitable habitat in KRF area. Inhabits coastal areas, including in sheltered inlets, bays and estuaries with intertidal mudflats, sometimes found on protected sandy or coralline shores.
Calidris subminuta	Long-toed Stint	*NA - not returned by PMST search*	-	■	■	MI	4	10	**Unlikely.** No suitable habitat in KRF area. In WA the species is found mainly along the coast, with scattered inland records. Occurs in a variety of shallow freshwater or brackish wetlands (lakes, swamps, streams) and areas of muddy shoreline with low vegetation. Forages on wet mud or in shallow water.
Calidris tenuirostris	Great Knot	*NA - not returned by PMST search*	CR	■	■	CR	8	49	**Unlikely.** No suitable habitat in KRF area. Inhabits intertidal mudflats and sandflats of sheltered coasts. Forages on intertidal flats and at the water's edge.
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo, Karrak	Species or species habitat known to occur	VU	-	-	VU	37	15	**Unlikely.** No suitable habitat in KRF area. Inhabits dense jarrah, karri and marri forests of southwest WA but is also seen feeding in the Perth metropolitan area. Diet is predominantly marri and jarrah seeds.
Calyptorhynchus baudinii (now *Zanda baudinii*)	Baudin's cockatoo	*NA - not returned by PMST search*	EN	-	-	EN	1	2	**Unlikely.** No suitable habitat in KRF area. Breed mostly in the far southwest of WA within jarrah, marri and karri forests. During the non-breeding season will range as far as the southern Swan Coastal Plain to forage on banksia, hakea and dryandra species.
Calyptorhynchus latirostris (now *Zanda latirostris*)	Carnaby's Black Cockatoo	Breeding known to occur	EN	-	-	EN	262	350	**Unlikely.** No suitable habitat in KRF area. Widespread in southwest WA in uncleared or remnant native eucalypt woodlands and within patches of remnant vegetation. Forages in forests containing marri, jarrah or karri; seasonally forages in pine plantations; and outside of the breeding season extensively on banksia woodlands on

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Status			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
									the Swan Coastal Plain. On the coastal plains, they roost in tall native or introduced eucalypts. Patches of remnant vegetation to the east (adjacent to PDE) and west of the KRF are mapped as 'Carnabys Cockatoo Areas requiring investigation as feeding habitat' and described as "open forest of *Eucalyptus gomphocephala* over *Callitris preissii*, *Spyridium globulosum* and *Acacia rostellifera* with *Spinifex longifolius* and *S. hisutus* on exposed dunes." (DBCA, 2018a); however, the KRF is over 2 km north of the nearest foraging buffer associated with a confirmed roosting site (DBCA, 2018b).
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	Species or species habitat likely to occur	VU	■	■	VU	2	9	**Unlikely.** No suitable habitat in KRF area. Mainly occur on sheltered beaches with large intertidal mudflats or sandbanks where it forages.
Charadrius mongolus	Lesser Sand Plover	*NA - not returned by PMST search*	EN	■	■	EN	-	1	**Unlikely.** No suitable habitat in KRF area. Forages mostly on exposed areas of intertidal sandflats and mudflats in estuaries or beaches.
Chlidonias leucopterus	White-winged black tern	*NA - not returned by PMST search*	-	■	■	MI	1	2	**Unlikely.** No suitable habitat in KRF area. Widespread on the southwest coast. Mostly inhabits fresh, brackish or saline, and coastal or subcoastal wetlands. Forages aerially, over water and muddy / sandy edges of wetlands.
Diomedea amsterdamensis	Amsterdam Albatross	Species or species habitat may occur	EN	■	■	CR	-	-	**None.** No suitable habitat in KRF area. Non-resident visitor to Australia and will likely only occur at sea in Australian waters.
Diomedea dabbenena	Tristan Albatross	Species or species habitat may occur	EN	■	■	CR	-	-	**None.** No suitable habitat in KRF area. Marine pelagic seabird that forages, sleeps and rests on the ocean when not breeding.
Diomedea epomophora	Southern Royal Albatross	Species or species habitat may occur	VU	■	■	VU	-	-	**None.** No suitable habitat in KRF area. Marine pelagic seabird; only makes land when breeding on a small number of subantarctic islands.
Diomedea exulans	Wandering Albatross	Foraging, feeding or related behaviour likely to occur	VU	■	■	VU	-	-	**None.** No suitable habitat in KRF area. Marine, aerial and pelagic. Feeds mainly in pelagic, offshore and inshore waters.
Diomedea sanfordi	Northern Royal Albatross	Species or species habitat may occur	EN	■	■	EN	-	-	**None.** No suitable habitat in KRF area. Rare foraging visitor to offshore southwest WA waters outside of breeding season. Feeds in the Southern Ocean.
Falco peregrinus	Peregrine falcon	*NA - not returned by PMST search*	-	-	-	OS	11	18	**Possible** May overfly area. Found in most habitats and at most altitudes, from the coast to alpine areas. Requires abundant prey and secure nest sites. Prefers coastal and inland cliffs or open woodlands near water; may even be found nesting on high city buildings. Sparse records across terrestrial Perth.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Status			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Haliaeetus leucogaster	White-bellied Sea-Eagle	Species or species habitat likely to occur	-	-	■	-	-	28	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Halobaena caerulea	Blue Petrel	Species or species habitat may occur within 2 km of PDE	VU	-	■	-	-	2	**Unlikely.** No suitable habitat in KRF area. Breeds in subantarctic islands. Rare foraging visitor to offshore southwest WA waters outside of breeding season.
Hydroprogne caspia	Caspian Tern	Foraging, feeding or related behaviour known to occur	-	■	■	MI	15	217	**Unlikely.** No suitable habitat in KRF area. Widespread in coastal regions in extensive wetlands, on coastal and interior beaches and sheltered estuaries. A foraging (provisioning young) BIA extends approximately 25 km off the WA coast from south of Mandurah to Kalbarri. Typically forages over water, diving for fish.
Ixobrychus dubius	Australian Little Bittern	*NA - not returned by PMST search*	-	-	-	P4	1	5	**Unlikely.** No suitable habitat in KRF area.
Larus pacificus	Pacific Gull	Foraging, feeding or related behaviour may occur	-	-	■	-	-	9	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Leipoa ocellata	Malleefowl	Species or species habitat likely to occur	VU	-	-	VU	-	-	**None.** No suitable habitat in KRF area. Found in arid and semi-arid areas dominated by mallee eucalypts on sandy soils. Also occur in *Acacia aneura, Melaleuca uncinata, Callitris verrucosa, Eucalyptus* woodlands and coastal heathlands. Most commonly seen in reserves and private property within and around the Wheatbelt region.
Limosa lapponica	Bar-tailed Godwit	Species or species habitat likely to occur	-	■	■	MI	2	17	**Unlikely.** No suitable habitat in KRF area. Widespread around WA coast, from Eyre to Derby. Occurs in large intertidal sandflats and mudflats of inlets, bays, open sandy beaches and brackish wetlands. Forages near the edge of water or in shallow water, mainly in tidal estuaries and harbours. Important sites are in the northwest around Eighty Mile Beach.
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit	Species or species habitat likely to occur	CR	■	■	CR	-	-	
Limosa limosa	Black-tailed godwit	*NA - not returned by PMST search*	MI	-	-	MI	1	3	**Unlikely.** No suitable habitat in KRF area. Primarily found in coastal habitat environment (sheltered bays, estuaries, intertidal mudflats or sandflats). Forages on intertidal flats.
Macronectes giganteus	Southern Giant Petrel	Species or species habitat may occur	EN	■	■	MI	1	20	**Unlikely.** No suitable habitat in KRF area. Forages and breeds in Antarctica and may be observed as far north as Australia in winter. Disperses widely over southern oceans for foraging.
Macronectes halli	Northern Giant Petrel	Foraging, feeding or related behaviour likely to occur	VU	■	■	MI		1	**Unlikely.** No suitable habitat in KRF area. Species is marine and oceanic. May visit subtropical waters.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Status			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Merops ornatus	Rainbow Bee-eater	Species or species habitat may occur	-	-	■	-	-	135	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Motacilla cinerea	Grey Wagtail	Species or species habitat may occur	-	■	■	MI	-	-	**None.** Extremely uncommon migrant (DoE, 2015). DBCA records do not show species as occurring in the Swan region.
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Species or species habitat likely to occur	CR	■	■	CR	1	4	**Unlikely.** No suitable habitat in KRF area. Patchily distributed in southwest WA. Most commonly associated with sheltered coasts with large intertidal mudflats or sandflats.
Numenius phaeopus	Whimbrel	*NA - not returned by PMST search*	-	■	-	MI	-	11	**Unlikely.** No suitable habitat in KRF area. Found on intertidal mudflats of sheltered coasts, as well as harbours, estuaries, and sometimes sandy or rocky beaches.
Oceanites oceanicus	Wilson's storm-petrel	*NA - not returned by PMST search*	-	■	-	MI	-	7	**Unlikely.** No suitable habitat in KRF area. Circumpolar distribution mainly in the seas of the southern hemisphere but extending northwards over the winter months. Feeds in cold waters over continental shelves or inshore; diet comprised mainly of planktonic crustaceans.
Onychoprion anaethetus	Bridled Tern	Foraging, feeding or related behaviour likely to occur	-	■	■	MI	43	43	**Unlikely.** No suitable habitat in KRF area. Rarely recorded along mainland coasts as it forages offshore over the mid and outer continental shelf, surface-dipping for fish. Breeds on offshore islands.
Oxyura australis	Blue-billed duck	*NA - not returned by PMST search*	-	-	-	P4	56	70	**Unlikely.** No suitable habitat in KRF area. Prefers deep freshwater rivers and lakes with dense vegetation.
Pachyptila turtur	Fairy Prion	Species or species habitat likely to occur	-	-	■	-	-	-	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Pachyptila turtur subantarctica	Fairy Prion (southern)	Species or species habitat likely to occur	VU	-	-	-	-	-	**None.** No suitable habitat in KRF area. Breeds on offshore islands of Tas and Vic, New Zealand and southern Indian Ocean. Ranges to SA and south WA for foraging during the non-breeding period. Occurs mainly offshore where it feeds on krill, fish and squid seized from the water.
Pandion haliaetus	Osprey	Species or species habitat known to occur within 2 km of PDE	-	■	■	MI	1	63	**Unlikely.** No suitable habitat in KRF area Occurs in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Requires extensive areas of open, fresh, brackish or saline water to forage for fish, occasionally diving to a depth of 1 m. Ospreys may use the same nest year after year; the nest is typically made from sticks and driftwood, and positioned high on a cliff, tall dead tree or man-made infrastructure. This is the case at the 3rd terminal jetty within the PDE, with terminal activity shutting down to accommodate nesting

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Status			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
									ospreys until bp constructed a nesting platform for them, allowing nesting and terminal activity to co-exist (pers. comm.)
Phaethon rubricauda	Red-tailed tropicbird	*NA - not returned by PMST search*	-	■	■	MI &d P4	1	2	**Unlikely.** No suitable habitat in KRF area. Marine, breeds on oceanic islands. Rarely venture near land.
Plegadis falcinellus	Glossy ibis	*NA - not returned by PMST search*	-	■	-	MI	34	62	**Unlikely.** No suitable habitat in KRF area. Preferred habitat for foraging and breeding are freshwater marshes at the edges of lakes and rivers, and swamps. Occasionally found in coastal locations such as estuaries and saltmarshes.
Pluvialis fulva	Pacific golden plover	*NA - not returned by PMST search*	-	■	-	MI	3	13	**Unlikely.** No suitable habitat in KRF area. Seldom recorded along the southwestern coast. Habitat includes beaches, mudflats and sandflats (sometimes in low vegetation) in sheltered areas including harbours, estuaries and lagoons.
Pluvialis squatarola	Grey plover	*NA - not returned by PMST search*	-	■	-	MI	16	146	**Unlikely.** No suitable habitat in KRF area. Sparse use of the coast of WA between Albany and the northern Kimberley coast. Usually inhabits sheltered embayments and estuaries with mudflats and sandflats, occasionally terrestrial wetlands. No breeding occurs in Australia.
Pterodroma mollis	Soft-plumaged Petrel	Species or species habitat may occur within 2 km of PDE	VU	-	■	-	-	2	**Unlikely.** No suitable habitat in KRF area. Marine oceanic species. Generally subantarctic, dispersing widely over southern oceans, but can be found in subtropical waters. Forages by surface-seizing.
Puffinus assimilis	Little Shearwater	Foraging, feeding or related behaviour known to occur	-	-	■	-	-	1	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Rostratula australis	Australian Painted Snipe	Species or species habitat likely to occur	EN	-	■	EN	-	1	**Unlikely.** No suitable habitat in KRF area. Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including lakes, swamps and claypans.
Stercorarius parasiticus	Parasitic jaeger, Arctic skua	*NA - not returned by PMST search*	-	■	■	MI	4	51	**Unlikely.** No suitable habitat in KRF area. Mainly piscivorous and named for stealing food from other birds. Breeds in the Arctic tundra; winters at sea in the tropics and southern oceans.
Stercorarius pomarinus	Pomarine jaeger, pomarine skua	*NA - not returned by PMST search*	-	■	■	MI	1	7	**Unlikely.** No suitable habitat in KRF area. Breeds in the Arctic tundra; winters at sea in southern oceans stealing food from other birds.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Status			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Stercorarius skua	Great Skua	Species or species habitat may occur within 2 km of PDE	-	-	■	-	-	-	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Sterna dougallii	Roseate Tern	Foraging, feeding or related behaviour likely to occur	-	■	■	MI	2	11	**Unlikely.** No suitable habitat in KRF area. Regularly recorded from Mandurah north to Eighty Mile Beach. Breeds on islands off coast, foraging in coastal waters by dipping for fish. A foraging BIA for offshore and coastal water extends from Mandurah north to Dongara; however, species rarely occur in inshore waters or near the mainland.
Sterna hirundo	Common Tern	*NA - not returned by PMST search*	-	■	■	MI	-	3	**Unlikely.** No suitable habitat in KRF area. Commonly observed in Australia near-coastal waters, on beaches and headlands and in sheltered waters with muddy, sandy or rocky shores. Occasionally found in saline or freshwater wetlands. May shelter in sand dunes during bad weather. Mostly piscivorous.
Sternula albifrons	Little Tern	Species or species habitat may occur	-	■	■	MI	-	3	**Unlikely.** No suitable habitat in KRF area. In WA, regularly occurs south to ~20° S, with occasional records further south (e.g. Shark Bay). DBCA records do not show species as occurring in the Swan region. Inhabits sheltered coastal environments, especially those with exposed sandbanks, and also on exposed ocean beaches. Forages in shallow waters.
Sternula nereis nereis	Australian Fairy Tern	Foraging, feeding or related behaviour known to occur	VU	-	-	VU	6	-	**Unlikely.** No suitable habitat in KRF area. Breeds in colonies of 2 – 400 pairs on islands and on open sandy beaches. Nests on sheltered sandy beaches in clear view of the water, above the high tide line where the substrate is sandy and the vegetation sparse. If breeding fails at one area, the birds will often move to new locations to attempt relaying. Forages in shallow waters for small fish. A foraging BIA for offshore and coastal water extends from Bunbury north to Geraldton. bp (pers. comm.) notes that Fairy Terns once nested along the bp site but haven't been seen nesting in years.
Thalassarche carteri	Indian Yellow-nosed Albatross	Species or species habitat likely to occur	VU	■	■	EN	-	-	**None.** No suitable habitat in KRF area. Oceanic species.
Thalassarche cauta	Shy Albatross	Foraging, feeding or related behaviour likely to occur	EN	■	■	VU	-	-	
Thalassarche chlororhynchos	Atlantic yellow-nosed albatross	*NA - not returned by PMST search*	-	■	■	VU	1	1	
Thalassarche impavida	Campbell Black-browed Albatross	Species or species habitat may occur	VU	■	■	VU	-	-	
Thalassarche melanophris	Black-browed Albatross	Foraging, feeding or related behaviour likely to occur	VU	■	■	EN	-	1	

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Status			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Thalassarche steadi	White-capped Albatross	Species or species habitat may occur	VU	■	■	VU	-	-	
Thalasseus bergii	Crested tern	*NA - not returned by PMST search*	-	■	■	MI	172	279	**Unlikely.** No suitable habitat in KRF area. Found on most Australian coastlines and breeds in colonies on small offshore islands. Forages along open nearshore waters.
Thinornis cucullatus	Hooded Plover, Hooded Dotterel	Species or species habitat may occur	-	-	■	P4	5	7	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Tringa brevipes	Grey-tailed Tattler	*NA - not returned by PMST search*	-	■	■	MI & P4	-	27	**Unlikely.** No suitable habitat in KRF area. Known to occur between Augusta and Cervantes. Forages in sheltered coasts with reefs and rock platforms or with intertidal mudflats.
Tringa glareola	Wood sandpiper	*NA - not returned by PMST search*	-	■	■	MI	3	6	**Unlikely.** No suitable habitat in KRF area. Occurs in well-vegetated, shallow, freshwater wetlands with aquatic plants or grass and taller fringing vegetation. Typically, the species does not use coastal flats. Forages on moist or dry mud at the edges of wetlands or in clear shallow water.
Tringa nebularia	Common Greenshank, Greenshank	Species or species habitat likely to occur	-	■	■	MI	49	82	**Unlikely.** No suitable habitat in KRF area. Widest distribution of any shorebird in Australia and occurs in all types of wetlands as well as sheltered coastal habitats of varying salinity. Forages on mudflats and the edges of wetlands. Does not breed in Australia.
Tringa stagnatilis	Marsh sandpiper	*NA - not returned by PMST search*	-	■	■	MI	1	6	**Unlikely.** No suitable habitat in KRF area. Found in permanent or ephemeral wetlands of varying salinity and intertidal mudflats. Usually feeds in shallow water, picking at the surface of water or mud.
Tyto novaehollandiae novaehollandiae	masked owl (southwest)	*NA - not returned by PMST search*	-	-	-	P3	2	3	**Unlikely.** No suitable habitat in KRF area. Favours open forests, breeding in the hollows of karri and marri trees and roosting in hollows as well as the dense foliage of peppermint, eucalypt and pine trees. Life-long pairs hunt within a 6 km home range for insects, birds and small mammals (mice, rabbits, possums, bandicoots). May visit farmland and semi urban areas when hunting.
Xenus cinereus	Terek Sandpiper	*NA - not returned by PMST search*	-	■	■	MI	-	3	**Unlikely.** No suitable habitat in KRF area. Forages in the open, on soft wet intertidal mudflats or in sheltered estuaries, harbours or lagoons.

Table A-0-4 Terrestrial mammals, reptiles and invertebrates

Scientific Name	Common Name Class	PMST indicative presence within PDE	EPBC Act Status	WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
					DBCA	NatureMap	
Mammals							
Dasyurus geoffroii	Chuditch, Western Quoll	Species or species habitat likely to occur	VU	VU	1	1	**Unlikely.** Suitable habitat not present. Chuditch need large natural areas (greater than 20,000 ha) to provide adequate prey and den resources (DEC, 2012). Major portion of the remaining natural populations occurs in varying densities in jarrah (*Eucalyptus marginata*) forests and woodlands in the south-west. Opportunistic feeder, foraging primarily at night for insects, mammals, birds and lizards. Solitary for majority of life.
Falsistrellus mackenziei	Western False Pipistrelle	*NA - not returned by PMST search*	-	P4	1	1	**Unlikely.** Suitable habitat not present. Occurs in banksia woodland of the coastal plain but core habitat is wet sclerophyll eucalypt (Jarrah, Karri, Marri and Tuart) forest and semi woodland of the southwest, favouring old growth forest. Usual roosting sites are hollows in eucalypts but may use abandoned buildings.
Hydromys chrysogaster	Water-rat, Rakali		-	P4	1	3	**Unlikely.** Suitable habitat not present. Usually found near permanent bodies of fresh or brackish water, including lakes, rivers, estuaries and even the coast. Live in burrows along banks; and intact riparian vegetation (and bank stability) is critical to their survival. Nocturnal, foraging at dusk. Predominately carnivorous, feeding on fish, crustaceans, molluscs, small birds, eggs, and frogs. Territorial and largely solitary, with a home range of 1 – 4 km of waterways.
Isoodon fusciventer	Quenda, Southwestern Brown Bandicoot		-	P4	621	186	**Possible.** Suitable habitat not present in KRF but known to occur in the coastal vegetation of the PDE. Widely distributed along the southwest coast from Esperance to Guilderton. On the Swan Coastal Plain, Quenda are often associated with wetlands, preferring scrubby, often swampy, vegetation with dense cover up to 1 m high. Often feeds in adjacent forest, woodland, pastures and croplands for invertebrates, underground fungi, subterranean plant material, and very occasionally, small vertebrates.
Myrmecobius fasciatus	Numbat, Walpurti		EN	EN	1	1	**Unlikely.** Suitable habitat not present. In WA, habitat is generally Eucalypt woodland, with abundant hollow logs and branches for shelter and termites for food. Numbats are diurnal and spend most of the day searching by scent for termites which they dig up. Feeds near the cover of shrubs, hollows and burrows, which are used as resting place during the day and a refuge from predators. Shelters in hollows or burrows overnight. Only two natural populations remain, the Dryandra and Perup sites, but has been successfully reintroduced to other Jarrah forest and Wheatbelt locations.
Notamacropus eugenii derbianus	Tammar Wallaby		-	P4	62	2	**Unlikely.** Suitable habitat not present. Currently known from several islands (including Garden Island) and several sites on the mainland and have been reintroduced to multiple areas. Inhabits coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland.

Scientific Name	Common Name Class	PMST indicative presence within PDE	EPBC Act Status	WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
					DBCA	NatureMap	
							Nocturnal, favouring dense, low vegetation for daytime shelter and open grassy areas for feeding.
Notamacropus irma	Western Brush Wallaby		-	P4	6	2	**Unlikely.** Suitable habitat not present. Prefers open forest or woodlands with seasonally wet sites and low vegetation and good grazing. Often found in dry schlerophyll forests, such as jarrah, and areas of mallee and heathland scrub. Diurnal herbivore. Generally solitary.
Perameles bougainville	Shark Bay Bandicoot		EN	VU	-	1	**None.** Outside distribution. Once widely distributed in an arc from Onslow across the southern mainland of Australia. Range once included coastline of the Swan River, where it resided in dense scrub, favouring *Casuarina* thickets. Remnant wild populations on Dorre and Bernier Islands, with some reintroduction to islands in Shark Bay and to the Mt Gibson Wildlife Sanctuary. Record is likely an incorrect identification or GPS location; DBCA records do not show species as occurring in the Swan region.
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale		-	CD	2	1	**Unlikely.** Suitable habitat not present. Occur between Albany and Perth and Albany in Jarrah forests and observed in dry sclerophyll forests and open woodlands that contain hollow-bearing trees. Highest densities occur in the Perup/Kingston area, Collie River valley, and near Margaret River and Busselton. Less common in high rainfall areas. Nocturnal, resting in tree hollows during the day and foraging almost exclusively in the tree canopy for invertebrates, nectar, small birds and small mammals.
Pseudocheirus occidentalis	Western Ringtail Possum	Species or species habitat likely to occur	CR	CR	1	-	**Unlikely.** Outside of known range. Historically widely distributed throughout the southwestern forests. Current distribution is patchy and largely restricted to near coastal areas of Peppermint woodland and Peppermint/Tuart associations from the Australind/Eaton area to east of Albany and in the southern forest near Manjimup. Highly arboreal nocturnal species that spends the majority of its time feeding, resting and socialising in tree canopies. Build nests (dreys) in low shrub thickets, sedges, rushes, grass trees and within various tree canopies, and may also rest in tree and log hollows, and in suburban areas may rest in roof spaces and other dark cavities. Home range is under 5 ha.
Reptiles							
Lerista lineata	Perth slider	*NA - not returned by PMST search*	-	P3	22	184	**Possible.** Restricted to Swan Coastal Plain south of the Swan River, including Rottnest and Garden Islands, where it inhabits coastal dunes, banksia / eucalypt woodlands and suburban gardens. Shelters in leaf litter and upper layers of loose soil at the base of shrubs, and bulldozer soil heaps. Occasionally found in loose soil beneath discarded rubbish (Bush, Maryan, Browne-Cooper, & Robinson, 2010).
Neelaps calonotos	black-striped snake, black-striped burrowing snake		-	P3	7	15	**Unlikely.** No suitable habitat present. Mostly found on the Swan Coastal Plain between Mandurah and Lancelin where it inhabits coastal dunes and banksia / eucalypt woodland of the Perth region. Shelters in upper layers of loose soil under leaf litter at the base of shrubs and trees (Bush, Maryan, Browne-Cooper, & Robinson, 2010).

Scientific Name	Common Name Class	PMST indicative presence within PDE	EPBC Act Status	WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
					DBCA	NatureMap	
Notoscincus butleri	lined soil-crevice skink (Dampier)		-	P4		2	**None.** Outside distribution. Records are likely an incorrect identification or GPS location as species is found in stony grassland in the Pilbara region. DBCA records do not show species as occurring in the Swan region.
Pletholax gracilis edelensis	keeled legless lizard (Shark Bay)		-	P3		1	**None.** Outside distribution. DBCA records do not show species as occurring in the Swan region.
Pogona minor minima	Abrolhos dwarf bearded dragon		-	VU		2	**None.** Outside distribution. Records are likely an incorrect identification or GPS location as species is found only on islands at Houtman Abrolhos. DBCA records do not show species as occurring in the Swan region.
Pseudonaja affinis exilis	Rottnest Island dugite		-	P4		1	**None.** Outside distribution. Known only from Rottnest Island (Bush, Maryan, Browne-Cooper, & Robinson, 2010).
Tiliqua rugosa konowi	Rottnest Island bobtail		-	VU		2	
Invertebrates							
Idiosoma sigillatum	Swan Coastal Plain shield-backed trapdoor spider	*NA - not returned by PMST search*	-	P3	16	10	**None.** No habitat not present. Occurs from Dalyellup north to Ledge Point, including Rottnest and Garden Islands, and east to the foothills of the Darling Escarpment. Once ubiquitous throughout the Greater Perth region, now found in remnant habitats (e.g., Kings Park, Bold Park, and Shenton Park bushland). Burrows usually occur in *Banksia* woodland and heathland on sandy soils (Rix, Huey, Cooper, Austin, & Harvey, 2018).
Synemon gratiosa	graceful sunmoth		-	P4	5	5	**None.** No habitat not present. Associated with two habitats: coastal heathland on Quindalup dunes with an abundance of its host plant *Lomandra maritima*, and *Banksia* woodland on Spearwood and Bassendean dunes with widespread occurrence of its other host plant *L. hermaphrodita*.
Westralunio carteri	Carter's freshwater mussel		VU	VU	6	6	**None.** No habitat not present. Freshwater species. Prefers slow-flowing perennial stream, riverine and wetland habitats, with stable sediments and low salinity, living partially and fully buried in sand and finer sediment.

Table A-0-5 Marine species (fish, sharks, sea snakes and cetaceans) potentially occurring within the PDE

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Syngnathids (pipefish, seahorses and sea dragons)									
Acentronura australe	Southern Pygmy Pipehorse	Species or species habitat may occur	-	-	■	-	-	-	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Campichthys galei	Gale's Pipefish	Species or species habitat may occur	-	-	■	-	-	1	
Heraldia nocturna	Eastern Upside-down Pipefish	Species or species habitat may occur	-	-	■	-	-	-	
Hippocampus angustus	Western Spiny Seahorse	Species or species habitat may occur	-	-	■	-	-	-	
Hippocampus breviceps	Short-snouted Seahorse	Species or species habitat may occur	-	-	■	-	-	-	
Hippocampus subelongatus	West Australian Seahorse	Species or species habitat may occur	-	-	■	-	-	-	
Histiogamphelus cristatus	Rhino Pipefish	Species or species habitat may occur	-	-	■	-	-	1	
Lissocampus caudalis	Australian Smooth Pipefish	Species or species habitat may occur	-	-	■	-	-	-	
Lissocampus fatiloquus	Prophet's Pipefish	Species or species habitat may occur	-	-	■	-	-	-	
Lissocampus runa	Javelin Pipefish	Species or species habitat may occur	-	-	■	-	-	-	
Maroubra perserrata	Sawtooth Pipefish	Species or species habitat may occur	-	-	■	-	-	-	
Mitotichthys meraculus	Western Crested Pipefish	Species or species habitat may occur	-	-	■	-	-	1	
Nannocampus subosseus	Bony-headed Pipefish	Species or species habitat may occur	-	-	■	-	-	-	
Phycodurus eques	Leafy Seadragon	Species or species habitat may occur	-	-	■	P2	-	-	**None.** Exclusively marine. Usually found on edges of macroalgae stands.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Phyllopteryx taeniolatus	Common Seadragon	Species or species habitat may occur	-	-	■	-	-	4	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Pugnaso curtirostris	Pug-nosed Pipefish	Species or species habitat may occur	-	-	■	-	-		
Solegnathus lettiensis	Gunther's Pipehorse	Species or species habitat may occur	-	-	■	-	-	1	
Stigmatopora argus	Spotted Pipefish	Species or species habitat may occur	-	-	■	-		15	
Stigmatopora nigra	Wide-bodied Pipefish	Species or species habitat may occur	-	-	■	-		1	
Thunnus maccoyii	Southern Bluefin Tuna	Species or species habitat likely to occur	CD	-		-			**None.** Exclusively marine. Known to spawn in the Indian Ocean between northern WA and Java (7–20° S). Juveniles inhabit inshore waters and utilise the Leeuwin current to reach the Great Australian Bight. Adults have a southern circumpolar distribution.
Urocampus carinirostris	Hairy Pipefish	Species or species habitat may occur	-	-	■	-		1	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Vanacampus margaritifer	Mother-of-pearl Pipefish	Species or species habitat may occur	-	-	■	-			
Vanacampus phillipi	Port Phillip Pipefish	Species or species habitat may occur	-	-	■	-			
Vanacampus poecilolaemus	Long-snouted Pipefish	Species or species habitat may occur	-	-	■	-		2	
Sharks									
Carcharhinus longimanus	Oceanic Whitetip Shark	Species or species habitat may occur	-	■	-	-	-	-	**None.** Exclusively marine. Occurs in tropical and temperate waters, generally oceanic deep-water but sometimes close to shore. Highly migratory.
Carcharias taurus (west coast population)	Grey Nurse Shark (west coast population)	Species or species habitat known to occur	VU	-	-	VU	-	-	**None.** Exclusively marine. Found primarily in waters along the southwest coast of WA to Shark Bay. Breeding sites unknown.
Carcharodon carcharias	White Shark, Great White Shark	Species or species habitat known to occur	VU	■	-	VU	-	-	**None.** Exclusively marine. Species can be found close inshore around rocky reefs, surf beaches and shallow bays, to the outer continental shelf.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Lamna nasus	Porbeagle, Mackerel Shark	Species or species habitat may occur	-	■	-	MI	-	-	**None.** Exclusively marine. Inhabits oceanic waters and areas around the edge of the continental shelf. They occasionally move into coastal waters, but these movements are temporary.
Mobula alfredi	Reef Manta Ray, Coastal Manta Ray	Species or species habitat may occur	-	■	-	MI	-	-	**None.** Exclusively marine. Perth is the southern boundary of its distribution in WA. Often seen inshore around coral and rocky reefs in tropical and subtropical waters.
Mobula birostris	Giant Manta Ray	Species or species habitat may occur	-	■	-	MI	-	-	
Pristis pristis	Freshwater Sawfish	Species or species habitat may occur	VU	■	-	MI & P3	-		**None.** Exclusively marine / estuarine species. May potentially occur in all large rivers of northern Australia. Mainly confined to the main channels of large rivers with mud bottoms. Juveniles and sub-adults predominantly occur in rivers and estuaries, while large mature animals frequent coastal and offshore waters (up to 25 m depth).
Rhincodon typus	Whale Shark	Species or species habitat may occur	VU	■	-	MI	-		**None.** Exclusively marine. Found in tropical and warm-temperate seas, both oceanic and coastal, between 30ºN and 35ºS. Commonly seen in waters off northern WA; Ningaloo Reef is the main known aggregation site in Australian waters. A Whale Shark was sighted in Cockburn Sound in 2021 (very rare occurrence).
Sphyrna lewini	Scalloped Hammerhead	Species or species habitat known to occur	CD	-	-	-	-		**None.** Exclusively marine. Found across northern and temperate Australia. Range widely over shallow coastal shelf waters, but rarely venture into or across deep ocean waters.
Sea snakes									
Disteira kingii	Spectacled Seasnake	Species or species habitat may occur	-	-	■	-	-	-	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Sea turtles									

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Caretta caretta	Loggerhead Turtle	Foraging, feeding or related behaviour known to occur	EN	■	■	EN	6	17	**None.** No suitable habitat present. Historical records on Perth beaches north and south of Fremantle. Potential foraging habitat present in the Cockburn Sound. Larger turtles (carapace > 70 cm) settle in coastal, benthic habitats (hard-and soft-substrates, including sand flats, reef and seagrass meadows), where they feed largely on benthic invertebrates and demonstrate fidelity to foraging areas. Breeding occurs north of Shark Bay.
Chelonia mydas	Green Turtle	Foraging, feeding or related behaviour known to occur	VU	■	■	VU	1	2	**None.** No suitable habitat present. Nest, forage and migrate across northern Australia, but individuals can stray into temperate waters. Larger turtles (carapace 30-40 cm) settle in shallow benthic foraging habitats, feeding mostly on seagrass and algal mats.
Dermochelys coriacea	Leatherback Turtle	Foraging, feeding or related behaviour known to occur	EN	■	■	VU	3	5	**None.** No suitable habitat present. Predominantly pelagic; however, distribution is influenced by their jellyfish prey and so are found in the open ocean and close to shore. Typically only ventures close to shore during nesting season. No major nesting sites in Australia; small numbers have been reported nesting in NT, QLD, and northern NSW,
Natator depressus	Flatback Turtle	Foraging, feeding or related behaviour known to occur	VU	■	■	VU	-	1	**None.** No suitable habitat present. Lives in the shallow, soft-bottomed tropical and subtropical waters of the Australian continental shelf. In WA, mainly occurs in the northwest of the state, from Exmouth to the Kimberley Coast. Considered to occur infrequently in the South West Marine Region.
Cetaceans (dolphins and whales)									
Balaenoptera acutorostrata	Minke Whale	Species or species habitat may occur	-	-	-	-	-	1	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for cetaceans within Commonwealth waters or for actions undertaken by a Commonwealth agency.
Balaenoptera edeni	Bryde's Whale	Species or species habitat may occur		■	-	MI	-	-	**None.** No habitat present in KRF. Occur in temperate to tropical waters, both oceanic and inshore. The inshore form appears to be resident in waters containing suitable prey stocks of pelagic shoaling fishes, with no evidence of large-scale movements.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Balaenoptera musculus	Blue Whale	Species or species habitat likely to occur	EN	■	-	EN	1	1	**None.** No habitat present in KRF. Most sightings are of the Pygmy Blue Whale, typically found north of 55°S. Much of the continental shelf and coastal waters are of no particular significance and are used for migration and opportunistic feeding. A significant feeding and aggregation area is the Perth Canyon, with numbers peaking from March to May.
Caperea marginata	Pygmy Right Whale	Species or species habitat may occur	-	■	-	MI	-	1	**None.** No habitat present in KRF. Possibly feed in areas of upwelling around Kangaroo Island, southern Eyre Peninsula and possibly southwestern WA. Perth is the northern limit of their distribution on the west coast.
Delphinus delphis	Short-beaked Common Dolphin	Species or species habitat may occur	-	-	-	-	-	-	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for cetaceans within Commonwealth waters or for actions undertaken by a Commonwealth agency.
Eubalaena australis	Southern Right Whale	Breeding known to occur	EN	■	-	VU	2	3	**None.** No habitat present in KRF. Feeds in the Southern Ocean over summer and migrates to calve and breed in warmer coastal waters. There is a calving BIA, composed of a 1.5 km coastline buffer running from Two Rocks (WA) to Kangaroo Island (SA), however generally aggregate off the southern coast. Perth represents the northern extent of the core range.
Grampus griseus	Risso's Dolphin, Grampus	Species or species habitat may occur	-	-	-	-	-	-	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for cetaceans within Commonwealth waters or for actions undertaken by a Commonwealth agency.
Megaptera novaeangliae	Humpback Whale	Species or species habitat known to occur	-	■	-	CD and MI	1	1	**None.** No habitat present in KRF. Migration pathway for the western population is generally within 200 km of shore with whales found well offshore during the northern migration (peak mid-June to mid-July) and close inshore during the southern migration (peak late September to mid-October). Some migratory staging point, socialising, resting and low levels of calving observed within 10 km of the coast.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing			WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
			Threatened	Migratory	Marine		DBCA	NatureMap	
Orcinus orca	Killer Whale, Orca	Species or species habitat may occur	-	■	-	MI	-	-	**None.** No habitat present in KRF. Species is cosmopolitan and able to inhabit all oceans, although off the Australian coast they are most often seen along the continental slope and shelf, particularly near seal colonies.
Stenella attenuata	Spotted Dolphin, Pantropical Spotted Dolphin	Species or species habitat may occur	-	-	-	MI	-		**None.** No habitat present in KRF. Species inhabits near-shore and oceanic habitats in tropical waters, and occasionally temperate waters. Generally occurs in waters deeper than 200 m, but also found on the continental shelf.
Tursiops aduncus	Indian Ocean Bottlenose Dolphin	Species or species habitat likely to occur	-	-	-	MI		7	**None.** No habitat present in KRF. In Australia, species is restricted to inshore areas (bays, estuaries), nearshore waters, open coastal areas and shallow offshore waters (including coastal areas of oceanic islands).
Tursiops truncatus s. str.	Bottlenose Dolphin	Species or species habitat may occur	-	-	-	-		7	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for cetaceans within Commonwealth waters or for actions undertaken by a Commonwealth agency.
Pinnipeds (seals and sea lions)									
Arctocephalus forsteri	New Zealand Fur-seal	Species or species habitat may occur	-	-	■	OS	-	-	**Not considered further.** Not listed under the BC Act, and EPBC Act only applicable for marine species within a Commonwealth area or for actions undertaken by a Commonwealth agency.
Neophoca cinerea	Australian Sea Lion	Species or species habitat known to occur	EN	-	■	EN	117	121	**Unlikely.** No suitable habitat present in KRF. Mid coast is home to the largest population in WA and males have a foraging BIA extending from Geraldton south to Garden Island. While unlikely, the species could haul out to rest on the beach area.

Table A-0-6 Plant species potentially occurring within the PDE

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing	WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
					DBCA	NatureMap	
Acacia sp. Binningup (G. Cockerton et al. WB 37784)		*NA - not returned by PMST search*	-	P1	1	1	**Unlikely.** No suitable habitat present in KRF Distribution from Busselton to Rockingham. Occurs in inland sub-coastal dunes in woodland and shrubland (combination of tuart, banksia and peppermint) on sand, often in degraded areas.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing	WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
					DBCA	NatureMap	
Amanita preissii	Cinnamon-ring Lepidella	*NA - not returned by PMST search*	-	P3	1	1	**None.** Suitable habitat not present at KRF. Distribution from Albany to Joondalup. One of the first mushrooms described from the south-west of WA and common in the Perth Interim Biogeographic Regions of Australia (IBRA) subregion. Grows in leaf litter, sandy soil and lateritic gravel under shrubs and *Eucalyptus*.
Andersonia gracilis	Slender Andersonia	Species or species habitat may occur	EN	VU	-	-	**None.** Suitable habitat not present at KRF. Distribution from Gosnells north to Nambung. Currently known from the Badgingarra, Dandaragan and Kenwick areas. Found on seasonally damp, black sandy clay flats near or on the margins of swamps. Often on duplex soils supporting low open heath vegetation including *Calothamnus hirsutus*, *Verticordia densiflora* and *Kunzea recurva* over sedges.
Aponogeton hexatepalus	Stalked Water Ribbons	*NA - not returned by PMST search*	-	P4	1	1	**None.** Suitable habitat not present at KRF. Distribution from Donnelly River north to Cannington. Occurs in mud around freshwater ponds, rivers and claypans.
Austrostipa mundula	Neat Spear-Grass	*NA - not returned by PMST search*	-	P3	1	1	**None.** Suitable habitat not present at KRF. WA distribution along coast from Balladonia to Joondalup in small isolated coastal populations. Also known from South Australia and Victoria. Grows in sandy soils (grey sand over limestone) in mallee-scrub and in low woodland.
Caladenia huegelii	Grand Spider-orchid	Species or species habitat may occur within 2 km of PDE	EN	CR	9	9	**None.** Suitable habitat not present at KRF. Distribution from Dunsborough north to Gnangara. Found within 20 km of the coast and favours areas of dense undergrowth (typically jarrah / banksia mixed woodland over dense shrubs). Grows in deep grey-white sand usually associated with the Bassendean sand-dune system (rarely extends into the Spearwood system). Also grows in clay loam. Known to inhabit winter-wet depressions but tolerates dry conditions.
Cyathochaeta teretifolia		*NA - not returned by PMST search*	-	P3	2	2	**None.** Suitable habitat not present at KRF. Distribution from Denmark to Muchea. Perennial sedge growing in grey sand and sandy clay in swamps and creek edges.
Diuris drummondii	Tall Donkey Orchid	*NA - not returned by PMST search*	VU	VU	1	1	**None.** Suitable habitat not present at KRF. Distribution from Albany to Gingin. Found in low-lying depressions in peaty and sandy clay swamps. Plants are frequently observed standing in several centimetres of water.
Diuris micrantha	Dwarf Bee-orchid	Species or species habitat known to occur	VU	VU	6	5	**None.** Suitable habitat not present at KRF. Distribution from Arthur River north to Kwinana. Found in small populations on dark, grey to blackish, sandy clay-loam substrates in winter wet depressions, swamps, and shallow water. Grows with sedges.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing	WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
					DBCA	NatureMap	
Diuris purdiei	Purdie's Donkey-orchid	Species or species habitat may occur	EN	EN	-	-	**None.** Suitable habitat not present in KRF footprint. Distribution from southwest of Pinjarra to Cannington in the Perth and Northern Jarrah Forest IBRA subregions. Grows on sand to sandy clay soils in winter-wet swamps amongst sedges and dense heath with scattered emergent *Melaleuca preissiana, Eucalyptus calophylla, E. marginata* and *Nuytsia floribunda*.
Dodonaea hackettiana	Hackett's Hopbush	*NA - not returned by PMST search*	-	P4	18	21	**Unlikely.** No suitable habitat present in KRF. Distribution from Rockingham north to east of Ledge Point in the Perth IBRA subregion. Occurs on sand and outcropping limestone.
Drakaea elastica	Glossy-leafed Hammer Orchid	Species or species habitat likely to occur	EN	CR	4	4	**None.** Suitable habitat not present at KRF. Distribution from Busselton north to Anketell, with a disjunct population at Guraga Lake (south of Cataby). Grows on bare patches of white or grey sand within otherwise dense vegetation in low-lying areas alongside winter-wet swamps.
Eucalyptus foecunda foecunda	Coastal Dune Mallee	*NA - not returned by PMST search*	-	P4	3		**Unlikely.** No suitable habitat present in KRF. Distribution from south of Preston Beach north to Jurien Bay, inland to the Beermullah Plain. Grows on yellowish coastal sands overlying limestone, often on limestone hills and dunes, in shrubland or very open woodland. Associated eucalypts include *Eucalyptus argutifolia, E. decipiens, E. gomphocephala* and *E. petrensis*.
Grevillea olivacea	Olive Grevillea	*NA - not returned by PMST search*	-	P4	1	1	**Unlikely.** No suitable habitat present in KRF. Distribution from Cockburn north to Geraldton. Grows in shrubland of coastal dunes on white or grey sand over limestone rocks.
Jacksonia gracillima		*NA - not returned by PMST search*	-	P3	1	1	**None.** Suitable habitat not present at KRF. Distribution from Busselton to Wanneroo. Grows on sand, often adjacent to winter wet areas.
Jacksonia sericea	Waldjumi	*NA - not returned by PMST search*	-	P4	1	1	**Unlikely.** No suitable habitat present in KRF. Distribution from Mandurah north to Yanchep and east to Midland. Grows on calcareous and sandy soils of the Swan Coastal Plain
Lachnagrostis nesomytica paralia		*NA - not returned by PMST search*	-	P1	3	3	**Unlikely.** No suitable habitat present in KRF. Collected from Garden Island coastal dunes and swales in thickets of *Callistris preissii* and *Melaleuca lanceolata* over calcareous sands.
Lepidium puberulum		*NA - not returned by PMST search*	-	P4	3	4	**Unlikely.** No suitable habitat present in KRF. Distribution include Rottnest and Garden Islands (southernmost), Jurien Bay, Houtman Abrolhos islands and Shark Bay (northernmost). Grows very near coast on sandy soils
Myosotis australis		*NA - not returned by PMST search*	-	P4	-	4	**Unlikely.** No suitable habitat present in KRF. Distribution from Esperance, along the coast, north to Rockingham and known from Garden Island. Grows on grey sand over limestone.

Scientific Name	Common Name	PMST indicative presence within PDE	EPBC Act Listing	WA Status	Records within 10 km of PDE		Likelihood of occurring in KRF footprint
					DBCA	NatureMap	
Netrostylis sp. Chandala (G.J. Keighery 17055)		*NA - not returned by PMST search*	-	P2	1		**None.** No suitable habitat present. Distribution within the Dandaragan Plateau and Perth IBRA subregions. Occurs in peaty soils on edges of swamps.
Pimelea calcicola		*NA - not returned by PMST search*	-	P3	2	3	**Unlikely.** No suitable habitat present in KRF. Extends from Yalgorup National Park north to Yanchep National Park, occurring close to the coast associated with limestone ridges.
Pithocarpa corymbulosa	Corymbose Pithocarpa	*NA - not returned by PMST search*	-	P3	-	1	**None.** No suitable habitat present. Occurs along the Darling Scarp, east of Perth, from Mundijong to Bullsbrook. Grows in gravelly or sandy loam amongst granite outcrops.
Sphaerolobium calcicola		*NA - not returned by PMST search*	-	P3	1	1	**None.** No suitable habitat present. Distribution from south of Preston Beach north to Two Rocks along the coast where it occurs in tall dunes, winter-wet flats, interdunal swamps, and low-lying areas. Substrates include white-grey-brown sand, sandy clay over limestone, and black peaty sandy clay.
Stylidium ireneae		*NA - not returned by PMST search*	-	P4	1	1	**None.** No suitable habitat present. Distribution from Augusta north to Kwinana. Grows in sandy loam of valleys near creek lines, woodland, often with *Agonis* sp.
Stylidium paludicola		*NA - not returned by PMST search*	-	P3	2	2	**None.** No suitable habitat present. Distribution from Busselton north to Joondalup. Occurs in winter wet habitats of Marri and Melaleuca woodland, Melaleuca shrubland, with peaty sand over clay.
Stylidium striatum	Fan-leaved Triggerplant	*NA - not returned by PMST search*	-	P4	-	1	**None.** No suitable habitat present. Distribution within the Dandaragan Plateau and Northern Jarrah Forest IBRA sub regions. Occurs on hillslopes with Jarrah/Marri forest or Wandoo woodland, with brown clay loam over laterite.
Thelymitra variegata	Queen of Sheba	*NA - not returned by PMST search*	-	P2	1		**None.** No suitable habitat present. Distribution within Esperance Plains, Jarrah Forest, and Swan Coastal Plain IBRA regions. Grows among low shrubs and grass tussocks in forests, woodlands and heathlands at elevations of 50 to 300 meters with sandy clay, sand, laterite.

Appendix B EPBC Protected Matters search

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 26-Jan-2023

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	47
Listed Migratory Species:	48

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	5
Commonwealth Heritage Places:	None
Listed Marine Species:	73
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	17
Key Ecological Features (Marine):	None
Biologically Important Areas:	13
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Forrestdale and thomsons lakes	Within 10km of Ramsar site	In feature area

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community may occur within area	In feature area
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Community likely to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anous tenuirostris melanops			
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In feature area
Botaurus poiciloptilus			
Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thalassarche melanophris](#)			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
[Thalassarche steadi](#)			
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
[Zanda latirostris listed as Calyptorhynchus latirostris](#)			
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding known to occur within area	In feature area
FISH			
[Thunnus maccoyii](#)			
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
MAMMAL			
[Balaenoptera musculus](#)			
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
[Dasyurus geoffroii](#)			
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Eubalaena australis](#)			
Southern Right Whale [40]	Endangered	Breeding known to occur within area	In feature area
[Neophoca cinerea](#)			
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat known to occur within area	In feature area
[Pseudocheirus occidentalis](#)			
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
PLANT			
[Andersonia gracilis](#)			
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area	In feature area
[Caladenia huegelii](#)			
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Diuris micrantha](#)			
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Diuris purdiei](#)			
Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area	In feature area
[Drakaea elastica](#)			
Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area	In feature area
REPTILE			
[Caretta caretta](#)			
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
[Chelonia mydas](#)			
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
[Dermochelys coriacea](#)			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
[Natator depressus](#)			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
SHARK			
[Carcharias taurus (west coast population)](#)			
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Carcharodon carcharias](#)			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Pristis pristis](#)			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
[Sphyrna lewini](#) Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area	In feature area

Listed Migratory Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
[Anous stolidus](#) Common Noddy [825]		Species or species habitat may occur within area	In feature area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
[Ardenna carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
[Ardenna grisea](#) Sooty Shearwater [82651]		Species or species habitat may occur within area	In feature area
[Diomedea amsterdamensis](#) Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In feature area
[Diomedea dabbenena](#) Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In feature area
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In feature area
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Hydroprogne caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Onychoprion anaethetus Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thalassarche melanophris](#) Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Marine Species			
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
[Caperea marginata](#) Pygmy Right Whale [39]		Species or species habitat may occur within area	In feature area
[Carcharhinus longimanus](#) Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eubalaena australis as Balaena glacialis australis			
Southern Right Whale [40]	Endangered	Breeding known to occur within area	In feature area
Lamna nasus			
Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae			
Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Mobula alfredi as Manta alfredi			
Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In feature area
Mobula birostris as Manta birostris			
Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Orcinus orca			
Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51496]	WA	In buffer area only
Commonwealth Land - [51980]	WA	In buffer area only
Commonwealth Land - [51495]	WA	In buffer area only
Commonwealth Land - [51896]	WA	In buffer area only
Commonwealth Land - [51897]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area	In feature area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]		Species or species habitat may occur within area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area overfly marine area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area	In feature area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour may occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Onychoprion anaethetus as Sterna anaethetus			
Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Pachyptila turtur			
Fairy Prion [1066]		Species or species habitat likely to occur within area	In feature area
Pandion haliaetus			
Osprey [952]		Species or species habitat known to occur within area	In buffer area only
Pterodroma mollis			
Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Puffinus assimilis			
Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Stercorarius skua as Catharacta skua			
Great Skua [823]		Species or species habitat may occur within area	In buffer area only
Sterna dougallii			
Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons as Sterna albifrons			
Little Tern [82849]		Species or species habitat may occur within area	In feature area
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat may occur within area overfly marine area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area	In feature area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area	In feature area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In feature area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In feature area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area	In feature area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In feature area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In feature area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area	In feature area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area	In feature area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area	In feature area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In feature area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In feature area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In feature area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In feature area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In feature area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In feature area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In feature area
Mammal			
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In feature area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat known to occur within area	In feature area
Reptile			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In feature area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area	In feature area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In feature area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In feature area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Construction of a Deepwater, General Container Port	2009/5178	Controlled Action	Proposed Decision	In feature area
Development of Kwinana Quay port facility	2008/4387	Controlled Action	Completed	In buffer area only
Industry Zone	2010/5337	Controlled Action	Post-Approval	In buffer area only
Natural Gas Pipeline Expansion	2006/2813	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
'Looping 10' gas transmission pipeline from Kwinana to Hopelands	2005/2212	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Expansion of berthing facilities at Kwinana Bulk Terminal	2006/2509	Not Controlled Action	Completed	In feature area
Expansion of existing Ammonium Nitrate Production Facility	2005/1941	Not Controlled Action	Completed	In feature area
Gas-fired Power Station	2005/2213	Not Controlled Action	Completed	In feature area
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Kwinana Depot Upgrade	2011/6035	Not Controlled Action	Completed	In buffer area only
Kwinana Gas-Fired Power Station	2005/2101	Not Controlled Action	Completed	In feature area
Perth Desalination Plant 2	2019/8454	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
City of Cockburn Sporting Facilties	2005/2139	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
South West Metropolitan Railway Project	2003/1175	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Wastewater Treatment Plant	2009/4970	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Biologically Important Areas			
Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Ardenna pacifica			
Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur	In feature area

Scientific Name	Behaviour	Presence	Buffer Status
Eudyptula minor Little Penguin [1085]	Foraging (provisioning young)	Known to occur	In feature area
Hydroprogne caspia Caspian Tern [808]	Foraging (provisioning young)	Known to occur	In feature area
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Former Range	In feature area
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur	In feature area
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur	In feature area
Sterna dougallii Roseate Tern [817]	Foraging	Known to occur	In feature area
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur	In feature area
Seals			
Neophoca cinerea Australian Sea Lion [22]	Foraging (male)	Likely to occur	In feature area
Whales			
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur	In feature area
Eubalaena australis Southern Right Whale [40]	Calving buffer	Known to occur	In buffer area only
Eubalaena australis Southern Right Whale [40]	Seasonal calving habitat	Known to occur	In feature area
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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