Project Environmental Management Plan

H2 Kwinana
bp Kwinana Energy Hub

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Contents

1 Symbols and abbreviations

For this document the following symbols and abbreviations apply:

AIRO	Aspects, Impacts, Risks and Opportunities
BPCS	Basic Process Control System
CEMP	Construction Environmental Management Plan
ECE	Environmental Critical Equipment
EMS	Environmental Management System
ENVIID	Environmental Impact Identification Assessment
GDP	Global Defined Practice (bp specific practice)
GHG	Green House Gas
H2K	Hydrogen Kwinana Project
KEH	Kwinana Energy Hub
KIC	Kwinana Industries Council
KRF	Kwinana Renewable Fuels Project
NGER	National Greenhouse and Energy Reporting
OMS	Operating Management System
SDOOL	Sepia Depression Ocean Outlet Line
TAR	Turnaround
WWTP	Wastewater Treatment Plant

2 Introduction and Scope

This document outlines the Environmental management and controls in place for the H2 Kwinana (H2K) project throughout its life, from construction and commissioning to operation. This document is considered a 'live' document and will be continuously updated as risk assessments are completed and project design progressed.

The Project AIRO (Aspects, Impacts, Risks and Opportunities) register has been reviewed at each project stage. It is populated from the GDP 3.6 Screening assessment from Concept development and also the Environmental Impact Identification (ENVIID) workshops. It identifies environmental and social aspects and their impacts across all phases of the project – construction, commissioning and operation. This environmental management plan extends on the aspects and impacts and their controls and mitigations that are outlined in the AIRO register. Once H2K is operational, the AIRO register will be transferred over to site operation and incorporated into the Kwinana Energy Hub's AIRO register.

The project is being built on existing bp allocated plot at the Kwinana Energy Hub where existing operations and activities are occurring. The below defines the activities that are in and out of scope for this project environmental management plan;

In scope

- H2K construction, commissioning and operation

Out of scope

- The existing terminal operations including Wastewater Treatment plant (WWTP), jetties, tankfarm and utilities covered under existing Part V licence *L5938/1967/12* and ATOM operating procedures unless this project will modify the equipment or change the existing operation.
- Demolition of the refinery units - Decommissioning and demolition of the redundant refinery equipment is covered under the "Decommissioning and Rehabilitation Plan" which has been provided to the EPA under Ministerial Statement 0161 Condition 6. These activities are also covered under bp procedures and the demolition contractors Environmental Management Plan.

3 Current Site Operations

Currently onsite the terminal operations including the tankfarm, jetties, steam generation area and the waste water treatment plant (WWTP) are operated by ATOM (Australian Terminal Operating Management) and those activities fall under ATOM's environmental management plan.

bp are currently responsible for the decommissioning and demolition of the redundant units under the Decommissioning and Rehabilitation Plan and also under the demolition contractor's Environmental Management Plan and Waste Management plan. The demolition contractor has prepared an Environmental Management Plan and held risk assessments in consultation with bp to ensure all environmental impacts and controls are in place for this work.

3.1 Environmental Licence

The BP Kwinana import terminal still requires utilities for operation. The existing tankfarm is an active fuels terminal which is serviced by the sites existing import and export infrastructure such as jetties, pipelines and dewatering drainage. Utilities such as the Wastewater Treatment Plant (WWTP) and the Steam Generation Area (SGA) which provides steam and water are still operational to meet the ongoing requirements of the site transition, through into future import terminal operation.

The bp Kwinana Import Terminal operates under an Environmental Licence to operate (L5938/1967/12) issued by Department of Water and Environmental Regulation (DWER) under Part V of the Environmental Protection Act 1986. A licence amendment was submitted to DWER in June 2021 to modify or remove any licence conditions that are no longer applicable due to ceasing refining operations.

The current licence provides targets and licence limits for the WWTP which is still operational. It also includes monitoring and performance requirements for the landfarm in the Waste Management Area where wastes are treated and prepared prior to reuse or disposal. bp Kwinana conducts a groundwater monitoring program and includes monthly monitoring well oil thickness and annually analysing groundwater for hydrocarbons, metals and nutrients. These conditions and reporting are outlined in the licence.

bp Kwinana has carried out remediation activities onsite for 35 years which are outlined in the DWER licence. These remediation activities are unaffected now refining operations have ceased and continue to occur at the terminal. The purpose of the subsurface oil recovery program is to target areas of the site that have appreciable quantities of separate phase hydrocarbon and remove them from the sub surface. In recent years, the rates of recovery have significantly declined due to less hydrocarbon available for recovery.

4 Environmental Management System

bp Kwinana Refinery had an Environmental Management System (EMS) that was aligned to ISO14001 and last attested to the standard in 2020. When the crude refining operations ceased and the terminal changed control over to ATOM, the attestation lapsed. It is expected by bp that the biorefinery will attest to ISO14001 within 3 years of operation. This provides assurance both to ourselves and the community that we are managing our significant environmental issues effectively. The EMS is structured, transparent and auditable and provides the framework for the continual improvement of our environmental performance.

5 Project Environmental Workshops

5.1 Environmental and Social Screening workshop

In December 2022, bp held the first environmental workshop for the project. The screening assessment focuses on 19 environmental and social triggers (such as effluent and waste production) and assesses the projects impact on those triggers.

5.2 Environmental Impact Identification Workshop

The Optimise ENVIID for the biorefinery was held in February 2024. Its purpose is to identify any environmental impacts from the hydrogen production facility and ensure that the controls in place are adequate. At each project stage the ENVIID is revisited and will review the content and incorporate any new design or scope changes.

5.3 Net Positive Impact Assessment

bp carried out a net positive impact assessment on the project to determine whether the project was in a high biodiversity area and whether it would have significant impact on this environment. As H2K is located on existing industrial site in the Kwinana Industrial area with no vegetation clearing or impact to marine environment and using reclaimed wastewater as feed, the impact to the biodiversity was deemed low. The emission profiles (air, water, dust and sound) are of small magnitude and unlikely to have a significant impact on biodiversity.

6 Project Activities

The physical project phases are outlined in Figure 6.1 and all introduce some environmental impact. This environmental management plan focuses on these phases and the controls in place to prevent and mitigate any impacts.

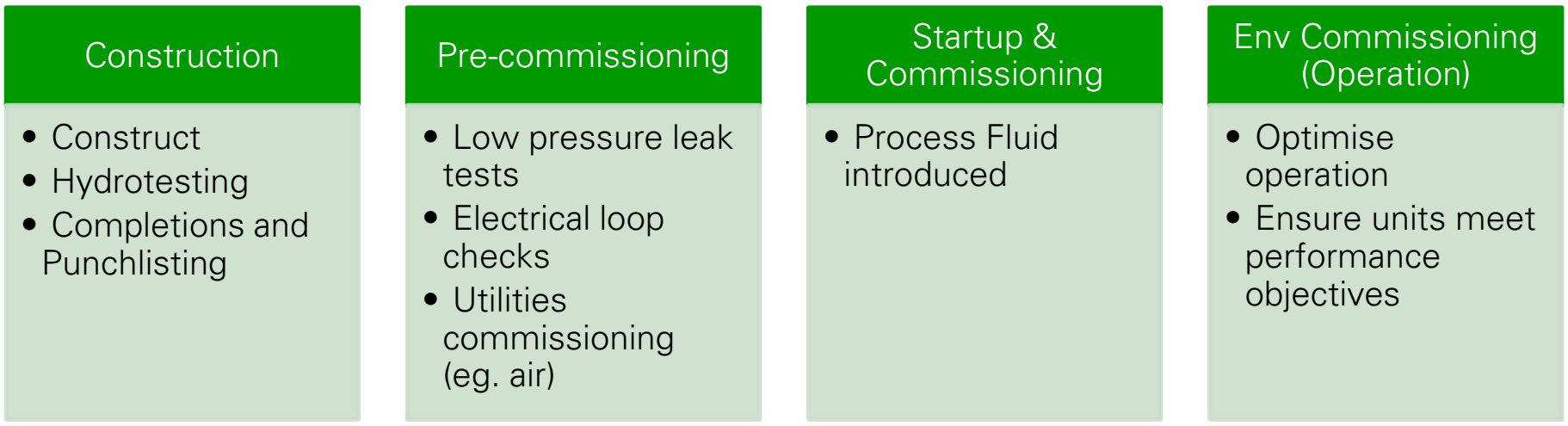

Figure 6-1

7 Construction & Pre-commissioning

The H2K master control schedule shows the construction timing and duration. The project will require a warehouse, construction village and laydown areas for approximately 21 months. Locations for this infrastructure are on existing KEH plot which is already cleared. Existing carpark facilities are sufficient to support the H2K construction work utilising overflow parking that was previously used in large maintenance events. Power required for construction activities is expected to be from diesel generators. The Pre-commissioning phase has a very minor environmental impact, as the equipment is being checked and verified before the startup phase and hence not included separately as part of this plan.

The construction impacts and controls have been identified in the Optimise ENVIID and risk assessed. Actions and recommendations from the ENVIID are created to cover any identified gaps and to ensure that the environmental construction requirements are passed onto the construction contractors.

The impacts and controls have been summarised below and will be updated after the Define ENVIID is held;

7.1 Atmospheric emissions

Atmospheric emissions expected from construction activities are dust and greenhouse gas emissions. There will be several sources of diesel combustion vehicles (such as cranes and concrete trucks) and stationary equipment such as power generators that will generate greenhouse gas emissions. Dust is likely to be generated from disturbance of the soil and also removal of the soil for below ground excavation services such as sewers.

Management Controls for atmospheric emissions are:

- Minimising the areas to be disturbed to reduce dust generation
- Watering of any potential dust source if required such as unsealed roads, work areas and soil stockpiles
- Construction location is within bp Kwinana site and within the Kwinana Industrial Area hence dust emissions very unlikely to impact community
- Monitoring of diesel usage and vehicle usage to reliably predict GHG emissions
- Maintenance of mobile equipment to maintain efficiency

Combustion emissions arising from construction are deemed insignificant when compared to the existing combustion emissions from the terminal steam generators and stationary diesel equipment.

7.2 Noise and Vibration

Construction activities will generate noise for the site. Under Noise regulations, construction noise is exempt as long as the following applies

- Construction work must be carried out between 7am and 7pm which is not a Sunday or a public holiday.
- Out of hours work must be carried out in accordance with an approved noise management plan

Management controls for noise and vibration are

- Maintenance of equipment to avoid unnecessary vibration and noise
- Construction activities scheduled for dayshift and weekdays to avoid community disturbance
- The project site is within the Kwinana Industrial Area and therefore noise emissions from construction activities are likely to be masked by current operations and industry neighbours
- Communication to our industry neighbours of construction period but also any activities that may generate excess noise

Construction noise information will be provided to the City of Kwinana as part of the planning approvals. If out of hours work is required, then the noise management plan will be provided to the City of Kwinana as per the Noise Regulations.

7.3 Discharges to ground

Construction activities can impact the soil and groundwater from discharges to the ground from fuel and oil spills from heavy machinery, vehicles and equipment and sand blasting activities. The groundwater at bp Kwinana Energy Hub flows towards Cockburn Sound and hence can affect the local marine environment if not managed.

Management Controls

A number of measures to limit and prevent discharges to land during construction will be implemented including the following:

- Dewatering licence and controls are required for any ground disturbance greater than 2m-4m (approximate depth of the water table) to prevent any potential groundwater impacts
- Maintenance of mobile equipment to ensure hydraulic lines and engine sumps are intact and without evidence of leaks.
- Sand blasting activities will be limited as the preference is for sandblasting to occur offsite. Mechanical cleaning will be preferred if required onsite.
- Construction spill response procedures and provision of spill kits within construction areas
- Use of screens and ground sheets to prevent spray contamination of the ground surface
- Mechanical completion activities and punchlisting to occur at the end of construction prior to handover to operations to ensure no leaks when water or process fluid is introduced

7.4 Waste streams

Construction activities will generate liquid and solid waste streams. Waste disposal will be the responsibility of the construction contractors. bp will work with the construction contractors to ensure that their waste management plan meets the expectations of bp. The construction wastes are summarised below;

- Scrap metal and piping
- Contaminated Soil
- Pallets
- Concrete
- Hazardous wastes solvents, paints, oils, batteries
- Hydrotest water disposal
- Sewage and greywater

Management Controls

Controls in place to reduce waste generation and recycle/reuse wastes where possible are;

- Construction waste management plan developed by contractors and approved by bp
- Adherence to the bp Kwinana Contaminated Soil guidelines which ensure soil is managed in accordance with the Contaminated Sites Act
- Waste segregation and utilising additional bins and skips if required
- Exploring existing reuse and recycling options for waste streams
- bp Kwinana waste permitting system (Waste Permit Procedure) and Controlled waste regulations

The existing bp waste permitting system is in place to ensure all waste movements onsite and offsite are correctly regulated and documented. It allows waste disposal to be effectively managed and also provide records of all waste generated and movements. Waste generation data is required for Commonwealth reporting (National Pollutant Inventory) and also bp internal reporting. Controlled wastes are tracked through a bp permit as well as controlled waste tracking receipts and the controlled waste system.

Hydrotesting Water

It is expected that hydrotesting water will come from the bp Kwinana fire main which is groundwater, abstracted from our licenced bore onsite. For final clean and washdown water, it is expected that this water will be potable water but still needs confirming. Where possible hydrotesting water will be recycled and reused. Disposal of hydrotesting water can be to the process water tanks for reuse or draining to the oily water sewer for treatment through the KEH wastewater treatment plant (WWTP).

8 Commissioning and Startup

This section outlines the environmental impact and controls in place for startup where process fluids such as water and chemicals are introduced for the first time and the equipment started up.

Environmental Critical Equipment (ECE) and systems are any part of an operational facility, plant or automated system involved in the prevention or mitigation of an environmental event or specifically identified as critical by the locally applicable regulations. ECE's are identified through the critical device workshops which assess safety and environmental scenarios with large consequence. For the project, the ECE's will be identified and managed in the same manner of the Safety Critical Equipment. This workshop will occur in early execute. The ECE's will be subject to verified performance testing during static commissioning where results will be recorded to provide an auditable trail of performance prior to introduction of production fluids and gases.

The H2K operations team will develop a commissioning strategy to reduce the duration of hydrogen that is required to be vented. Hydrogen can be considered an indirect greenhouse gas as it does not cause a warming effect on its own, but interacts with airborne molecules to prolong the lifetime of atmospheric methane. bp will track and aim to reduce as much hydrogen venting as possible during the commissioning period.

The wastewater effluent will be monitored during commissioning to ensure that its quality is as per expected and it can be disposed or treated as planned.

Noise during commissioning is expected to be very similar to operating noise. As the proposed site is within the Kwinana Industrial Area, it is expected that the noise generated is no different to the other industries during commissioning and startup. The operational noise modelling has indicated that the project is well within the noise regulations and hence the additional noise from commissioning is not expected to exceed the noise regulations.

Spills to ground are possible through commissioning as pipework and equipment will be subject to process fluids for the first time. Mechanical completion activities such as joint integrity management and tightness testing occur prior to introduction of production fluids and subsequent handover to operations.

The commissioning strategy outlines integrity management process that will occur on all mechanical joints to prevent leaks on startup.

There are limited waste streams generated through the commissioning phase.

9 Environmental Commissioning / Operation

DWER environmental commissioning period will start when the project moves into operation. The hydrogen production facility will be operated and environmental performance optimised and validated. Extra testing and monitoring will occur of wastewater streams to ensure that equipment is operating as expected. Equipment will also be optimised to meet the design performance specification from the vendors.

9.1 Atmospheric emissions

Oxygen and hydrogen will be vented to the atmosphere through two vents, the oxygen vent and the hydrogen vent. Oxygen is produced during electrolysis and will be vented from a low-pressure oxygen vent on a continual basis during operation. Oxygen will be vented from a height of approximately 30 m above ground level, at a rate of approximately 16.5 tonnes/hour.
Hydrogen will be vented to air intermittently through the hydrogen vent, during upset conditions and maintenance events such as shutdowns. Hydrogen will be vented from a height of approximately 30 m above ground level, at a rate of approximately 11,095 tonnes/annum.
Nitrogen will be used during commissioning (leak testing and system purging) and during routine operation, for purging and tank blanketing. Nitrogen will be vented through the hydrogen vent from a height of approximately 30 m above ground level, at a rate of up to approximately 2,722 tonnes/annum.

Emissions to air associated with the commissioning and operation of the Project are naturally occurring elements. In the quantities proposed to be vented to air, both oxygen and nitrogen are not anticipated to result in any environmental impacts. Hydrogen venting will be minimised as far as practicable.

9.2 Noise and Vibration

Noise is expected from the equipment and pipework. Noise from the H2K project has been modelled and has shown that bp Kwinana Energy hub operations (including KRF and H2K) achieves full compliance to the regulations at the site boundary and sensitive receptors. The Kwinana Energy hub with H2K operational will 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 (from KRF) during abnormal operation.

Management Controls

- Design noise limits and standards dictating equipment must be < 85 dB
- Adherence to the Noise Regulations
- Noise modelling of H2K equipment has occurred and demonstrated that the project is within the thresholds specified in the noise regulations
- Operation of units within the optimal operating envelope

Monitoring

- Noise measurement survey will be conducted once H2K is operational during environmental commissioning
- Annual review of noise complaints within the Part V licence Annual Compliance Audit

9.3 Water use

H2K will use Kwinana Water Reclamation Plant (KWRP) water, an industrial recycled wastewater as electrolyser feed, in cooling towers and other ancillary equipment. Using the recycled wastewater stream minimises the freshwater use from potable or ground water in line with Aim 17 (bp's water positivity aim). The KEH existing KWRP connection and pipework will be utilised.

Managed Controls

- KWRP contract for supply of water that reduces bp's reliance on groundwater and potable water
- Recycling of water/condensate where possible (for example, condensate from the compression unit is feed back to the demineralised water plant

Monitoring

- KWRP usage is monitored onsite as is scheme/potable water use and groundwater through the existing Water Measurement Procedure. KWRP water flowmeters will be installed for tracking water usage

9.4 Water discharges

There are three effluent streams that are generated from H2K. These are summarised below:

- Process effluent is water generated within the process itself and comes from the demineralisation plant, various knock out drums in the compression area and maintenance drains. These streams are fed to the final effluent tank in the KEH WWTP. The effluent will be combined with the KEH effluent and disposed of to the Sepia Depression Ocean Outlet Landline (SDOOL) under the existing prescribed premise licence (L5938/1967/12). With the refining operations shutdown, the KEH WWTP has the capacity to accept the effluent from the Project, and discharge volumes from the Project to the SDOOL will fall current licence limits.
- Stormwater or runoff that could be potentially contaminated will be collected in pits and tested prior to disposal. This effluent will be from areas such as safety shower operation, H2 compressor area, PDU and main transformer area, where minimal chemicals and oil will be present during operation. Any contaminated water will be disposed at the KEH WWTP for treatment. Stormwater tested as clean will be disposed of through ground infiltration.
- Stormwater from clean areas where no chemicals and/or oils are present (such as from nitrogen system, substations, building roofs and HVAC) will be collected and directed to ground infiltration through soakwells.

The WWTP and licence conditions are not proposed to be changed or altered as part of this project.

Management controls

- Operating procedures ensuring units and KEH WWTP are operated within their operating envelopes and within licence requirements
- Designed so that process effluent streams are fed to a Process Effluent pit before being sent to the KEH WWTP. This ensures adequate mixing and also sampling can occur on the H2K effluent.
- Bunding and hardstand for all process units

Monitoring

- Existing monitoring of the WWTP will remain unchanged. Laboratory analysis of wastewater through the WWTP indicates WWTP health and performance. Final effluent samples are analysed as per the licence conditions before discharge to SDOOL.
- Existing WWTP online pH analysers feed into BPCS.
- Monitoring of the Process Effluent pit to ensure H2K effluent is in specification before mixing with the KEH effluent streams
- Monitoring of stormwater is areas that could be potentially contaminated before disposal

9.5 Spills to ground

The main areas that could have a spill to ground are the compressor and transformer units which contain lubricating oils and the chemical storage areas for demineralised plant and cooling towers. These areas will be bunded with impermeable hardstand and runoff to collection pits. Other pipework will contain gases which in the event of a leak will not impact the ground.

Managed Controls

- Bunding
- Maintenance procedures and mechanical completions process to ensure no leaks
- BPCS with overfill alarms and inventory management
- Operating procedures to ensure units are operated within operating envelope to prevent corrosion and overpressure events that could cause leaks
- bp emergency response systems and procedures including spill kits

Monitoring

- Visual operator routines of the facility
- bp Remediation groundwater monitoring program inline with Part V licence requirements

9.6 Waste streams

9.6.1 Routine Waste Streams

Routine waste streams are wastes that are generated continuously while the hydrogen production facility is operating. The facility does not generate any routine process wastes besides from effluent.

The are several filters in the facility that may require changeout online. Due to the non-hazardous nature of the facility, it is expected that these filters would be landfilled.

The mixed bed resin replacement from the Electrolyser Ion Exchange package requires replacement every 4-6 months. The waste is 6 cartridges with a capacity of 150L each.

Management Controls

Controls in place to reduce waste generation and recycle/reuse wastes where possible are;

- Waste segregation and utilising additional bins and skips if required
- Exploring existing reuse and recycling options for waste streams as per site Waste management Plan. Existing disposal paths are outlined in the Waste Management Plan.
- bp Kwinana waste permitting system (Waste Permit Procedure) and Controlled waste regulations

9.6.2 Maintenance Waste Streams

The hydrogen production facility will carry out a large maintenance event every 5-10 years (still to be confirmed). Wastes generated through maintenance events are summarised below:

Electrolyser Unit

- Oil from transformers to be replaced every ten years
- Electrolyser components such as membrane electrode assembly and plates to be replaced every six - ten years. This waste stream will be sent back to the manufacturer for recycling or refurbishment

Hydrogen drying and purification Unit

- Deoxygenation catalyst requires replacement every 3 years and is expected to be sent back for recovery or refurbishment
- Hydrogen driers contain molecular sieve that needs replacing every 3 years – this waste is an aluminate silicate oxide and will be landfilled if a recovery or reuse option is not found.

Demineralised water unit

- Resin and adsorbents will be either reused if possible or disposed of to landfill
- Filters in the demineralised water unit will need replacing or cleaning during the maintenance activities.

Cooling tower system

- Filters in the demineralised water unit will need replacing or cleaning during the maintenance activities.

Management Controls

Controls in place to reduce waste generation and recycle/reuse wastes where possible throughout a turnaround are;

- Development of a TAR waste management plan specific to that turnaround event, including each waste's generation, approximate volumes, how to store and transport it and suggestions on disposal options.
- Waste segregation and utilising additional bins and skips if required
- bp Kwinana waste permitting system (Waste Permit Procedure) and Controlled waste regulations
- Waste disposal procedure outlining laboratory analysis and samples required for disposal