Decision Report

Application for Licence

Part V Division 3 of the *Environmental Protection Act 1986*

Licence Number	L9449/2024/1
Applicant	Hazer Group Limited
ACN	144 044 600
File number	DER2024/000236
Premises	Hazer Commercial Demonstration Plant 837 Cockburn Road MUNSTER WA, 6166 Legal description Lot 9 on Deposited Plan 31097 As defined by the coordinates in Schedule 1 of the licence
Date of report	15 December 2025
Decision	Licence granted

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1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the operation of the Hazer Commercial Demonstration Plant at 837 Cockburn Road in Munster (premises). As a result of this assessment, licence L9449/2024/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Application summary and overview of premises

2.2.1 Application information

On 24 May 2024, the applicant submitted an application for a licence to the department under section 57 of the *Environmental Protection Act 1986* (EP Act).

The application is to seek a licence relating to chemical manufacturing at the premises. The premises is approximately 8.5 km south of Fremantle between Jervoise Bay and Lake Coogee.

The premises relates to the category and assessed production capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in licence L9449/2024/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) are outlined in licence L9449/2024/1.

2.2.2 Manufacturing process

The Premises will use biogas from the Water Corporation's adjacent Woodman Point Waste Water Treatment Plant (WWTP) as a feed gas for the production of fuel cell grade hydrogen, whilst capturing carbon as a graphite by-product. The biogas is mainly composed of Methane (CH4) and Carbon Dioxide (CO2) with traces of Hydrogen Sulphide (H2S), Nitrogen (N2), Oxygen (O2) and Carbon Monoxide (CO). A Feed Gas Blower will draw the biogas, which is otherwise flared, from the WWTP into a H2S & Siloxane Removal Package designed to remove water, siloxanes and H2S from the gas. The gas is then blended with the waste gas recycle stream originating from the Hydrogen Purification Package in a later stage. The resulting gas stream is compressed through the Gas Feed Compression Package and routed into the CO2 Removal Package where CO2, N2, H2O and a percentage of CO are removed.

The methane gas will then pass through a Gas/Gas Exchanger and into the reactor where it is mixed with the iron ore catalyst, mainly composed of Iron Oxide (Fe2O3) and other constituents. The catalyst, stowed in drums in the storage shed, is loaded into a Loading Hopper, fed into a Transport Vessel where it is pressurised using N2, then is fed into reactor via the Catalyst Screw Feeder where it reacts with the treated feed gas. The catalyst enables the gas to undergo thermo-catalytic decomposition of methane to produce hydrogen and graphite.

This resulting gas/solid stream passes into two Gas/Gas Exchangers where it is subject to heat recovery before being separated in the Gas/Solid Separator Cyclone. The Gas/Solid Separator Cyclone removes a minimum of 60% of the graphite solids from the stream, which will then gravitate to the Graphite Collection Vessel and process gas removed, cooled and the remaining solids passed through Graphite Collection Filters. The Graphite Screw Conveyor collects the

graphite and routes it to the Graphite Loading Package to be stored in the Graphite Loading Hopper. The synthetic graphite is then loaded into drums, and stored in the same storage shed as the catalyst drums.

Process gas is then cooled down, compressed in the Process Gas Compression Package and routed to the Hydrogen Purification Package. The packages pressure swing adsorption PSA beds produce fuel cell grade hydrogen and a waste gas stream. A percentage of the waste gas stream containing CH4, H2, H2O, N2, CO and CO2 is recycled back to the inlet of the plant, via the Waste Gas Compression Package, to improve reaction conversion. The remainder of the waste gas is flared via an internal combustion flare. The hydrogen is routed to a fuel cell for offset power generation.

The Premises is anticipated to convert up to 90 % of the methane feed gas into hydrogen and graphite, with the H2S removed using a filtration process; the manufacturing process is illustrated as a flowchart in Figure 1. The biogas from the WWTP is currently being flared by Water Corporation at their premises. As such using the biogas as a feed to the hydrogen manufacturing process, which has very low emissions, will therefore have a net environmental benefit from an air emissions point of view.

The Premises' process emissions to air will be flared from a ground flare system with a vent stack 9m above the surface and 1.2m in diameter. The exhaust from the flare will result in approximately 170kg/hr CO2 emissions with minor quantities of other constituents (CO, N2, H2O and particulate matter).

The removal of Hydrogen Sulphide (H_2S) from the biogas using an activated carbon (or similar) filtration process, will generate solid waste in the form of used filter cartridges. The gas compression element of the process will generate wastewater, which will be captured in a wastewater pit and then transferred to the WWTP.

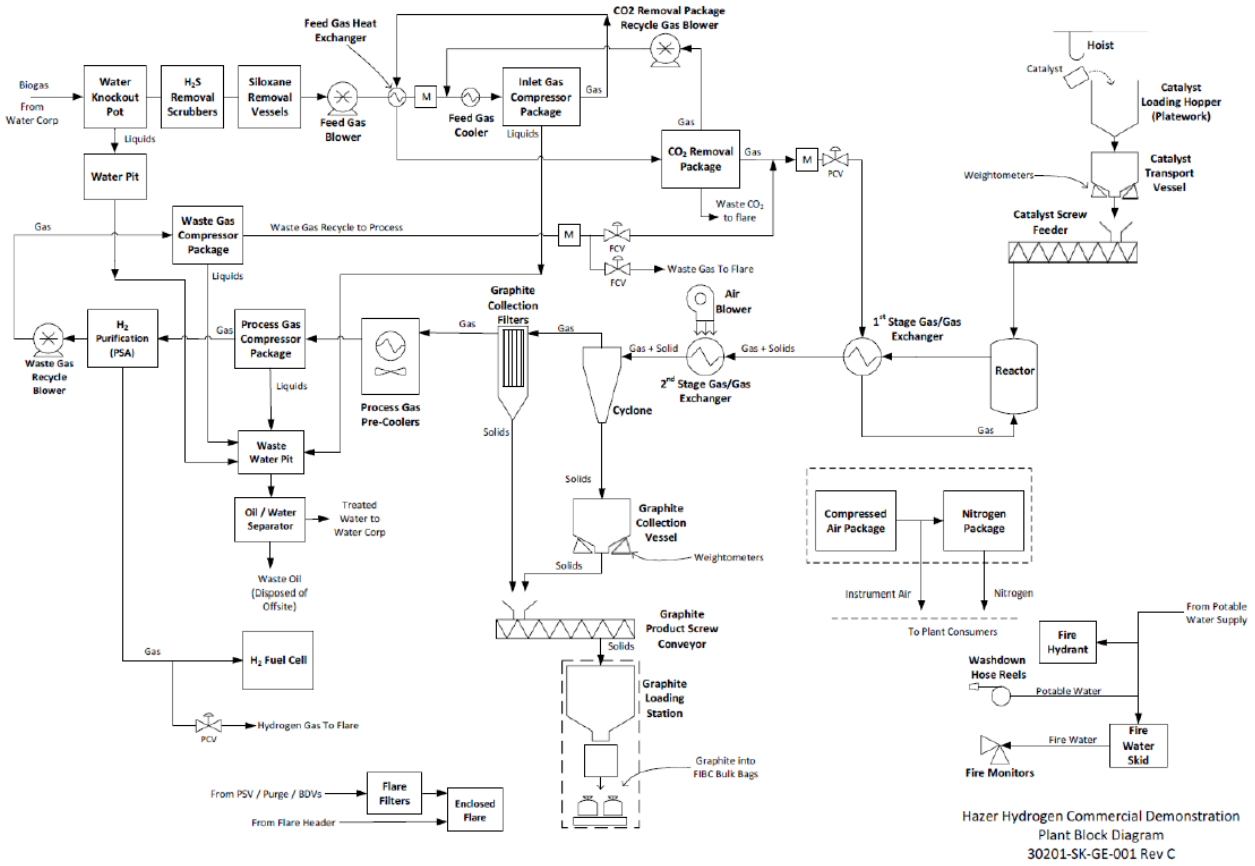

Figure 1: Process flow chart

3. Compliance

The applicant was granted works approval W6402/2020/1 for the installation and time limited operations of chemical manufacturing on the premises. The works approval holder submitted an Environmental Compliance Report (ECR) following completion of construction of phase 1 infrastructure on 20 July 2022. A review of the compliance documentation submitted found that the infrastructure had been built in accordance with the works approval requirements. This submission included the following infrastructure;

- Cold reactor system process infrastructure and equipment
- Gas flare stack
- Wastewater collection pit
- Biogas compression package
- Catalyst loading system and graphitic carbon unloading system

The applicant also has submitted the ECR for phase 2 infrastructure on the 26 July 2024. In reviewing the commissioning documentation all activities were undertaken in compliance with the granted works approval.

- Hot reactor system process infrastructure and equipment
- Process and H2 gas compression packages

4. Air Emissions

In alignment with the associated works approval (W6402/2020/1) the ground level concentrations (GLC) of CO and PM from the pilot's flare stack (trial smaller plant that operated at 2 Thorpe Way, Kwinana Beach under works approval W6173/2018/1) are estimated to be lower than the relevant guidelines under the department's draft *Guideline: Air emissions*. There is no reasonable expectation of emissions to air causing an adverse effect on receptors. Therefore, in accordance with *Guidance Statement: Risk Assessments* (DER 2017), a risk event does not exist.

Table 1: Emissions from pilot trial plant

Parameter	AGV (µg/m^3)	Averaging Period	Maximum GLC as nearest receptor (µg/m^3)
CO	10000	8-hour	0.02
Total Suspended Particles	82	24-hour	$1.74*10^{-9}$
PM_{10}	46	24-hour	$8.79*10^{-10}$
$PM_{2.5}$	23	24-hour	$2.18*10^{-10}$

The pilot plant produces approximately 94 kg/day of graphite, whereas the Premise will produce 1100 kg/day, a factor of 11.7 times more. The nearest residential receptor to the Premises is at a similar distance to the receptors associated with the pilot plant. From an assessment of the GLC's presented in Table 1, despite the increased production capacity at the Premises, it cannot be reasonably concluded that there is the potential for emissions to air to cause adverse effect on the receptors surrounding the Premises. Therefore, in accordance with *Guidance Statement: Risk Assessments* (DER 2017), a risk event does not exist; hence,

no related emission limit conditions are required in the works approval.

5. Process Waste

Waste expected to be generated during the operation of the premises is expected to be minimal but will likely include the following.

- Waste solids from H_2S filters, including spent catalyst
- Generated clean water
- Equipment washdown water

Waste solids once collected are to be disposed of at appropriately licensed facility with minimal handling to occur to ensure risk of accidental release of solids to land from the filters are minimised. The systems that are at the most risk of accidental release are to be sealed such as to minimise the escape of catalyst or graphite, and it is estimated that filters are replaced / disposed at most every quarter with minor excursions once every 48hrs during catalyst loading and graphite unloading operations.

Generated clean water and equipment washdown water are to be disposed of into an 800L concrete wastewater pit. Volumetric monitoring (and high-level alarm) is present on this pit to ensure water level does not exceed 100% of the capacity of the pit with a control level set point of 70% and high-level alarm that is set to trigger when water exceeds 80%. All wastewater is transferred to the nearby WWTP.

6. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk Assessments* (DWER 2020).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

6.1 Source-pathways and receptors

6.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this decision report are detailed in Table below. Table also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 2: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Operation			
Noise (Vehicle movement and compressors)	Operation of the Hazer Commercial Demonstration Plant	*Air / windborne pathway causing impacts to health and amenity*	• Each compressor will have a rated sound power level of 85 dB(A) at 1m, which is predicted to achieve noise levels at receptors are below those stipulated in the Environmental Protection (Noise) Regulations 1997 • Complaints management system.

Emission	Sources	Potential pathways	Proposed controls
			Hazer will record all complaints associated with noise emissions including the details of complaints received, and any action taken in response to the complaint (i.e. noise emission monitoring)

Process air waste (CH4, H2, H2O, N2, CO and CO_2)			• Use of a vent stake 9m above surface level and 1.2m in diameter.
			• The flare system's pilot flame and stack flame are monitored via a system of thermocouples that will detect if they are alight or not.
			• In the event of a blowout, the flare's burner management system will alarm to alert the operator, and the plant will be shutdown.
			• Stack emission monitoring: once during commissioning and then bi-annually during operation.
			• Bi-annual stack emission monitoring of:
			  ○ Water flow
			  ○ VOC's,
			  ○ H2S
			  ○ Temperature

Dust (from graphite loading hopper)			• Systems to be sealed such as to minimise the escape of catalyst or graphite-. • Dust collector at bottom of graphite loading hopper.
Wastewater (Process generated Clean water / equipment clean-down water)		Seepage to soil and groundwater causing contamination to soil and groundwater and surface waters	• Volumetric monitoring (and high level alarm) to ensure water level does not exceed 100% of the capacity of the pit with a control level set point of 70% and high-level alarm that is set to trigger when water exceeds 80%. • Wastewater transferred to the WWTP • Periodically emptying the pit using an oil skimmer to remove accumulated recovered oil and remove accumulated solids. All waste to be transported off-site and disposed of at an appropriately licensed facility
Process waste (solids from spent		Air/windborne pathway	• Loading of filter automatically monitored. Alarm sounds when filter requires changing, and a stand-by

Emission	Sources	Potential pathways	Proposed controls
H2S filters)			filter is switched in to replace the fully loaded filter. • Filter to be replaced at minimum once every 3 months. • Loaded filters will be disposed of at an appropriately licensed facility. • Waste generated from the Hydrogen CDP will be stored within the process area in suitable containment receptacles (where appropriate). The process area will be bunded.

6.1.2 Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 2 and Figure 2 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises *(Guideline: Environmental Siting* (DWER 2020)).

Table 2: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Closest residential receptor	Approximately 885m from eastern edge of the Premises boundary
Woodman Point Discovery Park (Caravan Park), Woodman Point Café and Woodman Point Sea Rescue.	Approximately 420m west of the Premises boundary
Water Corporation's Woodman Point Waste Water Treatment Works	Adjacent to the Premises boundary
Australian Maritime Complex	Approximately 730m SSW of the Premises boundary
Environmental receptors	**Distance from prescribed activity**
Specified Ecosystems – Lake Coogee	Approximately 425 m east of the premises boundary
Underlying groundwater (non-potable purposes) Cockburn Groundwater Area – Superficial Swan aquifer	Groundwater expected to be 10 mbgl Water Corporation superficial bore 650 m south of premises boundary

Bush-forever site – Woodman Point (includes TEC – Tuart woodland and Callitris preissii)	Approximately 125 m west of the premises boundary
Cultural receptors	**Distance from prescribed activity**
Aboriginal site ID 15840 – Cockburn Road.	Within and adjacent to the premises boundary

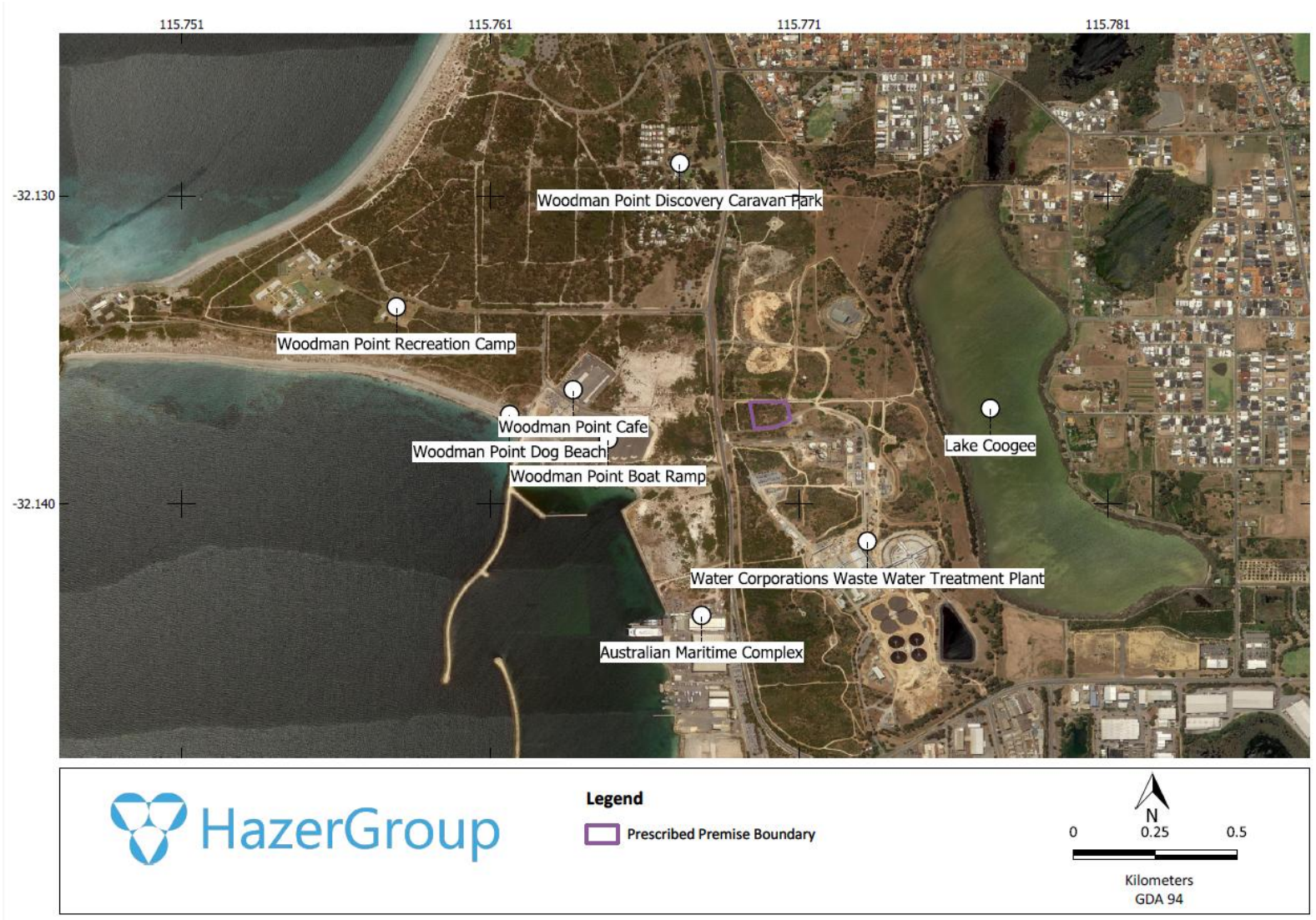

Figure 2: Distance to sensitive receptors

6.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 6.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 6.1), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 3.

Licence L9449/2024/1 that accompanies this decision report authorises emissions associated with the operation of the premises i.e. chemical manufacturing activities.

The conditions in the issued licence, as outlined in Table 3 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 3: Risk assessment of potential emissions and discharges from the premises during operation

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of licence	Justification for additional regulatory controls / DWER comments
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Operation								
Operation of process plant and vehicle movement	Noise (vehicle movement and compressors)	Air / windborne pathway causing impacts to health and amenity	Residential 830 m east, 550 m west and 570 m north of the premises boundary	*Refer to Section 3.1*	C = Slight L = Rare **Low Risk**	Y	Conditions 1	N/A
	Process air waste (CH4, H2, H2O, N2, CO and CO_2)				C = Slight L = Rare **Low Risk**	Y	Conditions 1, 2 and 3	NA
	Dust (from graphite loading hopper)				C = Slight L = Rare **Low Risk**	Y	Conditions 1	N/A
	Wastewater	Seepage to soil and groundwater causing contamination to soil and groundwater and surface waters	Lake Coogee 425m east and superficial groundwater bore user 650 m south of the premises boundary	*Refer to Section 3.1*	C = Slight L = Rare **Low Risk**	Y	Conditions 1	N/A

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

7. Consultation

Table 4 provides a summary of the consultation undertaken by the department.

Table 4: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 17 September 2024	None received	N/A
Local Government Authority advised of proposal on 17 September 2024	None received	N/A
Water Corporation advised of proposal on 17 September 2024	None received	N/A
Applicant was provided with draft documents on 13 November 2025	The Applicant submitted a response to drafts on 14 November 2025. An updated site infrastructure plan as provided.	The department has noted the response and made the required updates in the final licence.

8. Conclusion

Based on the assessment in this decision report, the delegated officer has determined that a licence will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
4. DWER 2019b, *Guideline: Air emissions (DRAFT)*, Perth, Western Australia
5. Hazer Limited 2024, *Application for a licence under the Environmental Protection Act 1986 dated*, *25 May 2024*, Perth, Western Australia
6. Hazer Group Limited 2024, *Application for a licence under the Environmental Protection Act 1986 dated*, *25 May 2024*, Perth, Western Australia
7. Hazer Group Limited 2024, RFI response for *Application for a licence under the Environmental Protection Act 1986 dated* ,*25 May 2024*, Perth, Western Australia
8. Hazer Group Limited 2022, *Hazer Hydrogen and Graphitic Carbon CDP – Environmental Compliance Report Amended Works Approval W6402/2020/1,* dated 20 July 2022, Perth, Western Australia
9. Hazer Group Limited 2024, *Hazer Hydrogen Graphitic Carbon CDP – Environmental*