

DOCUMENT NO	REVISION	DATE OF REVISION
P-WGP2-058	Rev 1	22/05/2020



**mitsui** E&P  
Australia

## **Waitsia Gas Project Stage 2 - Management of Flaring**

Disclaimer:

This document is protected by copyright, no part of this document may be reproduced or adapted without the consent of the originator/company owner, all rights are reserved. This document is “uncontrolled when printed”, refer to electronic copy for up to date version.

**TABLE OF CONTENTS**

**TERMS AND DEFINITIONS ..... 4**

**1.0 INTRODUCTION ..... 6**

**2.0 PURPOSE ..... 7**

**3.0 MANAGEMENT OF FLARING - THE WAITSIA GAS PLANT ..... 8**

    3.1 Flare design and use ..... 8

    3.2 Impacts of flaring on visual amenity ..... 8

    3.3 Impacts of Waitsia Gas Plant on air quality..... 8

    3.4 Operational flaring controls – commissioning ..... 9

**4.0 ZERO ROUTINE FLARING BY 2030 (ZRF 2030) INITIATIVE..... 10**

    4.1 West Australian State Government Commitment to Zero Routine Flaring..... 10

    4.2 Management of Zero Routine Flaring at the Waitsia Gas Project Stage 2 ..... 10

**5.0 REFERENCES ..... 11**

**ATTACHMENT 1 ..... 13**

**IMPACTS OF FLARING ON VISUAL AMENITY – DISTANCE OF WAITSIA GAS PLANT TO NEAREST SENSITIVE RECEPTORS ..... 13**

**ATTACHMENT 2 ..... 15**

**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT TO HOUSE 115**

**ATTACHMENT 3 ..... 17**

**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT TO HOUSE 217**

**ATTACHMENT 4 ..... 19**

**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT TO HOUSE 319**

**ATTACHMENT 5 ..... 21**

**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT TO HOUSE 421**

**ATTACHMENT 6 ..... 23**

**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT TO IRWIN TOWN SITE 23**

**LIST OF FIGURES**

Figure 1-1 Regional Setting of the Waitsia Gas Project Stage 2 ..... 6

## TERMS AND DEFINITIONS

Term or Abbreviation	Definition
Standard API 537	<i>Flare Details for Petroleum, Petrochemical, and Natural Gas Industries</i>
Flare Stack	An elevated vertical pipe used so that ignition and combustion of gas takes place at a considerable height predominately for safety purposes.
Irwin Park Farm	Farming property in the Waitsia Gas Project Stage 2 Development Envelope owned by MEPAU
MEPAU	Mitsui Exploration & Production Australia <i>AWE Perth Pty Limited is the legal entity, operator of the relevant Production Licenses (L1 and L2), the proponent for the Waitsia Gas Project Stage 2 proposal and operates under the Mitsui E&amp;P Australia (MEPAU) brand.</i>
NEPM	National Environment Protection Measure  NEPM are a special set of national objectives designed to assist in protecting or managing particular aspects of the environment (NEPC, 2020).
Non-routine flaring <sup>1</sup>	Non-routine flaring of gas is all flaring other than routine and safety flaring. Non-routine flaring is typically intermittent and of short duration. It is either planned or unplanned. Includes flaring during: <ul style="list-style-type: none"> <li>• Temporary (partial) failure of equipment that handles the gas during normal operations, until their repair or replacement, e.g. failure of compressors, pipeline, instrumentation, controls;</li> <li>• Temporary failure of a customer’s facilities that prevents receipt of the gas;</li> <li>• Initial plant/field startup before the process reaches steady operating conditions and/or before gas compressors are commissioned;</li> <li>• Startup following facility shutdowns;</li> <li>• Scheduled preventive maintenance and inspections;</li> <li>• Construction activities, such as tie-ins, change of operating conditions, plant design modifications;</li> <li>• Process upsets when process parameters fall outside the allowable operating or design limits and flaring is required to stabilize the process again;</li> <li>• Reservoir or well maintenance activities such as acidification, wire line interventions;</li> <li>• Exploration-, appraisal-, or production-well testing or cleanup following drilling or well work-over</li> </ul>
Pilot flame	A pilot flame is a flame required to maintain the flare system operational in a safe and ready condition.
Routine flaring	As described by The World Bank (2020), routine flaring of gas is flaring during normal oil production operations in the absence of sufficient facilities or amenable geology to re-inject the produced gas, utilize it on-site, or dispatch it to a market.



Term or Abbreviation	Definition
Safety flaring <sup>1</sup>	<p>Safety flaring includes flaring of:</p> <ul style="list-style-type: none"> <li>• Gas stemming from an accident or incident that jeopardizes the safe operation of the facility;</li> <li>• Blow-down gas following emergency shutdown to prevent over-pressurization of all or part of the process system;</li> <li>• Gas required to maintain the flare system in a safe and ready condition (purge gas/make-up gas/fuel gas);</li> <li>• Gas required for a flare’s pilot flame;</li> <li>• Gas produced as a result of specific safety-related operations, such as safety testing, leak testing, or emergency shutdown testing;</li> <li>• Gas containing H<sub>2</sub>S, including the volume of gas added to ensure good dispersion and combustion;</li> <li>• Gas containing high levels of volatile organic compounds other than methane.</li> </ul>
The Proposal	The Waitsia Gas Project Stage 2 – referred to the EPA under section 38 of the <i>Environmental Protection Act 1986</i> (EPA Assessment 2226).
ZRF 2030	The World Banks ‘Zero Routine Flaring by 2030’ Initiative

<sup>1</sup>Global Gas Flaring Reduction Partnership 2016

## 1.0 INTRODUCTION

The Waitsia Gas Project Stage 2 (Figure 1-1) was referred to the EPA in August 2019 (MEPAU 2019). In November 2019 the level of assessment was set by the EPA at Assessment on Referral Information (ARI).

This document has been compiled by Mitsui E&P Australia (MEPAU) to meet Environmental Protection Authority (EPA) requirements requested under Section 40 (2)(a) of the EP Act as part of the ARI process.

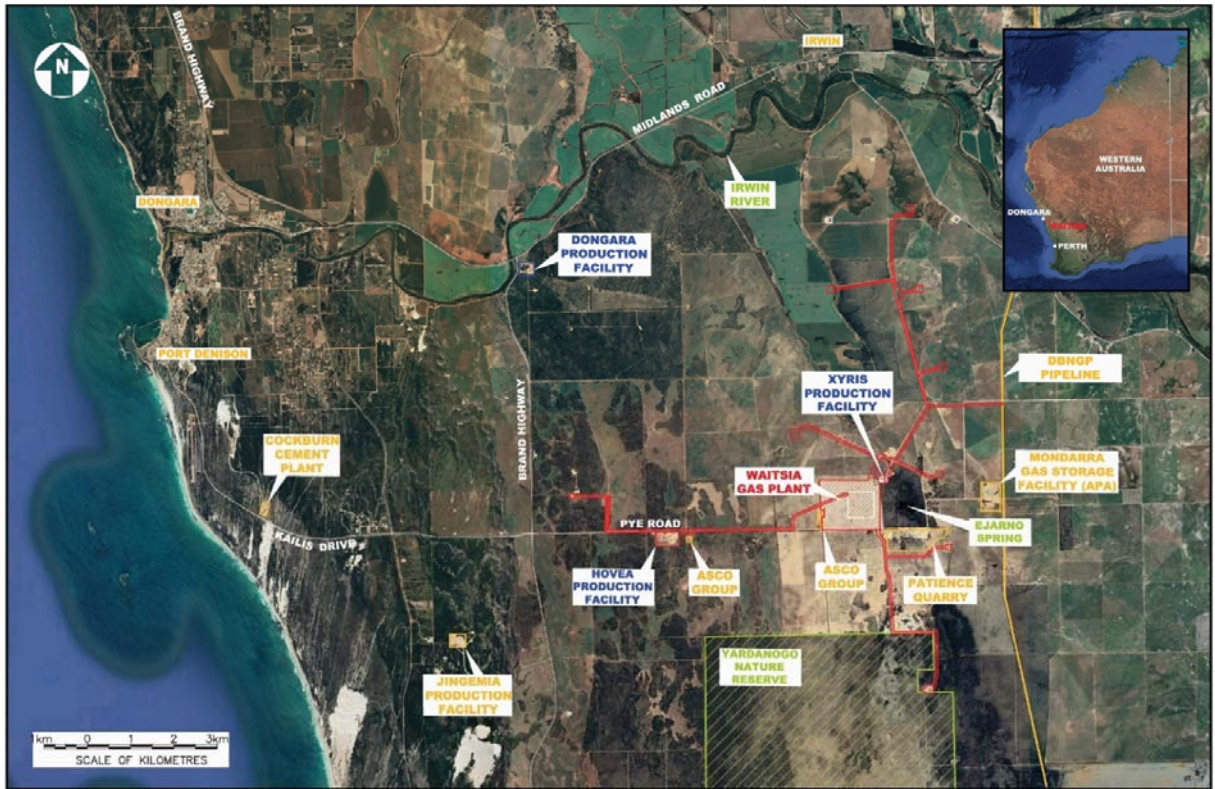


Figure 1-1 Regional Setting of the Waitsia Gas Project Stage 2

## 2.0 PURPOSE

The purpose of this document is to provide further details on the following:

- An outline of the management of flaring at the Waitsia Gas Plant site location
- Impacts of flaring from the Waitsia Gas Plant to visual amenity
- Impacts of flaring from the Waitsia Gas Plant on air quality; and
- Commitment to World Banks Zero Routine Flaring by 2030 Initiative and compliance with the Western Australian Government's position on routine flaring.

### **3.0 MANAGEMENT OF FLARING - THE WAITSIA GAS PLANT**

#### **3.1 Flare design and use**

A flare system will be built at the Waitsia Gas Plant adhering to the requirements of applicable industry standards including API 537 and 521. The flare system will include:

- A flare stack that will be approximately 25m in height
- A constant pilot flame that will be enclosed such that no flame will be visible during normal operations
- A smokeless flame<sup>2</sup> during normal operations; and
- An operating philosophy<sup>3</sup> that mandates industry best practice of combustion or flaring instead of cold venting.

The flaring of gas is only expected to occur for safety flaring and non-routine flaring purposes, as defined in the Terms and Definitions section of the document.

#### **3.2 Impacts of flaring on visual amenity**

Given the enclosure of the pilot flame, no flame will be visible during normal plant operations. Non-routine flaring or safety flaring events that may infrequently occur will result in a flame temporarily higher than the flare enclosure. During such events the flame will be visible at the Waitsia Gas Plant, however due to the selection of the plant location, the local terrain and the height of the flare, the flame is not expected to be visible at nearby sensitive receptors (shown in Attachments 1 through 6).

Attachment 1 provides both:

- A plan of the distance to nearest sensitive receptors (houses on farm properties and the town site of Irwin) from the Waitsia Gas Plant flare stack, and a
- Line of sight plan, demonstrating distance and elevation from the sensitive receptors to the Waitsia Gas Plant flare stack.

Both safety flaring and non-routine flaring are not expected to create a significant visual amenity impact to nearby sensitive receptors, during day or night periods.

#### **3.3 Impacts of Waitsia Gas Plant on air quality**

As detailed in Ramboll, 2019 the impact of the operation of the Waitsia Gas Plant, including the flaring of gas:

- Complies with NEPM targets, demonstrated by modelling a normal operations and emergency operations scenarios, and
- Will maintain air quality such that environmental values of the region are protected.

---

<sup>2</sup> Defined as being less than Ringelmann 1, as measured using methodology as per AS 3543:2014, *Use of standard Ringelmann and Australian Standard miniature smoke charts*.

<sup>3</sup> Cold venting results in the release of methane, carbon dioxide, volatile organic compounds, sulphur compounds and gas impurities to the atmosphere. Combustion or flaring causes these gases to oxidise and form carbon dioxide, which, when compared to methane, has significantly lower global warming potential. By adopting the operating philosophy that combustion or flaring are the preferred methods of disposal of hydrocarbon during upset or abnormal operating conditions, emissions associated with this activity are reduced to as low as reasonably practicable.

### **3.4 Operational flaring controls – commissioning**

During commissioning of the Waitsia Gas Plant it is likely that more frequent non-routine flaring events will occur. This is primarily associated with the requirements to achieve safe operating conditions within the plant. The plant design includes a full plant recycle, to reduce the frequency of using flaring to bring the plant to operational specifications.

The safe and efficient commissioning of the Waitsia Gas Plant is managed and controlled by the use of commissioning plans, commissioning procedures, and the permit to work system, all of which are developed and reviewed by the commissioning and operations teams for safety, efficiency and interactions across numerous work fronts. It is an objective of commissioning plans and procedures that flaring and gas (hydrocarbon) wastage is minimised, while still ensuring safe operating conditions are always achieved. Commissioning programs and plans will be reviewed daily and at each step throughout the commissioning phase of the Proposal.

All equipment that can contribute to flaring gas (e.g. pressure relief and blowdown valves) are pre-tested and certified to operate as specified. This verification is managed and controlled with the supply vendors by the project design and construction teams. The commissioning teams then cross verifies these compliances.

The first stages of commissioning (as per the commissioning procedures) will involve pressure and leak testing of the installed systems using a non-hydrocarbon source (e.g. water, air or nitrogen). Leak points and critical valves are all checked and rechecked at increasing pressure testing stages for leaks and operating problems. If leaks to the flare occur during this phase, then there are nil gas emissions to the flare. As would be detailed in the commissioning procedures, only once the systems have been tested to planned testing pressures (and confirmed compliant to design specifications), will hydrocarbons be introduced to the plant systems, which could become a source of emissions via the flare.

The next stages of commissioning will be purging processing systems to remove oxygen, ensuring safe conditions are achieved before the first introduction of hydrocarbons. These purge stages can result in flaring to achieve safe operating conditions. These steps, times and gas flared volumes are all managed in accordance with the commissioning plans and procedures.

All flared volumes are metered and accounted for within the design of the Waitsia Gas Plant, which will be operational before the first introduction of hydrocarbons.

Contractual negotiations are currently underway to allow a degree of off-specification gas to be diverted to the export pipeline system under a commissioning gas variation, thus potentially reducing the volumes of off- specification gas that need to be flared during commissioning.

#### **4.0 ZERO ROUTINE FLARING BY 2030 (ZRF 2030) INITIATIVE**

During oil production, associated gas is produced from the reservoir together with the oil. Much of this gas is utilised or conserved because governments and oil companies have made substantial investments to capture it; nevertheless, some of it is routinely flared because of technical, regulatory, or economic constraints. As a result, thousands of gas flares at oil production sites around the globe burn approximately 140 billion cubic meters of natural gas annually, causing more than 300 million tons of CO<sub>2</sub> to be emitted to the atmosphere (World Bank 2020). The World Bank established the ZRF 2030 Initiative to bring together governments, oil companies and development institutions who agree to cooperate to eliminate routine flaring no later than 2030.

The ZRF 2030 Initiative, introduced by the World Bank, is premised on routine flaring (as described above), not being sustainable from a resource management and environmental perspective. The initiative seeks to eliminate routine flaring<sup>4</sup> no later than 2030.

The Waitsia Gas Project Stage 2 Proposal is consistent with the ZRF 2030 Initiative in that from the initial commencement of operations, routine flaring will not be undertaken.

##### **4.1 West Australian State Government Commitment to Zero Routine Flaring**

In February 2019 the West Australian Government became the first Australian jurisdiction to endorse the World Bank's ZRF 2030 Initiative.

Companies operating oil fields in Western Australia are therefore required to comply with the Initiative. The Waitsia Gas Project Stage 2 Proposal complies with the ZRF 2030 Initiative and the Western Australian Government's commitment.

##### **4.2 Management of Zero Routine Flaring at the Waitsia Gas Project Stage 2**

The Waitsia Gas Project Stage 2 is development project that would capture and process gas for commercial production. Minor amounts of associated liquid hydrocarbons known as condensates would also be recovered at the Waitsia Gas Plant. At the plant, condensate will be stabilised, stored and loaded out to tankers for road transport to Kwinana (MEPAU 2019), or used for fuel inside the plant.

During the Waitsia Gas Project Stage 2 operations will:

- Operate a pilot flare during routine operations to ensure availability to operate as a safety flare when required (this ensures emissions from flaring are minimised),
- Not undertake routine flaring of gas, and
- Minimise non-routine and safety flaring of gas.

The Waitsia Gas Project Stage 2 Proposal is therefore in alignment with the intentions of the World Banks ZRF 2030 Initiative.

---

<sup>4</sup> The ZRF 2030 Initiative relates to routine flaring and not safety flaring, exploration testing or non-routine flaring.

## 5.0 REFERENCES

Global Gas Flaring Reduction Partnership (GGFR) (2016). *Gas Flaring Definitions*  
<http://documents.worldbank.org/curated/en/755071467695306362/pdf/106662-NEWS-PUBLIC-GFR-Gas-Flaring-Definitions-29-June-2016.pdf>

Mitsui E&P Australia (MEPAU) (2019). *Waitsia Gas Project Stage 2 – Environmental Referral Supporting Report* [http://www.epa.wa.gov.au/sites/default/files/Referral\\_Documentation/Supporting%20Document\\_7.pdf](http://www.epa.wa.gov.au/sites/default/files/Referral_Documentation/Supporting%20Document_7.pdf)

National Environment Protection Council (NEPC) (2020) National Environment Protection Measures (NEPMs) Accessed 21 January 2020 <http://www.nepc.gov.au/nepms>

Ramboll (2019). *Waitsia Gas Project – Stage 2 – Air Dispersion Modelling* in MEPAU (2019) Mitsui E&P Australia (MEPAU) (2019). *Waitsia Gas Project Stage 2 Appendix E*  
[http://www.epa.wa.gov.au/sites/default/files/Referral\\_Documentation/Appendix%20E%20-%20Air%20Dispersion%20Modelling.pdf](http://www.epa.wa.gov.au/sites/default/files/Referral_Documentation/Appendix%20E%20-%20Air%20Dispersion%20Modelling.pdf)

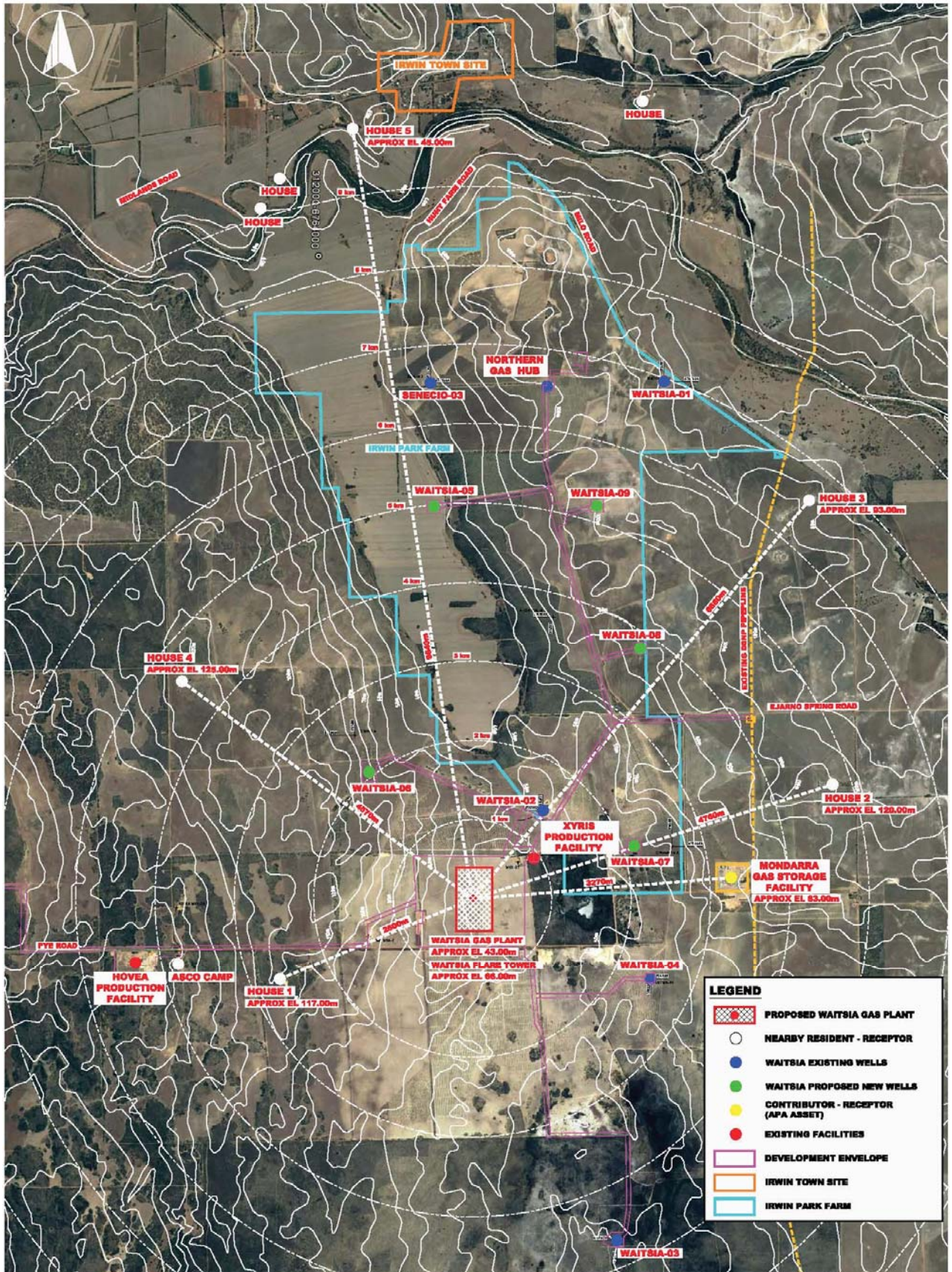
The World Bank (2020) *Zero Routine Flaring by 2030*. Accessed 15 January 2020  
<https://www.worldbank.org/en/programs/zero-routine-flaring-by-2030>

## **ATTACHMENTS**



**ATTACHMENT 1**

**IMPACTS OF FLARING ON VISUAL AMENITY – DISTANCE OF WAITSIA GAS PLANT  
TO NEAREST SENSITIVE RECEPTORS**



WAT-SK-027-01

**ATTACHMENT 1**

**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT  
TO HOUSE 1**



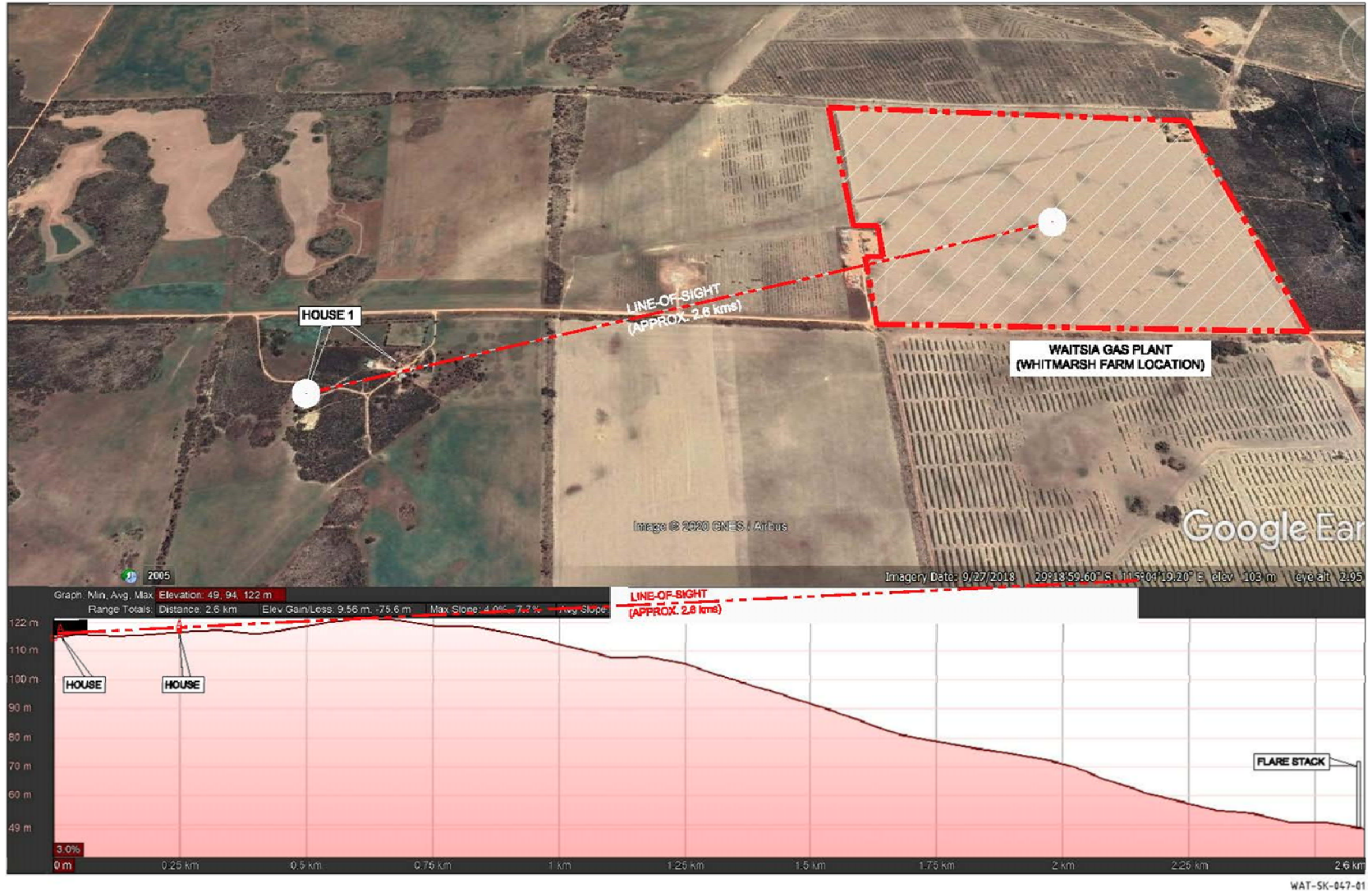


Image Source: Google Earth, 2020

**ATTACHMENT 2**

**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT  
TO HOUSE 2**



Image Source: Google Earth, 2020

**ATTACHMENT 3**

**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT  
TO HOUSE 3**



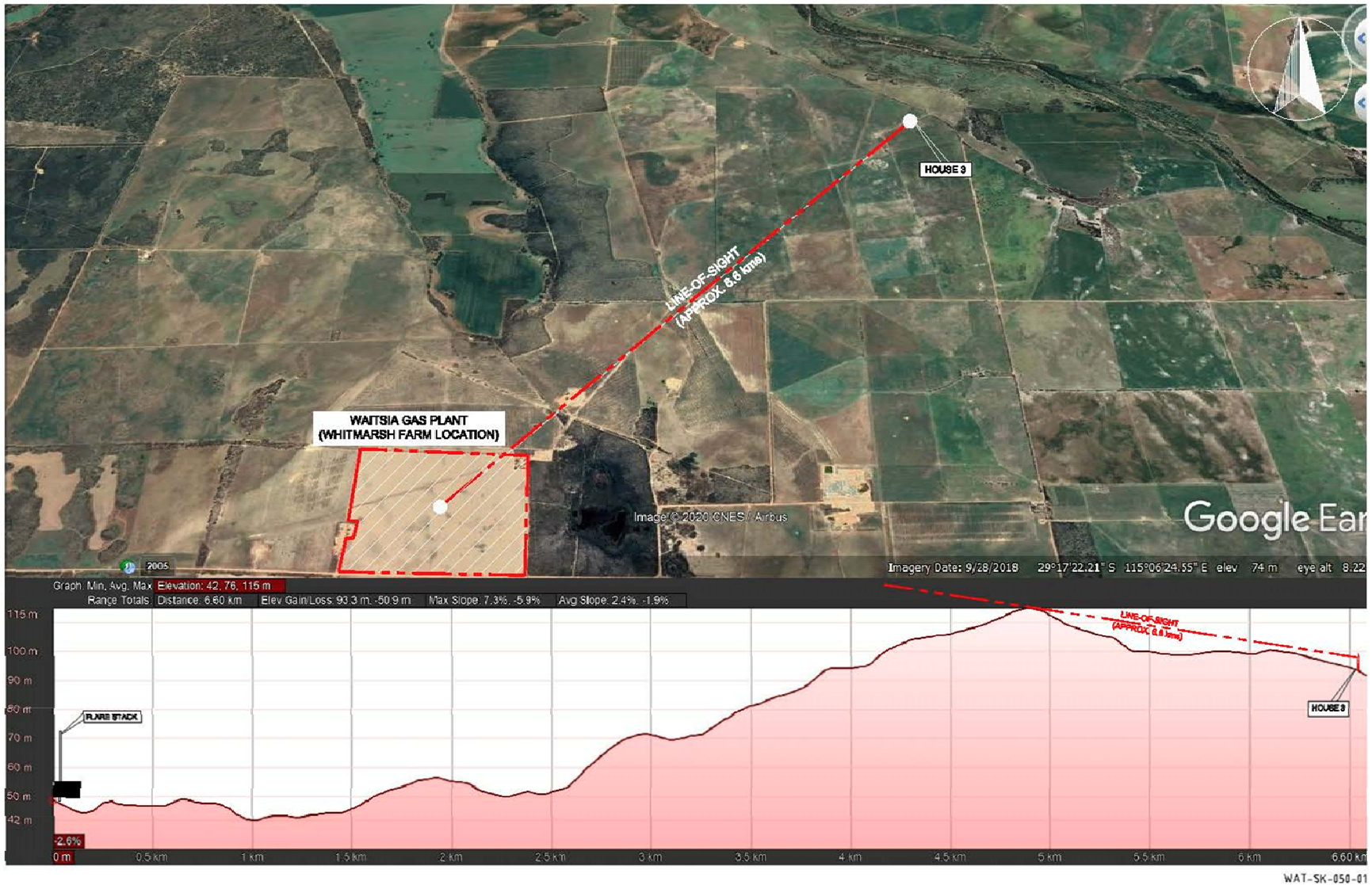


Image Source: Google Earth, 2020



**ATTACHMENT 5**

**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT  
TO HOUSE 4**

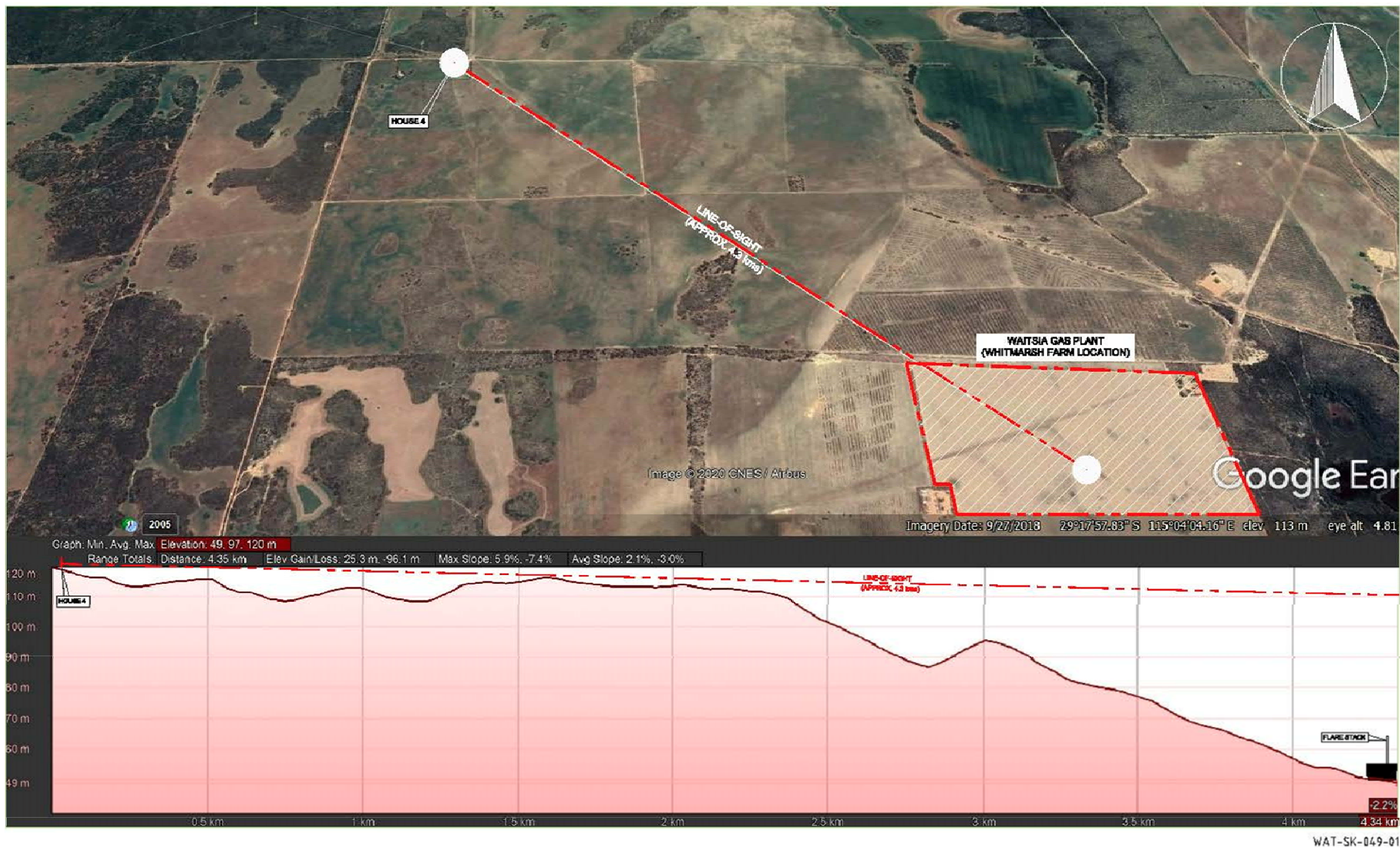
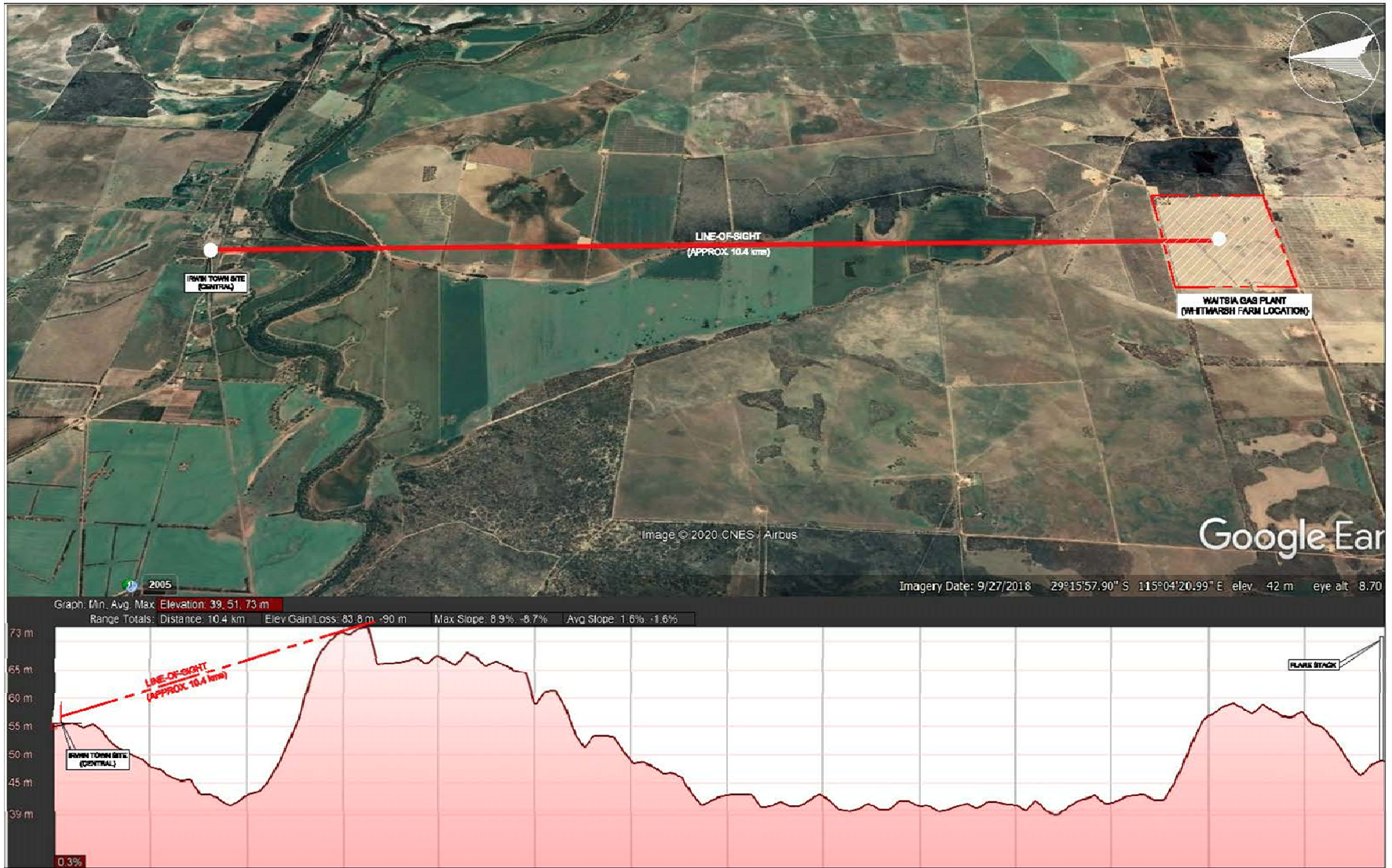


Image Source: Google Earth, 2020

**ATTACHMENT 6**  
**IMPACTS OF FLARING ON VISUAL AMENITY – LINE OF SIGHT - WAITSIA GAS PLANT**  
**TO IRWIN TOWN SITE**





WAT-5K-052-01

Image Source: Google Earth, 2020

This page is left intentionally blank