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Belisama Conventional Gas Project Air Quality Assessment

Hancock Energy Pty Ltd

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A	13th November 2025	Lachlan Dowsett	Martin Parsons	Initial issue
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MRP Technical Consulting Pty Ltd prepared this report in accordance with the scope of work as outlined in our proposal to Hancock Energy Pty Ltd dated 7th August 2025 and in accordance with our understanding and interpretation of current regulatory standards.

The conclusions presented in this report represent MRP's professional judgement based on information made available during the course of this assignment and are true and correct to the best of MRP's knowledge as at the date of the assessment.

MRP did not independently verify all of the written or oral information provided during the course of this investigation. While MRP has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to MRP was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

This report has been prepared for Hancock Energy Pty Ltd and may not be relied upon by any other person or entity without MRP's express written permission.

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Table of Contents

Tables

Figures

Appendices

1 Introduction

1.1 Background

Hancock Energy (PBN) Pty Ltd (Hancock Energy) is proposing to develop the Belisama Conventional Gas Project (BCGP) in the mid-west region of Western Australia. The development will collect gas from surrounding Upstream gas collection hubs (external to this Proposal) to a Central Processing Facility (CPF) where the gas will be treated, and product gas routed via an export pipeline to the Dampier Bunbury Natural Gas Pipeline (DBNGP) for sale. Liquid hydrocarbons (condensate) generated as a by-product of the gas treatment process will be stored on-site prior to being transported by road for sale. The foundation project will be capable of producing up to 210 TJ/d sales gas.

The CPF will be located at Yandanooka West Road, Milo (Lot 441 on Plan 2981) owned in freehold by Hancock Energy. The site is approximately 350 km north of Perth, 45 km from Dongara and 35 km from Mingenew by road. Surrounding land is used for broadacre agriculture with a mixture of cropping and grazing. Rural residential homesteads are sparsely located in the surrounding area with the closest being approximately 3.5 km from the CPF and owned by Hancock Energy.

The gas will be sourced from the fields predominantly associated with the Lockyer Gas Project located in Exploration Permits EP-368 and EP-426 and other surrounding new gas discoveries.

The key components of the Proposal include:

- An infield gathering system comprising underground flowlines;
- A CPF, including on-site infrastructure to support the operations phase including power generation, administration control rooms, warehousing, workshops, switch room infrastructure, sedimentation pond, and accommodation buildings;
- An underground gas export pipeline connecting the CPF to the DBNGP; and
- Condensate stabilisation, storage and offloading system to support road transport of liquid product.

1.2 Project overview

The nearest sensitive receptors to the BCGP are presented in Table 1-1. An aerial overview of the site including the nearest sensitive receptors is found in Figure 1-1. The aerial overview outlines the Hancock Energy cadastral boundary, which is used in assessing offsite impacts of air toxics against the relevant criteria. It is noted that two receptors (Homestead 7 and 9) are located within Hancock Energy's boundary and are controlled and owned by Hancock Energy, however they have been included in this assessment for conservativity.

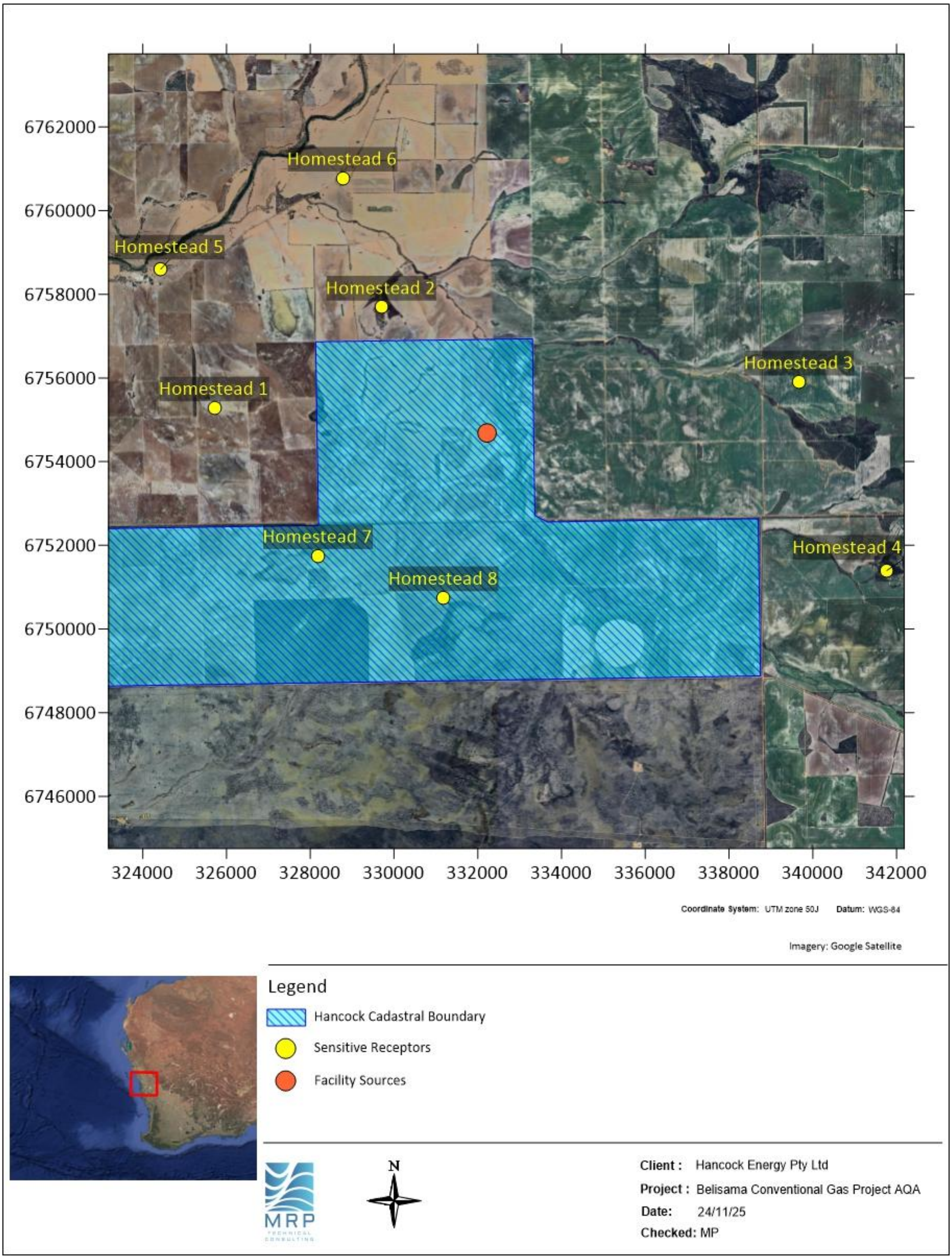

Figure 1-1: Aerial site overview showing the Hancock Energy cadastral boundary and nearby sensitive receptors

Table 1-1: Sensitive receptor locations

ID	Receptor	UTM Coordinates	
		mE	mN
R1	Homestead 1	325,709	6,755,282
R2	Homestead 2	329,685	6,757,693
R3	Homestead 3	339,674	6,755,904
R4	Homestead 4	341,770	6,751,401
R5	Homestead 5	324,430	6,758,605
R6	Homestead 6	328,772	6,760,776
R7	Homestead 7	328,184	6,751,747
R8	Homestead 8	331,184	6,750,747

2 Existing environment

2.1 Existing environment

The climate of the region is classed as subtropical Mediterranean, characterised by hot, dry summers and mild, wet winters. For the regional climate information, data is taken from the nearest Bureau of Meteorology (BoM) monitoring station to the project (Morawa Airport). The data shows that during the summer months (December to February) the maximum average temperatures can go as high as 38°C and during the winter months (June to August) the minimum average temperatures can go as low as 6°C. The average maximum and minimum temperature plots are presented in Figure 2-1 and Figure 2-2 respectively.

The annual average rainfall at the nearest meteorological station is 292.5 mm. The majority of rainfall within the region occurs between May and September, and the remaining period October to April is comparatively dry. The plot for mean annual rainfall is found in Figure 2-3.

Figure 2-4 presents the 2022 annual wind rose from Morawa Airport, showing a mean annual wind speed of 4.49 m/s and prevailing winds hailing from south-westerly directions.

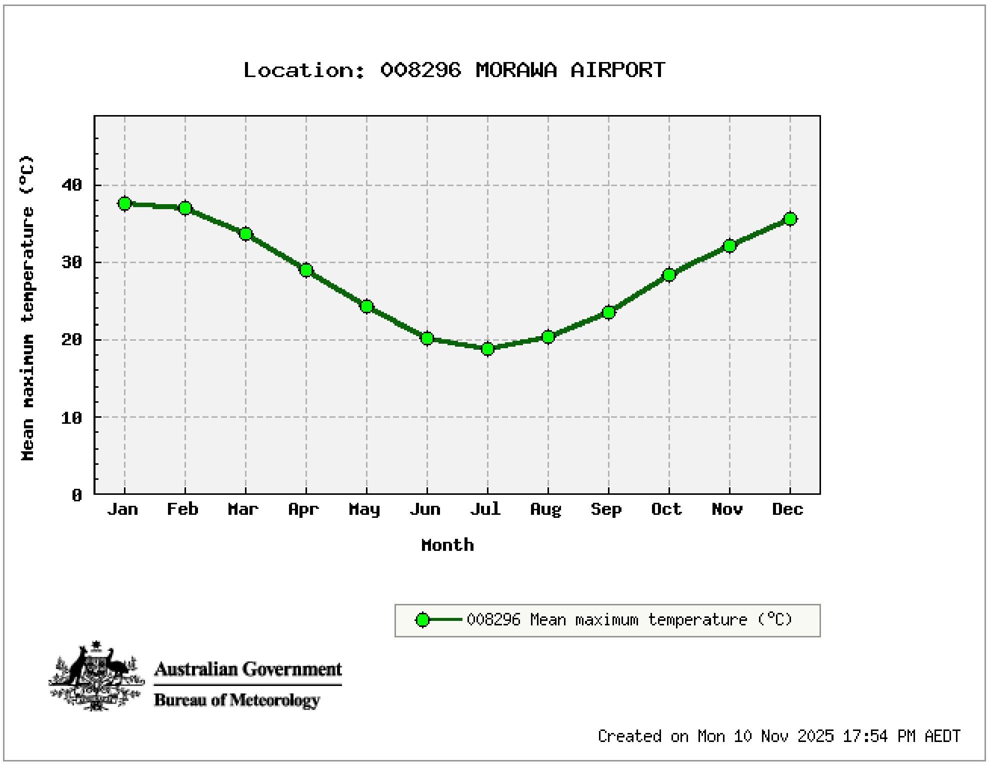

Figure 2-1: Mean Maximum Temperature Recorded at BoM Monitoring Site – Morawa Airport (1997 – 2025)

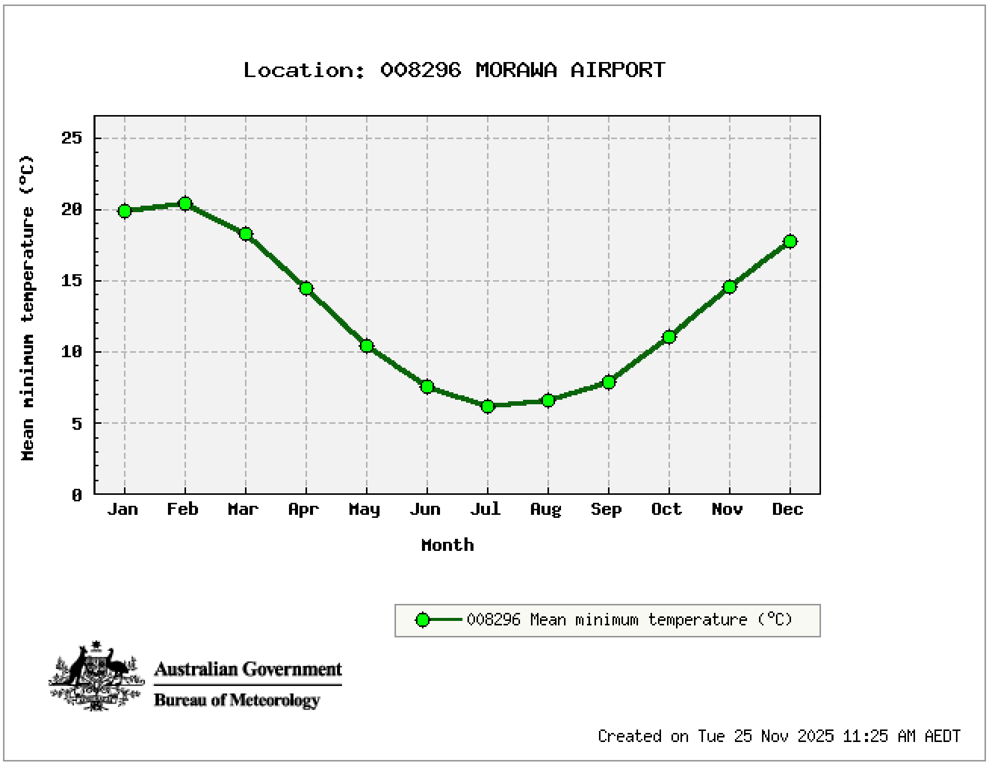

Figure 2-2: Mean Minimum Temperature Recorded at BoM Monitoring Site – Morawa Airport (1997 – 2025)

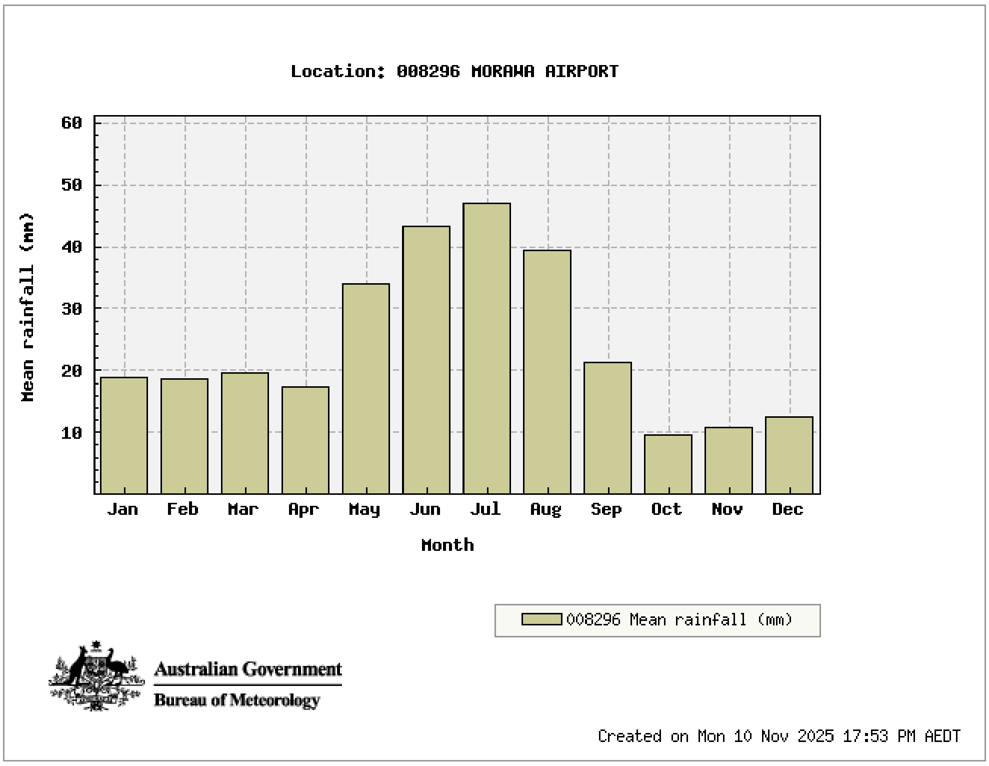

Figure 2-3: Mean Rainfall at BoM Monitoring Station – Morawa Airport (1997 – 2025)

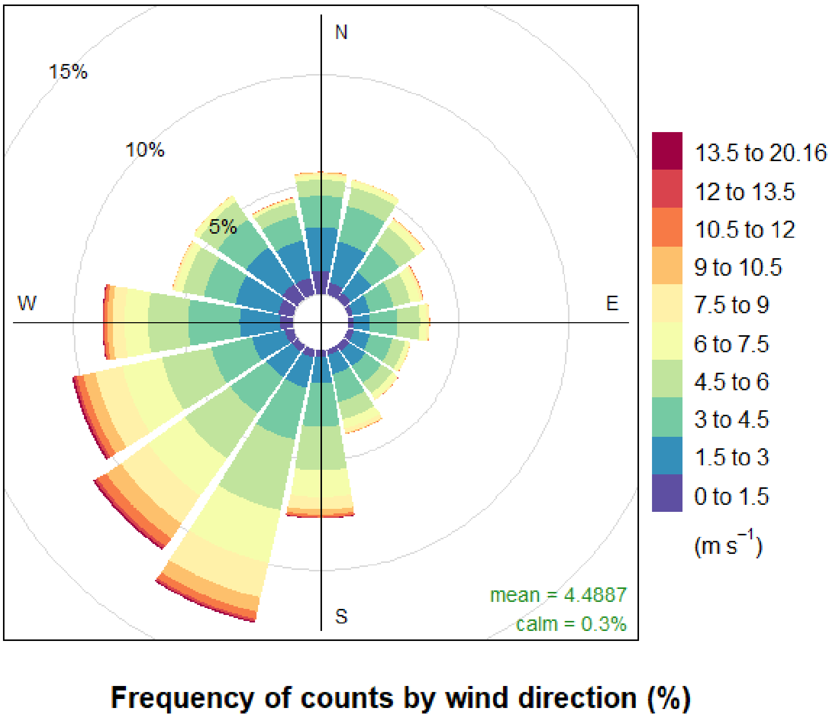

Figure 2-4: Morawa Airport 2022 – Annual Average Wind Rose

3 Atmospheric emissions

3.1 Introduction

This section provides details on the atmospheric emissions of concern from the proposed expansion of the BCGP and other sources in the region. Emissions of concern included in this assessment of the BCGP are carbon monoxide (CO), oxides of nitrogen (NO_x), sulphur dioxide (SO_2), fine particulates ($PM_{2.5}$), hydrogen sulphide (H_2S), formaldehyde (CH_2O) and VOCs (including benzene, ethylbenzene, toluene and xylene) (BTEX).

Besides the sources emitted from the BCGP, other potential emission sources in the region include:

- APA Group (APA) – Mondarra Gas Storage and Processing Facility (Mondarra) – Operational
- Australian Gas Infrastructure Gas Group (AGIG) – West Erregulla Gas Project (West Erregulla) - Proposed
- Mitsui E&P Australia (MEPAU) – Hovea Production Facility (Hovea) – Decommissioned
- Mitsui E&P Australia (MEPAU) – Waitsia Gas Project (Waitsia) – Operational
- Mitsui E&P Australia (MEPAU) – Xyris Gas Plant (Xyris) – Operational

3.2 Belisama Conventional Gas Project

Emission sources from the proposed BCGP include the following:

- Thermal oxidiser (TOX) – overhead vapours from the Amine regeneration unit will be directed to the TOX unit or LP flare if the TOX is unavailable;
- One diesel generator - the diesel genset is to be used to supply essential loads during failure of normal power and for black start only;
- Firewater pumps (diesel) – expected to operate in an emergency;
- Gas gensets (x4) with an N+1 operating philosophy;
- HP flare – will primarily be a minor source, increasing in the event of a blowdown;
- LP flare – will be operational if the TOX is unavailable; and
- Evaporation ponds (x2).

Additionally, the following technologies will be utilised to optimise air quality;

- Absorption guard beds – Dedicated, separate mercury and H_2S guard beds will remove the potential for mercury and H_2S in the gas stream to be discharged to the atmosphere. Permanent absorption of all H_2S substantially reduces the discharge of SO_2 to the environment via combusted fuel gas and vented exhaust has from the thermal oxidiser/flare system.
- Thermal oxidiser unit – The thermal oxidiser unit for the AGRU waste stream will reduce benzene, toluene, ethylbenzene and xylene (BTEX) volatile organic compounds (VOCs) by high temperature incineration.

3.3 Other regional emission sources

Other regional sources considered as part of this assessment, both existing and planned, include the Mondarra, West Erregulla, Hovea, Waitsia and Xyris gas facilities. The locations of these facilities are presented in Figure 3-1.

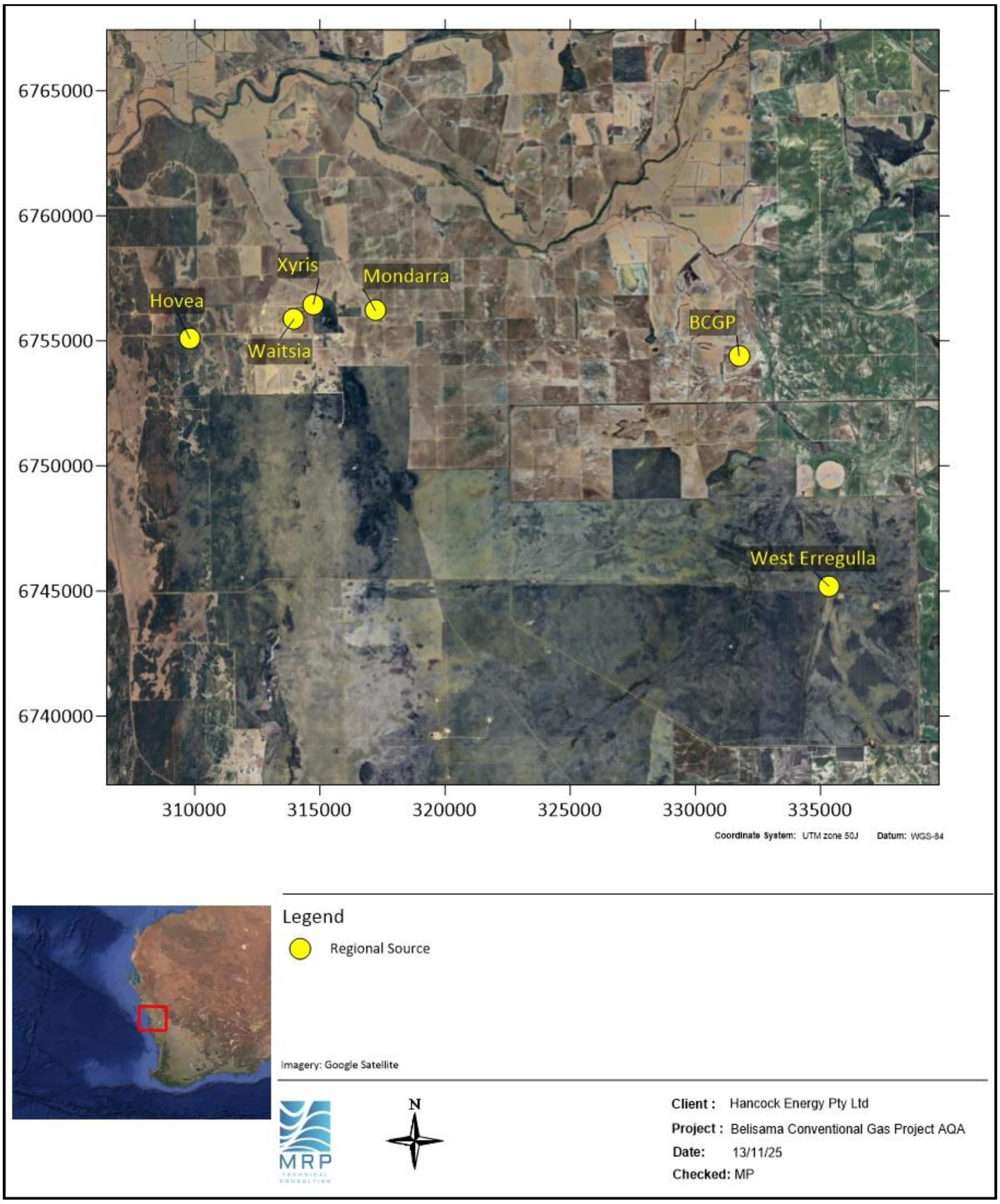

Figure 3-1: Significant sources in the region

3.3.1 APA – Mondarra

Mondarra operates approximately 14 km to the west of the BCGP and is located between two major pipelines that service Perth: the Parmelia Pipeline and the DBNGP.

The Mondarra facility includes the following sources of air emissions:

- Flare – a small quantity of gas is vented through a permanently lit flare. The gas that reaches the flare is used to maintain a blanket of gas over the liquids, effectively preventing ingress of air into the vessels. The flare can operate under either normal conditions, whereby the facility is in injection mode for two-thirds of the time and in withdrawal one-third of the time, or under blow-out conditions, expected to only occur under extreme circumstances on a less that one hour per year basis.
- A vent is maintained at the site for emergency purposes and for purging gas from equipment prior to maintenance.
- Power generation and compressors – Mondarra has two natural gas powered 3.2 MW compressor reciprocating engines as well as two 300 kVA natural gas powered GEAs operating.

Emissions information was obtained from publicly available information sources (Ramboll, 2019).

3.3.2 AGIG – West Erregulla

West Erregulla is proposed to be located 10 km south of the BCGP and has an expected export flow of 87 TJ/day. Emission sources from the proposed West Erregulla facility have been considered as part of this assessment and include the following:

- Gas engine alternators (GEAs) (x3) – for power generation.
- Hot oil heater/thermal oxidiser stack – to dispose of gas from the Amine Reflux Drum/Amine Flash Drum and from the burning fuel gas.
- Diesel engine alternator (DEA) – used in the event of the GEAs being unavailable (such as during a black start scenario), but this is also expected to be a rare occurrence (<1% annually).
- Storage/evaporation pond – the water in ponds can contain some trace amounts of mercury and have been included as a fugitive emission source.
- Gas chromatograph vents.
- Maintenance vents (x2) – operation of these vents is expected to be a very rare occurrence with the facility being blown down to flare as part of normal shutdown procedures.

All emissions information was obtained from a previous air quality assessment (EAQ Consulting, 2021).

3.3.3 MEPAU – Waitsia

The Waitsia Gas Project is location 18 km west of the BCGP. Emission sources from Waitsia include the following:

- Compressor gas engines – Compression will be undertaken by two sets of three 2,600 kW compressors. Each set of compressors will operate on an n+1 basis and so only 4 compressors will be operating at any one time. Emissions of concern are primarily considered to be NO_x;

- Gas engine alternator (GEA) – Power will be supplied by four 2,100 kW generators. Then generators will be operating on an n+1 basis and so only three generators will operate continuously. Emissions of concern are primarily considered to be NO_x;
- Heating medium boiler – A 15,000 kw heating medium boiler will operate continuously. Emissions of concern are primarily considered to be NO_x;
- Incinerator – An incinerator will be used to incinerate acid gases removed during processing. Emissions of concern are primarily considered to be NO_x;
- Flare – A flare will operate with a pilot light under normal operations and gas will be rerouted to the flare under an emergency scenario. In the event that the incinerator is not operational, the acid gas emissions will be redirected to the flare;
- Evaporation pond – a process water pond will be used which can contain some traces amounts of hydrocarbon and so has been included as fugitive emissions sources. Emissions of concern are primarily considered to be BTEX and mercury;
- Vehicular combustion sources – motor vehicles are considered a negligible source of atmospheric emissions (during both construction and operation), though they can result in relatively high ground level concentrations (GLCs) immediately adjacent to highly trafficked roads under stable, light wind conditions; and
- Fugitive dust from motor vehicle traffic and nearby exposed surfaces – this source is difficult to quantify and therefore difficult to model accurately and is considered best addressed through a monitoring and management program.

All emissions information was obtained from publicly available assessments (Ramboll, 2019).

3.3.4 MEPAU – Hovea

The Hovea Production Facility is located approximately 22 km to the west of the BCGP. It is currently decommissioned with no known plans to operate into the future. However, the Hovea Production Facility still has an evaporation pond and a sump where stored water can contain some trace amounts of hydrocarbons. The evaporation ponds have been included in this assessment as fugitive sources.

All emissions information was obtained from publicly available assessments (Ramboll, 2019).

3.3.5 MEPAU – Xyris

Emission sources from Xyris at an assumed production rate of 30 TJ/day have been considered as part of this assessment and include the following:

- Compressor gas engine – compression will be undertaken by a 750 kW CAT G3512 LE burn four stroke engine. Emissions of concern are primarily considered to be NO_x;
- Gas engine alternator (GEA) – power will be supplied by a 100 kW Cummins CG6L-8G1 lean burn four stroke model engine. Emissions of concern are primarily considered to be NO_x;
- Vents – the vents include a gas breakout tank vent, a liquids storage tank vent and a plant vent. The plant vents are only used during plant maintenance when the plant needs to be de-pressured. Emissions of concern include BTEX and Hg;

- Two process ponds including an evaporation pond and a turkey nest. Both ponds can contain some trace amounts of hydrocarbon and so have been included as fugitive emissions sources;
- Vehicular combustion sources – motor vehicles are considered to be a negligible source of atmospheric emissions (during both construction and operation), though they can result in relatively high ground level concentrations (GLCs) immediately adjacent to highly trafficked roads under stable, light wind conditions; and
- Fugitive dust from motor vehicle traffic and nearby exposed surfaces – this source is difficult to quantify and therefore difficult to model accurately and is considered best addressed through a monitoring and management program.

All emissions information was obtained from publicly available assessments (Ramboll, 2019).

3.4 Emission scenarios

For the purpose of this report, four scenarios were modelled. A breakdown of these scenarios is presented below:

- Scenario 1 – BCGP under normal operations with background concentrations;
- Scenario 2 – BCGP under normal operations with thermal oxidiser (TOX) emissions rerouted to the LP Flare with background concentrations;
- Scenario 3 – BCGP under upset/emergency conditions with background concentrations;
- Scenario 4 – BCGP under normal operations in isolation; and
- Scenario 5 – Background Concentrations – existing and future regional sources (Xyris, Hovea, Mondarra, Mitsui, West Erregulla) including non-industry background concentrations but excluding BCGP emissions.

Normal operations from the BCGP includes emissions from the gas gensets, continuous emissions from the HP flare, the evaporation ponds, and emissions from either the TOX or the LP flare. It is noted that the gas gensets are expected to run using an N+1 philosophy, with only 3 out of 4 running at any given time. Despite this, MRP has conservatively included all gas gensets in the normal operating scenarios, and therefore Scenarios 1, 2 and 4 are considered the upper-limit of normal operations.

Scenario 3 includes emergency conditions, including evaporation ponds, diesel gensets operational and the HP flare operational at maximum intermittent conditions. Typically, the gas gensets, TOX and LP flare would be off during an emergency scenario, however as a conservative measure these have also been included in Scenario 3, which is indicative of upset conditions.

3.5 Emission rates

Emissions rates for the BCGP were derived from a number of sources provided by Hancock Energy. A summary of the source parameters and emission rates for the proposed BCGP utilised in the air-dispersion modelling are presented from Table 3-1 to Table 3-6.

Table 3-1: Emission rates for the BCGP

Emission Source	Thermal Oxidizer (TOX)	Diesel Genset	Firewater Pumps (Diesel)	Gas Genset (x4)[2]	HP Flare (Cont)	HP Flare (Int)	LP Flare (Cont)	Evaporation Pond 1	Evaporation Pond 2
Emission Type	Continuous	Emergency	Emergency	Continuous	Continuous	Emergency	Continuous	Continuous	Continuous
Stack Height (m)[1]	17.3	4	4	13.2	60 (60.47)	60 (133.77)	60 (60.05)	0	0
Stack Internal Diameter (m)	0.8	0.3	0.3	0.6	0.79	0.79	0.3	-	-
Exit Velocity (m/s) [per unit]	13.35	67.20	82.62	33.67	0.02	104.86	0.022	-	-
Temperature (°C)	950	555	555	348	1000	1000	1000	-	-
Dimensions	-	-	-	-	-	-	-	115x392x1.2	225x200x1.2
Mass Emission Rate per Unit (g/s)								**Mass Emission Rate per Area (g/s/m2)[3]**	
$PM_{2.5}$	-	7.22E-02	8.89E-02	5.56E-02	5.28E-04	2.06E+01	5.83E-06	-	-
NOx	-	2.33E+00	2.78E-01	1.36E+00	1.33E-03	5.28E+01	1.44E-05	-	-
SO_2	-	7.50E-01	9.17E-01	4.17E-03	2.25E-05	8.61E-01	-	-	-
Mercury	-	-	-	1.39E-10	7.50E-13	2.78E-08	-	-	-
Benzene	3.61E-05	-	-	9.17E-04	4.44E-06	1.67E-01	4.72E-08	2.76E-10	2.76E-10
Toluene	2.78E-04	-	-	6.11E-03	4.17E-06	1.56E-01	2.00E-09	2.36E-10	2.36E-10
Ethylbenzene	4.17E-08	-	-	-	1.92E-07	7.50E-03	7.50E-12	-	-
Xylene	1.75E-07	-	-	-	8.33E-07	3.06E-02	2.78E-11	8.27E-10	8.27E-10
H_2S	-	-	-	4.44E-05	2.44E-07	9.44E-03	-	-	-

Notes:

1. *Values in brackets for the flares are the pseudo-stack heights that have been calculated based on the flow of gas to the flare, in accordance with procedures presented in "Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants"* (USEPA, 1992) for calculating the effective release height above ground for flare sources..
2. *Gas gensets expected to operate with an N+1 operating philosophy i.e., only 3 out of 4 operating at any one time.*
3. *Emission rates for the evaporation pond calculated using methodology outlined in "AP-42, Fifth Edition, Volume 1 Chapter 4: Evaporation Loss Sources"* (USEPA, 1998).

Table 3-2: Source parameters and emission rates for Waitsia under normal conditions

Emission Sources	Gas Engine Generator	Export/Inlet Gas Compressor Turbine	Acid Gas Incinerator	Heating Medium	Flare (Normal)	Evaporation Pond
Stack Height (m)[1]	3.5	9.8	18.5	8	18	-
Stack Internal Diameter (m)	0.35	1.27	1.4	0.9	0.5	-
Exit Velocity (m/s) [per unit]	63.8	31.4	16.3	30	20	-
Temperature (°C)	400	450	815	400	-	-
Package Length (m)	12	6	-	3	-	-
Package Width (m)	4	2.5	2.1	3	-	-
Package Height (m)	2.5	2.7	-	4	18	-
Area (m^2)	-	-		-		21,576
Mass Emission Rate per unit (g/s)						
NO_x	6.57E-01	7.93E+00	1.66E+00	2.04E+00	9.04E-04	-
CO	1.48E+00	6.53E-01	3.14E-01	8.12E-01	4.96E-03	-
$PM_{2.5}$	2.05E-04	1.49E-02	2.85E-02	7.37E-02	-	-
SO_2	2.06E-03	4.04E-03	9.36E-04	2.42E-03	3.77E-06	-
Benzene	1.17E-03	9.32E-05	1.49E-01	2.05E-03	-	9.21E-03
Toluene	1.08E-03	1.03E-03	1.26E-01	3.26E-03	-	4.48E-03
Ethylbenzene	1.05E-04	2.52E-04	1.10E-01	-	-	1.61E-04
Xylenes	4.89E-04	4.97E-04	1.10E-01	-	-	3.34E-03
Hg	-	-	-	-	-	6.56E-06
H_2S	-	-	-	-	-	-

Table 3-3: Source parameters and emission rates for Xyris under normal conditions

Emission Source	Gas Engine Generator	Export Gas Compressor Engine	Gas Breakout Tank	Liquids Storage Tank	Plant Vent	Sump	Turkeys Nest
Capacity (kW)	100	750	-	-	-	-	-
Stack Height (m)	2	5	8	8	5	-	-
Stack Internal Diameter (m)	0.114	0.179	0.290	0.146	0.100	-	-
Exit Velocity (m/s)	9.6	109.3	0.09	0.01	245	-	-
Temperature (°C)	300-400	300-400	23	20 – 30	0 to -5	25	25
Dimensions	-	-	-	-	-	33mx33mx2.5m	35m25mx2.5m
Mass Emission Rate per unit (g/s)							
NO_x	1.30E-01	8.28E-01	-	-			
CO	8.54E-02	5.44E-01	-	-			
$PM_{2.5}$	1.18E-05	7.53E-05	-	-			
SO_2	1.19E-04	7.58E-04	-	-			
Benzene	2.75E-03	1.73E-02	1.67E-04	4.70E-06	5.40E-02	2.37E-04	3.46E-04
Toluene	2.16E-03	1.36E-02	1.31E-04	3.69E-06	4.24E-02	1.08E-04	1.61E-04
Ethylbenzene	1.83E-04	1.15E-03	1.11E-05	3.12E-07	3.58E-03	3.88E-06	5.76E-06
Xylenes	8.46E-04	5.32E-03	5.13E-05	1.44E-06	1.66E-02	8.31E-05	1.25E-04
Hg	4.67E-08	2.94E-07	2.83E-09	7.98E-11	7.98E-07	4.14E-07	4.39E-07

Table 3-4: Source parameters and emission rates for West Erregulla under normal conditions

Emission Sources	Inlet Header Facility Vent	Amine Vent	Regen Tower Reflux Vent	GEA (x3)	Gas Breakout Tank Vent	Water Setting Tank Vent	Atmospheric Vent	Thermal Oxidiser Stack	DEA (standby)	GC Hut Vent	Storage/Evaporation Point
Stack Height (m)	4	31	31	10	10	9	8.5	4	12	10	4
Stack Internal Diameter (m)	0.027	0.038	0.194	0.300	0.303	0.102	0.154	0.600	0.200	0.020	-
Exit Velocity (m/s)	50	50	50	26.7	0.03	0.06	0.03	50	24.9	6.12	-
Temperature (°C)	303.55	341.15	322.95	723.15	351.55	313.15	313.15	673.15	573.15	303.55	-
Dimensions (m)	-	-	-	-	-	-	-	-	-	-	180 x 180 x 3
Mass Emission Rate per unit (g/s)											
NO_x	-	-	-	2.67E-01	-	-	-	4.76E+00	8.60E-01	-	-
CO	-	-	-	2.98E-01	-	-	-	3.31E+00	2.05E-02	-	-
$PM_{2.5}$	-	-	-	-	-	-	-	-	-	-	-
SO_2	-	-	-	-	-	-	-	-	-	-	-
Benzene	-	-	-	-	-	-	-	2.31E-01	2.86E-02	-	-
Toluene	-	-	-	-	-	-	-	2.31E-01	2.86E-02	-	-
Ethylbenzene	-	-	-	-	-	-	-	2.31E-01	2.86E-02	-	-
Xylene	-	-	-	-	-	-	-	2.31E-01	2.86E-02	-	-
Hg	-	-	-	-	-	-	-	-	-	-	4.63E-07
H_2S	2.34E-02	1.20E+00	-	-	3.00E-04	3.00E-04	5.04E-02	1.25E-02	1.00E-04	-	2.69E-05

Table 3-5: Source parameters and emission rates for Mondarra under normal conditions

Emission Source	Export Gas Compressor Engine	Gas Engine Generator	Flare
Total Quantity	2	2	1
Quantity Operating	2	2	1
Stack Height (m)	9	9	12.6
Stack Internal Diameter (m)	0.3	0.2	4.5
Exit Velocity (m/s)	15	21	0.14
Temperature (°C)	460	450	1000
Mass Emission Rate per unit (g/s)			
NO_x	3.31E+00	4.14E-01	2.03E-02
CO	2.17E+00	2.72E-01	1.17E-01
$PM_{2.5}$	2.78E-04	2.78E-05	1.67E-03
SO_2	3.06E-03	2.78E-04	-
Benzene	1.67E-03	2.78E-04	5.56E-07
Toluene	1.67E-03	2.78E-04	8.33E-07
Ethylbenzene	2.78E-04	2.78E-05	-
Xylenes	8.33E-04	8.33E-05	-
Hg	-	-	-

Table 3-6: Source parameters and emission rates for Hovea (evaporation ponds) under normal conditions

Emission Source	Evaporation Pond	Turkeys Nest
Temperature (°C)	25	25
Dimensions (m)	45 x 35 x 1	29 x 24 x 1.5
Mass Emission Rate per unit (g/s)		
Benzene	5.47E-04	2.08E-04
Toluene	2.85E-04	1.00E-04
Ethylbenzene	1.03E-05	3.59E-06
Xylenes	2.11E-04	7.66E-05
Hg	2.40E-07	1.59E-07

4 Assessment criteria

4.1 Ambient air quality

The publications containing air quality criteria relevant to this assessment include:

- National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) by the National Environment Protection Council (NEPC, 2021) noting that a proposed variation to the $PM_{2.5}$ and SO_2 standards have recently come into effect as of the 1st of January 2025);
- NEPM (Air Toxics) (NEPC, 2011); and
- Air Emissions Guideline (DWER, 2019).

The Western Australian Department of Water and Environmental Regulation (DWER) has issued draft Air Quality Guideline Values (AGVs) to assess the level of risk associated with emissions to air (DWER, 2019). This contains AGVs for a number of the compounds of interest. These AGVs are supplemented by values outlined in the NEPC criteria. A summary of the standards applicable for this assessment are summarised in Table 4-1.

Table 4-1: Ambient air quality standards applicable to the project

Pollutant	Averaging Period	Criteria (µg/m³)	Reference
NO_2	1-hour max	150	NEPC (2021)
	Annual	28	NEPC (2021)
SO_2	1-hour max	196	NEPC (2021)
	24-hour max	52	NEPC (2021)
Mercury	1-hour max	0.55	DWER (2019)
	Annual	0.18	DWER (2019)
Benzene	1-hour max	29	DWER (2019)
	Annual	9.6	NEPC (2011) & DWER (2019)
Toluene	24-hour max	3,770	NEPC (2011) & DWER (2019)
	Annual	377	NEPC (2011) & DWER (2019)
Ethylbenzene	1-hour max	8,000	DWER (2019)
	Annual	270	DWER (2019)
Xylenes	24-hour max	1,080	NEPC (2011) & DWER (2019)
	Annual	870	NEPC (2011) & DWER (2019)
H_2S	1-hour max	2,565	DWER (2019)
	24-hour max	137	DWER (2019)
	Annual	1.8	DWER (2019)
$PM_{2.5}$	24-hour max	18	NEPC (2021)
	Annual	6.4	NEPC (2021)
CO	1-hour max	30,000	DWER (2019)
	8-hour max	10,000	NEPC (2021) & DWER (2019)
Formaldehyde	1-hour max	20	DWER (2019)

Notes:

1. *Referenced to 25°C and 101.3 kPa.*

4.2 Particulate emissions

In this assessment, whilst emissions of total particulates have been modelled from the BCGP, the results have only been compared against the $PM_{2.5}$ (particulate matter <2.5 µm in diameter) criteria. This criteria has been adopted as the primary indicator for assessing potential health impacts from airborne particulates, as emissions from the BCGP are likely to mostly comprise of particle sizes smaller than 2.5 microns. The $PM_{2.5}$ criteria is more conservative than the PM_{10} criteria and $PM_{2.5}$ is widely recognised to pose a greater risk to human health than PM_{10}, due to its ability to penetrate deeper into the respiratory system and enter the bloodstream (Department of Environment and Conservation, 2011).

5 Atmospheric dispersion modelling

5.1 Air dispersion model

The air dispersion modelling has been conducted using the AERMOD (version 23132) which is a steady state Gaussian (plume) model and is the recommended regulatory model for short range (<50 km) dispersion in the United States. AERMOD is used widely in Australia for regulatory approvals applications and is accepted for use by DWER. AERMOD is a current-generation air dispersion model that incorporates concepts such as planetary boundary layer theory and advanced methods for handling complex terrain. The utilisation of AERMOD is consistent with the considerations of EIA outlined in the EPA's Environmental Factor Guideline for Air Quality (EPA, 2020)

5.2 Meteorological data

Processing of meteorological data for AERMOD for the dispersion modelling was completed using the AERMET meteorological pre-processor. Meteorological modelling was completed with consideration of the EPA Victoria guidance publication (1550) (EPA Victoria, 2013). A site-specific meteorological file was developed for input to the model using the meteorological file was developed for input to the model using meteorological monitoring data collected at the Morawa Airport (BoM) monitoring station from 2022, supplemented with data generated by The Air Pollution Model (TAPM).

TAPM (Version 4) was used to generate a prognostic gridded meteorological dataset for the model domain. The data from this dataset was used to supplement missing data or for parameters which were not available from the monitored data. TAPM was developed by the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) and consists of coupled prognostic meteorological and air pollution model components. The meteorological component of TAPM predicts the local-scale meteorological features, such as sea breezes and terrain-induced circulations, using the larger-scale synoptic meteorology as boundary conditions combined with other data including terrain, land use, soil and surface types. TAPM has been used extensively throughout Australia for generating site-specific meteorological files for use in air dispersion modelling studies.

5.3 Ozone

MRP has applied the Ozone Limiting Method (OLM) to predict GLCs of NO_2 as specified by the USEPA (Cole & Summerhays, 1979) and NSW Environmental Protection Authority (NSW EPA, 2022). This method assumed that all available ozone in the atmosphere will react with nitrogen oxide (NO) in the plume until either all the available ozone or all the NO is used up. This approach is conservative in that it assumes that the atmospheric reaction is instant when in reality, the reaction typically takes place over a number of hours. In the absence of ozone monitoring data, regional ozone concentrations were adapted from the Copernicus Atmosphere Monitoring Service (CAMS) global reanalysis dataset similarly to the background concentrations of all the pollutants of concern (Copernicus, 2024).

5.4 Background concentrations

In the absence of baseline monitoring data for each of the pollutants of concern, estimates of regional pollutant concentrations were obtained from the CAMS global reanalysis dataset (Copernicus, 2024) for the 2022 calendar year. Reanalysis combines model data with observations from across the world into a globally complete and consistent dataset.

No specific guidance for selection of an appropriate background level is provided in Western Australia. In Victoria, the State Environmental Protection Policy (Ambient Air Quality) (SEPP (AQM)) (EPA Victoria, 2001), states that the 70th percentile concentration (concentration which is exceeded by 30% of concentrations for that averaging period) should be adopted as the background level.

The background concentration values adopted for this study as adapted from the CAMS dataset for the cumulative assessment of the various pollutants across the region are presented in Table 5-1.

Table 5-1: CAMS derived background concentrations 2022

Pollutant	Averaging Period	Background (µg/m^3)
NO_2	1-hour max	1.10E+00
	Annual average	9.40E-01
SO_2	1-hour max	1.70E-01
	24-hour max	1.70E-01
CO	1-hour max	8.99E+01
	8-hour max	9.00E+01
$PM_{2.5}$	24-hour max	5.59E+00
	Annual average	4.75E+00
Formaldehyde	1-hour max	1.91E+00

Notes:

1. *Referenced to 25°C and 101.3 kPa.*

5.5 Determination of evaporation source emissions

Pollution is emitted from wastewater collection, treatment and storage systems through volatilisation of compounds at the liquid surface. Emissions can occur by either diffusive or convective mechanisms, or both. Diffusion occurs when concentrations at the water surface are much higher than ambient concentrations. The compounds volatilise or diffuse into the air in an attempt to reach equilibrium between aqueous and vapour phases. Convection occurs when air flows over the water surface, sweeping organic vapours from the water surface into the air. The rate of volatilisation related directly to the speed of the air flow over the water surface.

Other factors that can affect the rate of volatilisation include wastewater surface area, temperature, retention time in the system, the depth of the wastewater in the system, the concentrations of the compounds in the wastewater and their physical properties, such as volatility and diffusivity in water; the presence of a mechanism that inhibits volatilisation, such as an oil film; or a competing mechanism, such as biodegradation. The rate of volatilisation can be determined using mass transfer theory. Individual gas and liquid phase mass transfer coefficients are used to estimate overall mass transfer coefficients for each pollutant. Each pollutant varies in their degree of volatility, which is typically measured by the pollutant's Henry's law constant (USEPA, 1998).

Using these principles, MRP calculated pollutant emission rates for the BCGP's two evaporation sources using the following formula, which incorporates site-specific parameters and the mass transfer concepts outlined above:

$$N = \left(1 - e^{(-K_{oil})\left(\frac{t}{D_{oil}}\right)}\right)(V_{oil})\left(\frac{Co}{(t)(FO)}\right)$$

Where:

N = emission rate (g/s)
K_{oil} = overall mass transfer coefficient of constituent from oil to gas (m/s)
t = residence time of disposal (s)
D_{oil} = oil film thickness (m)
V_{oil} = volume of oil (m^3)
Co = initial concentration of constituent in the oil phase (g/m^3)

6 Modelling results

Predicted GLCs for each scenario at the nearest sensitive receptors for each pollutant of concern were compared against their respective air quality criteria. The maximum predicted GLCs recorded at each sensitive receptor are summarised from Table 6-1 to Table 6-8. In accordance with the methodology outlined by the DWER Air Emissions Guideline (DWER, 2019) and highlighted by the NSW EPA (2022), the 99.9th percentile 1-hour average concentrations of air toxics predicted outside the facility boundary were also compared against the 1-hour average criteria for benzene, ethylbenzene, formaldehyde and mercury, with results presented in Table 6-9.

No exceedances of the 1-hour, 24-hour or annual criteria were predicted at any sensitive receptors for any pollutants modelled across all scenarios and predicted GLCs for most pollutants in isolation and cumulatively were well below the corresponding ambient air quality criteria at the nominated sensitive receptor locations.

The highest concentrations relative to the criteria were predicted from 1-hour maximum NO_2 concentrations at R5, reaching 87.3% of the hourly criteria for Scenarios 1, 2 and 3. In contrast, Scenario 4 which considered normal operations from the BCGP in isolation, predicted NO_2 concentrations significantly under the criteria, reaching just 6.2%.

High concentrations relative to the criteria were also predicted from $PM_{2.5}$ in Scenario 3, with predicted annual average concentrations reaching 76.8% of the criteria and predicted 24-hour average concentrations reaching 37.1% of the criteria at R2. It is noted however that these percentages are heavily influenced by non-industry regional background concentrations and predicted $PM_{2.5}$ concentrations from the BCGP in isolation were less than 11% of the criteria at sensitive receptor locations.

Scenario 4 indicated that the largest impact from GLCs relative to the criteria were predicted from NO_2 concentrations, which reached between 5.7% and 25.6% of the1-hour maximum criteria at R1. Additionally, the most significant offsite impacts relative to the criteria were predicted from formaldehyde, with cumulative 99.9^{th} percentile offsite concentrations reaching 49.6% of the hourly criteria.\

Appendix 1 presents contour plots of predicted GLCs for each pollutant of concern across the modelled domain. Where applicable, the respective criteria for each pollutant are presented as red contour lines. The contour plots are arranged in this report as follows:

- Figure 8-1 to Figure 8-22 show contour plots of predicted concentrations from Scenario 1;
- Figure 8-23 to Figure 8-44 show contour plots of predicted concentrations from Scenario 2;
- Figure 8-45 to Figure 8-66 show contour plots of predicted concentrations from Scenario 3;
- Figure 8-67 to Figure 8-88 show contour plots of predicted concentrations from Scenario 4; and
- Figure 8-89 to Figure 8-109 show contour plots of predicted concentrations from Scenario 5.

The contour plots show that no exceedances of the relevant criteria for any pollutant of concern were predicted at any sensitive receptors across the modelled domain.

Table 6-1: Predicted GLCs and percentage of criteria for each scenario at R1

Pollutant	Averaging Period	Criteria (µg/m³)	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.
NO_2	1-hour max	150	94.61	63.1%	94.61	63.1%	94.65	63.1%	38.33	25.6%	94.59	63.1%
	Annual	28	2.18	7.8%	2.18	7.8%	2.49	8.9%	0.18	<1%	2.01	7.2%
SO_2	1-hour max	196	0.30	<1%	0.30	<1%	16.84	8.6%	0.13	<1%	0.25	<1%
	24-hour max	52	0.18	<1%	0.18	<1%	1.71	3.3%	0.01	<1%	0.18	<1%
Mercury	1-hour 99.9th percentile	0.55	1.35E-05	<1%	1.35E-05	<1%	1.35E-05	<1%	2.19E-09	<1%	1.35E-05	<1%
	Annual	0.18	8.04E-08	<1%	8.04E-08	<1%	8.05E-08	<1%	2.02E-11	<1%	8.04E-08	<1%
Benzene	1-hour 99.9th percentile	29	0.38	1.3%	0.38	1.3%	0.38	1.3%	0.01	<1%	0.38	1.3%
	Annual	9.6	0.01	<1%	0.01	<1%	0.01	<1%	1.37E-04	<1%	0.01	<1%
Toluene	24-hour max	3,770	0.07	<1%	0.07	<1%	0.07	<1%	0.01	<1%	0.06	<1%
	Annual	377	0.01	<1%	0.01	<1%	0.01	<1%	8.98E-04	<1%	0.01	<1%
Ethylbenzene	1-hour 99.9th percentile	8,000	0.33	<1%	0.33	<1%	0.33	<1%	3.31E-07	<1%	0.33	<1%
	Annual	270	0.01	<1%	0.01	<1%	0.01	<1%	4.79E-09	<1%	0.01	<1%
Xylenes	24-hour max	1,080	0.06	<1%	0.06	<1%	0.06	<1%	3.01E-04	<1%	0.06	<1%
	Annual	870	0.01	<1%	0.01	<1%	0.01	<1%	8.56E-06	<1%	0.01	<1%
H_2S	1-hour max	2,565	4.23	<1%	4.23	<1%	4.23	<1%	1.39E-03	<1%	4.23	<1%
	24-hour max	137	0.45	<1%	0.45	<1%	0.45	<1%	9.91E-05	<1%	0.45	<1%
	Annual	1.8	0.04	2.4%	0.04	2.4%	0.04	2.4%	6.45E-06	<1%	0.04	2.4%
$PM_{2.5}$	24-hour max	18	5.71	31.7%	5.71	31.7%	6.40	35.5%	0.12	<1%	5.63	31.3%
	Annual	6.4	4.76	74.4%	4.76	74.4%	4.84	75.7%	0.01	<1%	4.75	74.3%
CO	1-hour max	30,000	263.82	<1%	263.82	<1%	277.65	<1%	173.87	<1%	105.01	<1%
	8-hour max	10,000	120.31	1.2%	120.31	1.2%	125.86	1.3%	30.31	<1%	94.00	<1%
Formaldehyde	1-hour 99.9th percentile	20	4.54	22.7%	4.54	22.7%	4.54	22.7%	2.63	13.1%	1.91	9.6%

Table 6-2: Predicted GLCs and percentage of criteria for each scenario at R2

Pollutant	Averaging Period	Criteria (µg/m³)	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.
NO_2	1-hour max	150	100.56	67.0%	100.56	67.0%	100.57	67.0%	13.33	8.9%	100.56	67.0%
	Annual	28	2.36	8.4%	2.36	8.4%	2.86	10.2%	0.20	<1%	2.16	7.7%
SO_2	1-hour max	196	0.30	<1%	0.30	<1%	12.43	6.3%	0.05	<1%	0.30	<1%
	24-hour max	52	0.18	<1%	0.18	<1%	1.61	3.1%	0.01	<1%	0.18	<1%
Mercury	1-hour 99.9th percentile	0.55	1.89E-05	<1%	1.89E-05	<1%	1.89E-05	<1%	1.26E-09	<1%	1.89E-05	<1%
	Annual	0.18	1.00E-07	<1%	1.00E-07	<1%	1.00E-07	<1%	2.29E-11	<1%	1.00E-07	<1%
Benzene	1-hour 99.9th percentile	29	0.52	1.8%	0.52	1.8%	0.52	1.8%	0.01	<1%	0.52	1.8%
	Annual	9.6	0.01	<1%	0.01	<1%	0.01	<1%	1.77E-04	<1%	0.01	<1%
Toluene	24-hour max	3,770	0.06	<1%	0.06	<1%	0.06	<1%	0.01	<1%	0.06	<1%
	Annual	377	0.01	<1%	0.01	<1%	0.01	<1%	1.04E-03	<1%	0.01	<1%
Ethylbenzene	1-hour 99.9th percentile	8,000	0.43	<1%	0.43	<1%	0.43	<1%	5.44E-07	<1%	0.43	<1%
	Annual	270	0.01	<1%	0.01	<1%	0.01	<1%	8.96E-09	<1%	0.01	<1%
Xylenes	24-hour max	1,080	0.05	<1%	0.05	<1%	0.05	<1%	1.71E-03	<1%	0.05	<1%
	Annual	870	0.01	<1%	0.01	<1%	0.01	<1%	7.32E-05	<1%	0.01	<1%
H_2S	1-hour max	2,565	4.14	<1%	4.14	<1%	4.14	<1%	4.85E-04	<1%	4.14	<1%
	24-hour max	137	0.48	<1%	0.48	<1%	0.48	<1%	8.37E-05	<1%	0.48	<1%
	Annual	1.8	0.05	2.6%	0.05	2.6%	0.05	2.6%	7.34E-06	<1%	0.05	2.6%
$PM_{2.5}$	24-hour max	18	5.69	31.6%	5.69	31.6%	6.67	37.1%	0.10	<1%	5.65	31.4%
	Annual	6.4	4.76	74.4%	4.76	74.4%	4.91	76.8%	0.01	<1%	4.76	74.3%
CO	1-hour max	30,000	151.43	<1%	151.43	<1%	216.64	<1%	60.46	<1%	131.26	<1%
	8-hour max	10,000	110.69	1.1%	110.69	1.1%	130.60	1.3%	20.66	<1%	99.89	<1%
Formaldehyde	1-hour 99.9th percentile	20	3.42	17.1%	3.42	17.1%	3.42	17.1%	1.51	7.6%	1.91	9.6%

Table 6-3: Predicted GLCs and percentage of criteria for each scenario at R3

Pollutant	Averaging Period	Criteria (µg/m³)	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.
NO_2	1-hour max	150	35.93	24.0%	35.93	24.0%	44.87	29.9%	28.31	18.9%	25.77	17.2%
	Annual	28	1.63	5.8%	1.63	5.8%	1.86	6.6%	0.23	<1%	1.41	5.0%
SO_2	1-hour max	196	0.28	<1%	0.28	<1%	7.53	3.8%	0.10	<1%	0.19	<1%
	24-hour max	52	0.18	<1%	0.18	<1%	0.88	1.7%	0.01	<1%	0.17	<1%
Mercury	1-hour 99.9th percentile	0.55	2.79E-05	<1%	2.79E-05	<1%	2.79E-05	<1%	2.36E-09	<1%	2.79E-05	<1%
	Annual	0.18	1.63E-07	<1%	1.63E-07	<1%	1.63E-07	<1%	2.59E-11	<1%	1.63E-07	<1%
Benzene	1-hour 99.9th percentile	29	0.38	1.3%	0.38	1.3%	0.38	1.3%	0.02	<1%	0.38	1.3%
	Annual	9.6	0.01	<1%	0.01	<1%	0.01	<1%	1.72E-04	<1%	0.01	<1%
Toluene	24-hour max	3,770	0.08	<1%	0.08	<1%	0.09	<1%	0.01	<1%	0.08	<1%
	Annual	377	0.01	<1%	0.01	<1%	0.01	<1%	1.15E-03	<1%	0.01	<1%
Ethylbenzene	1-hour 99.9th percentile	8,000	0.38	<1%	0.38	<1%	0.38	<1%	1.25E-06	<1%	0.38	<1%
	Annual	270	0.01	<1%	0.01	<1%	0.01	<1%	1.97E-08	<1%	0.01	<1%
Xylenes	24-hour max	1,080	0.08	<1%	0.08	<1%	0.08	<1%	4.16E-05	<1%	0.08	<1%
	Annual	870	0.01	<1%	0.01	<1%	0.01	<1%	8.37E-07	<1%	0.01	<1%
H_2S	1-hour max	2,565	5.08	<1%	5.08	<1%	5.08	<1%	1.12E-03	<1%	5.08	<1%
	24-hour max	137	0.76	<1%	0.76	<1%	0.76	<1%	8.10E-05	<1%	0.76	<1%
	Annual	1.8	0.08	4.4%	0.08	4.4%	0.08	4.4%	8.27E-06	<1%	0.08	4.4%
$PM_{2.5}$	24-hour max	18	5.70	31.6%	5.70	31.6%	6.21	34.5%	0.10	<1%	5.60	31.1%
	Annual	6.4	4.76	74.4%	4.76	74.4%	4.82	75.3%	0.01	<1%	4.75	74.2%
CO	1-hour max	30,000	229.80	<1%	229.80	<1%	235.58	<1%	139.80	<1%	100.26	<1%
	8-hour max	10,000	117.59	1.2%	117.59	1.2%	119.04	1.2%	27.43	<1%	93.65	<1%
Formaldehyde	1-hour 99.9th percentile	20	4.74	23.7%	4.74	23.7%	4.74	23.7%	2.83	14.2%	1.91	9.6%

Table 6-4: Predicted GLCs and percentage of criteria for each scenario at R4

Pollutant	Averaging Period	Criteria (µg/m³)	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.
NO_2	1-hour max	150	24.18	16.1%	24.18	16.1%	29.11	19.4%	22.65	15.1%	23.60	15.7%
	Annual	28	1.45	5.2%	1.45	5.2%	1.60	5.7%	0.15	<1%	1.30	4.7%
SO_2	1-hour max	196	0.25	<1%	0.25	<1%	6.59	3.4%	0.08	<1%	0.19	<1%
	24-hour max	52	0.18	<1%	0.18	<1%	0.72	1.4%	0.01	<1%	0.17	<1%
Mercury	1-hour 99.9th percentile	0.55	1.56E-05	<1%	1.56E-05	<1%	1.56E-05	<1%	1.66E-09	<1%	1.56E-05	<1%
	Annual	0.18	8.86E-08	<1%	8.86E-08	<1%	8.87E-08	<1%	1.66E-11	<1%	8.86E-08	<1%
Benzene	1-hour 99.9th percentile	29	0.38	1.3%	0.38	1.3%	0.38	1.3%	0.01	<1%	0.38	1.3%
	Annual	9.6	0.01	<1%	0.01	<1%	0.01	<1%	1.11E-04	<1%	0.01	<1%
Toluene	24-hour max	3,770	0.06	<1%	0.06	<1%	0.06	<1%	0.01	<1%	0.06	<1%
	Annual	377	0.01	<1%	0.01	<1%	0.01	<1%	7.39E-04	<1%	0.01	<1%
Ethylbenzene	1-hour 99.9th percentile	8,000	0.38	<1%	0.38	<1%	0.38	<1%	8.84E-07	<1%	0.38	<1%
	Annual	270	0.01	<1%	0.01	<1%	0.01	<1%	1.13E-08	<1%	0.01	<1%
Xylenes	24-hour max	1,080	0.06	<1%	0.06	<1%	0.06	<1%	3.48E-05	<1%	0.06	<1%
	Annual	870	0.01	<1%	0.01	<1%	0.01	<1%	7.60E-07	<1%	0.01	<1%
H_2S	1-hour max	2,565	5.22	<1%	5.22	<1%	5.22	<1%	8.23E-04	<1%	5.22	<1%
	24-hour max	137	0.48	<1%	0.48	<1%	0.48	<1%	6.51E-05	<1%	0.48	<1%
	Annual	1.8	0.06	3.1%	0.06	3.1%	0.06	3.1%	5.33E-06	<1%	0.06	3.1%
$PM_{2.5}$	24-hour max	18	5.67	31.5%	5.67	31.5%	6.03	33.5%	0.08	<1%	5.60	31.1%
	Annual	6.4	4.76	74.3%	4.76	74.3%	4.80	74.9%	0.01	<1%	4.75	74.2%
CO	1-hour max	30,000	192.74	<1%	192.74	<1%	196.05	<1%	102.74	<1%	99.54	<1%
	8-hour max	10,000	114.65	1.1%	114.65	1.1%	115.83	1.2%	24.34	<1%	91.96	<1%
Formaldehyde	1-hour 99.9th percentile	20	3.90	19.5%	3.90	19.5%	3.90	19.5%	1.99	10.0%	1.91	9.6%

Table 6-5: Predicted GLCs and percentage of criteria for each scenario at R5

Pollutant	Averaging Period	Criteria (µg/m³)	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.
NO_2	1-hour max	150	130.91	87.3%	130.91	87.3%	130.92	87.3%	9.23	6.2%	130.91	87.3%
	Annual	28	2.32	8.3%	2.32	8.3%	2.55	9.1%	0.10	<1%	2.23	8.0%
SO_2	1-hour max	196	0.31	<1%	0.31	<1%	7.55	3.9%	0.03	<1%	0.31	<1%
	24-hour max	52	0.19	<1%	0.19	<1%	1.50	2.9%	4.80E-03	<1%	0.19	<1%
Mercury	1-hour 99.9th percentile	0.55	1.79E-04	<1%	1.79E-04	<1%	1.79E-04	<1%	8.37E-10	<1%	1.79E-04	<1%
	Annual	0.18	8.64E-07	<1%	8.64E-07	<1%	8.64E-07	<1%	1.09E-11	<1%	8.64E-07	<1%
Benzene	1-hour 99.9th percentile	29	0.87	3.0%	0.87	3.0%	0.87	3.0%	0.01	<1%	0.87	3.0%
	Annual	9.6	0.01	<1%	0.01	<1%	0.01	<1%	7.85E-05	<1%	0.01	<1%
Toluene	24-hour max	3,770	0.08	<1%	0.08	<1%	0.08	<1%	0.01	<1%	0.08	<1%
	Annual	377	0.01	<1%	0.01	<1%	0.01	<1%	4.87E-04	<1%	0.01	<1%
Ethylbenzene	1-hour 99.9th percentile	8,000	0.32	<1%	0.32	<1%	0.32	<1%	2.06E-07	<1%	0.32	<1%
	Annual	270	0.01	<1%	0.01	<1%	0.01	<1%	3.16E-09	<1%	0.01	<1%
Xylenes	24-hour max	1,080	0.05	<1%	0.05	<1%	0.05	<1%	1.29E-03	<1%	0.05	<1%
	Annual	870	0.01	<1%	0.01	<1%	0.01	<1%	1.87E-05	<1%	0.01	<1%
H_2S	1-hour max	2,565	3.22	<1%	3.22	<1%	3.22	<1%	3.35E-04	<1%	3.22	<1%
	24-hour max	137	0.30	<1%	0.30	<1%	0.30	<1%	5.12E-05	<1%	0.30	<1%
	Annual	1.8	0.03	1.8%	0.03	1.8%	0.03	1.8%	3.48E-06	<1%	0.03	1.8%
$PM_{2.5}$	24-hour max	18	5.68	31.6%	5.68	31.6%	6.13	34.0%	0.06	<1%	5.68	31.6%
	Annual	6.4	4.76	74.4%	4.76	74.4%	4.83	75.4%	4.35E-03	<1%	4.76	74.3%
CO	1-hour max	30,000	162.90	<1%	162.90	<1%	174.13	<1%	41.87	<1%	162.90	<1%
	8-hour max	10,000	114.22	1.1%	114.22	1.1%	114.23	1.1%	14.87	<1%	114.22	1.1%
Formaldehyde	1-hour 99.9th percentile	20	2.92	14.6%	2.92	14.6%	2.92	14.6%	1.01	5.0%	1.91	9.6%

Table 6-6: Predicted GLCs and percentage of criteria for each scenario at R6

Pollutant	Averaging Period	Criteria (µg/m³)	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.
NO_2	1-hour max	150	103.53	69.0%	103.53	69.0%	103.53	69.0%	8.49	5.7%	103.53	69.0%
	Annual	28	2.11	7.5%	2.11	7.5%	2.39	8.5%	0.09	<1%	2.02	7.2%
SO_2	1-hour max	196	0.29	<1%	0.29	<1%	7.26	3.7%	0.03	<1%	0.29	<1%
	24-hour max	52	0.18	<1%	0.18	<1%	1.05	2.0%	3.73E-03	<1%	0.18	<1%
Mercury	1-hour 99.9th percentile	0.55	8.41E-05	<1%	8.41E-05	<1%	8.41E-05	<1%	7.62E-10	<1%	8.41E-05	<1%
	Annual	0.18	3.56E-07	<1%	3.56E-07	<1%	3.56E-07	<1%	1.02E-11	<1%	3.56E-07	<1%
Benzene	1-hour 99.9th percentile	29	0.62	2.1%	0.62	2.1%	0.62	2.1%	0.01	<1%	0.62	2.1%
	Annual	9.6	0.01	<1%	0.01	<1%	0.01	<1%	7.70E-05	<1%	0.01	<1%
Toluene	24-hour max	3,770	0.06	<1%	0.06	<1%	0.06	<1%	0.01	<1%	0.06	<1%
	Annual	377	0.01	<1%	0.01	<1%	0.01	<1%	4.61E-04	<1%	0.01	<1%
Ethylbenzene	1-hour 99.9th percentile	8,000	0.35	<1%	0.35	<1%	0.35	<1%	3.17E-07	<1%	0.35	<1%
	Annual	270	0.01	<1%	0.01	<1%	0.01	<1%	3.84E-09	<1%	0.01	<1%
Xylenes	24-hour max	1,080	0.04	<1%	0.04	<1%	0.04	<1%	6.38E-04	<1%	0.04	<1%
	Annual	870	0.01	<1%	0.01	<1%	0.01	<1%	2.71E-05	<1%	0.01	<1%
H_2S	1-hour max	2,565	3.67	<1%	3.67	<1%	3.67	<1%	3.08E-04	<1%	3.67	<1%
	24-hour max	137	0.40	<1%	0.40	<1%	0.40	<1%	3.97E-05	<1%	0.40	<1%
	Annual	1.8	0.04	2.1%	0.04	2.1%	0.04	2.1%	3.27E-06	<1%	0.04	2.1%
$PM_{2.5}$	24-hour max	18	5.65	31.4%	5.65	31.4%	6.34	35.2%	0.05	<1%	5.65	31.4%
	Annual	6.4	4.76	74.4%	4.76	74.4%	4.84	75.7%	4.09E-03	<1%	4.75	74.3%
CO	1-hour max	30,000	137.18	<1%	137.18	<1%	181.69	<1%	38.50	<1%	137.17	<1%
	8-hour max	10,000	105.37	1.1%	105.37	1.1%	118.84	1.2%	12.54	<1%	105.31	1.1%
Formaldehyde	1-hour 99.9th percentile	20	2.83	14.1%	2.83	14.1%	2.83	14.1%	0.92	4.6%	1.91	9.6%

Table 6-7: Predicted GLCs and percentage of criteria for each scenario at R7

Pollutant	Averaging Period	Criteria ($\mu g/m^3$)	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.
NO_2	1-hour max	150	31.01	20.7%	31.01	20.7%	31.04	20.7%	8.74	5.8%	30.95	20.6%
	Annual	28	2.84	10.2%	2.84	10.2%	4.02	14.4%	0.70	2.5%	2.31	8.3%
SO_2	1-hour max	196	0.20	<1%	0.20	<1%	4.70	2.4%	0.03	<1%	0.20	<1%
	24-hour max	52	0.20	<1%	0.20	<1%	2.57	4.9%	0.03	<1%	0.17	<1%
Mercury	1-hour 99.9th percentile	0.55	7.75E-06	<1%	7.75E-06	<1%	7.75E-06	<1%	6.82E-10	<1%	7.75E-06	<1%
	Annual	0.18	5.09E-08	<1%	5.09E-08	<1%	5.10E-08	<1%	1.80E-11	<1%	5.08E-08	<1%
Benzene	1-hour 99.9th percentile	29	0.70	2.4%	0.70	2.4%	0.70	2.4%	0.00	<1%	0.70	2.4%
	Annual	9.6	0.01	<1%	0.01	<1%	0.01	<1%	1.21E-04	<1%	0.01	<1%
Toluene	24-hour max	3,770	0.11	<1%	0.11	<1%	0.11	<1%	0.01	<1%	0.10	<1%
	Annual	377	0.01	<1%	0.01	<1%	0.01	<1%	8.02E-04	<1%	0.01	<1%
Ethylbenzene	1-hour 99.9th percentile	8,000	0.70	<1%	0.70	<1%	0.70	<1%	3.14E-07	<1%	0.70	<1%
	Annual	270	0.01	<1%	0.01	<1%	0.01	<1%	4.16E-09	<1%	0.01	<1%
Xylenes	24-hour max	1,080	0.10	<1%	0.10	<1%	0.10	<1%	7.08E-05	<1%	0.10	<1%
	Annual	870	0.01	<1%	0.01	<1%	0.01	<1%	1.76E-06	<1%	0.01	<1%
H_2S	1-hour max	2,565	14.73	<1%	14.73	<1%	14.73	<1%	3.18E-04	<1%	14.73	<1%
	24-hour max	137	1.39	1.0%	1.39	1.0%	1.40	1.0%	5.63E-05	<1%	1.39	1.0%
	Annual	1.8	0.11	6.3%	0.11	6.3%	0.11	6.3%	5.76E-06	<1%	0.11	6.3%
$PM_{2.5}$	24-hour max	18	5.66	31.5%	5.66	31.5%	6.73	37.4%	0.07	<1%	5.60	31.1%
	Annual	6.4	4.76	74.3%	4.76	74.3%	4.88	76.3%	7.21E-03	<1%	4.75	74.2%
CO	1-hour max	30,000	130.25	<1%	130.25	<1%	212.43	<1%	39.64	<1%	106.56	<1%
	8-hour max	10,000	105.38	1.1%	105.38	1.1%	121.80	1.2%	14.96	<1%	94.07	<1%
Formaldehyde	1-hour 99.9th percentile	20	2.73	13.6%	2.73	13.6%	2.73	13.6%	0.82	4.1%	1.91	9.6%

Table 6-8: Predicted GLCs and percentage of criteria for each scenario at R8

Pollutant	Averaging Period	Criteria (µg/m³)	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.
NO_2	1-hour max	150	82.92	55.3%	82.92	55.3%	92.05	61.4%	81.82	54.5%	27.13	18.1%
	Annual	28	1.92	6.9%	1.92	6.9%	2.33	8.3%	0.41	1.5%	1.51	5.4%
SO_2	1-hour max	196	0.46	<1%	0.46	<1%	19.04	9.7%	0.29	<1%	0.19	<1%
	24-hour max	52	0.20	<1%	0.20	<1%	2.57	4.9%	0.03	<1%	0.17	<1%
Mercury	1-hour 99.9th percentile	0.55	3.60E-05	<1%	3.60E-05	<1%	3.60E-05	<1%	4.81E-09	<1%	3.60E-05	<1%
	Annual	0.18	1.80E-07	<1%	1.80E-07	<1%	1.80E-07	<1%	4.69E-11	<1%	1.80E-07	<1%
Benzene	1-hour 99.9th percentile	29	0.38	1.3%	0.38	1.3%	0.38	1.3%	0.03	<1%	0.38	1.3%
	Annual	9.6	0.01	<1%	0.01	<1%	0.01	<1%	3.13E-04	<1%	0.01	<1%
Toluene	24-hour max	3,770	0.08	<1%	0.08	<1%	0.08	<1%	0.04	<1%	0.06	<1%
	Annual	377	0.01	<1%	0.01	<1%	0.01	<1%	2.08E-03	<1%	0.01	<1%
Ethylbenzene	1-hour 99.9th percentile	8,000	0.38	<1%	0.38	<1%	0.38	<1%	3.70E-06	<1%	0.38	<1%
	Annual	270	0.01	<1%	0.01	<1%	0.01	<1%	5.18E-08	<1%	0.01	<1%
Xylenes	24-hour max	1,080	0.06	<1%	0.06	<1%	0.06	<1%	3.77E-05	<1%	0.06	<1%
	Annual	870	0.01	<1%	0.01	<1%	0.01	<1%	1.35E-06	<1%	0.01	<1%
H_2S	1-hour max	2,565	5.64	<1%	5.64	<1%	5.64	<1%	3.09E-03	<1%	5.64	<1%
	24-hour max	137	0.71	<1%	0.71	<1%	0.71	<1%	2.70E-04	<1%	0.71	<1%
	Annual	1.8	0.07	4.0%	0.07	4.0%	0.07	4.0%	1.50E-05	<1%	0.07	4.0%
$PM_{2.5}$	24-hour max	18	5.93	33.0%	5.93	33.0%	6.72	37.3%	0.34	1.9%	5.60	31.1%
	Annual	6.4	4.77	74.5%	4.77	74.5%	4.87	76.1%	0.02	<1%	4.75	74.2%
CO	1-hour max	30,000	474.80	1.6%	474.80	1.6%	489.62	1.6%	384.85	1.3%	101.88	<1%
	8-hour max	10,000	180.43	1.8%	180.43	1.8%	184.39	1.8%	90.12	<1%	92.77	<1%
Formaldehyde	1-hour 99.9th percentile	20	7.67	38.3%	7.67	38.3%	7.67	38.3%	5.76	28.8%	1.91	9.6%

Table 6-9: Predicted offsite impacts for each modelled scenario for air toxics

Pollutant	Averaging Period	Criteria (µg/m³)	Offsite maximum									
			Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.	Conc. (µg/m3)	% of crit.
Mercury	1-hour 99.9th percentile	0.55	1.96E-03	<1%	1.96E-03	<1%	1.96E-03	<1%	6.66E-09	<1%	1.96E-03	<1%
Benzene		29	4.15	14.3%	4.15	14.3%	4.15	14.3%	0.04	<1%	4.15	14.3%
Ethylbenzene		8,000	4.15	<1%	4.15	<1%	4.15	<1%	0.00	<1%	4.15	<1%
Formaldehyde		20	9.92	49.6%	9.92	49.6%	9.92	49.6%	8.01	40.0%	1.91	9.6%

7 Conclusion

An air quality assessment using air dispersion modelling was undertaken to predict the potential air quality impacts from the development of the Belisama Conventional Gas Project by Hancock Energy. GLCs of the pollutants of concern have been predicted using the AERMOD air dispersion model using emissions data provided by Hancock Energy and meteorological data adapted from the nearest BoM monitoring station – Morawa Airport.

The key findings from the air quality assessment are as follows:

- GLCs from all pollutants of concern were predicted to be below their corresponding ambient air quality criteria at all sensitive receptors;
- Maximum cumulative 1-hour average concentrations of NO_2 at R5 were predicted to have the highest concentrations relative to the criteria;
- Cumulative 99.9th percentile 1-hour concentrations of air toxics including benzene, ethylbenzene, formaldehyde and mercury were not predicted to exceed relevant criteria anywhere outside of the cadastral boundary outlining Hancock Energy's ownership.

8 References

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Appendix 1 – Contour plots

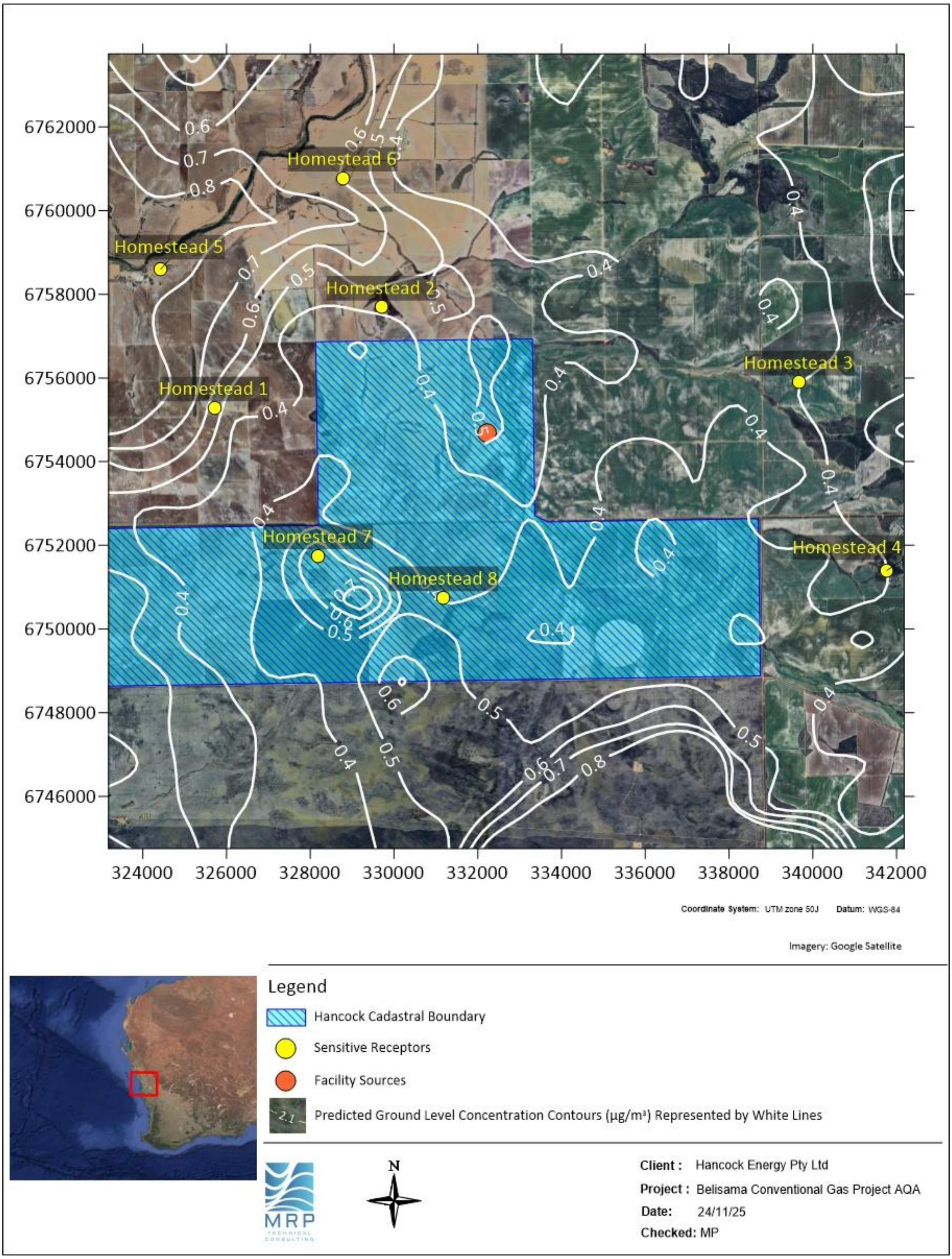

Figure 8-1: 99.9th percentile predicted 1-hour average GLCs of benzene for Scenario 1

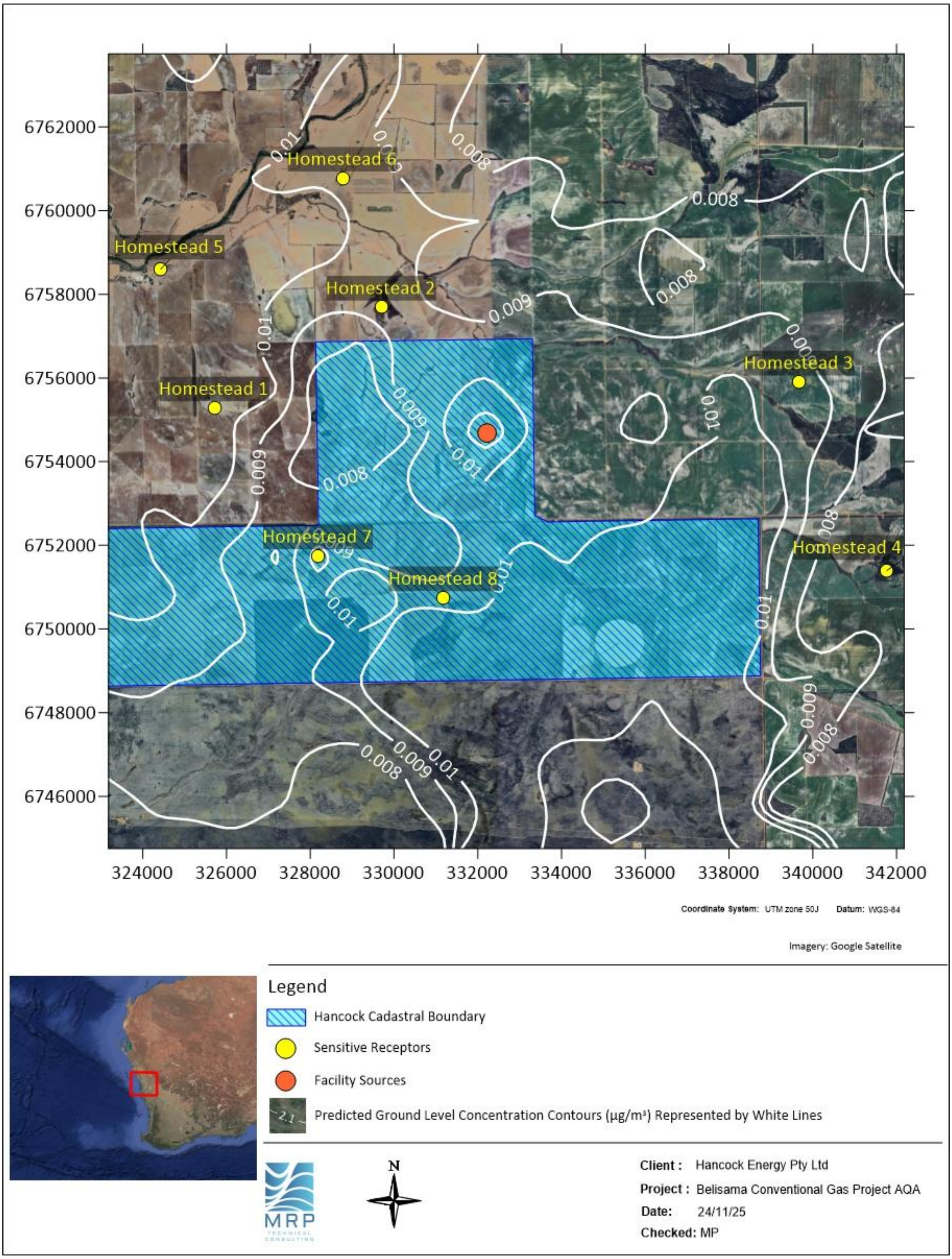

Figure 8-2: Predicted annual average GLCs of benzene for Scenario 1

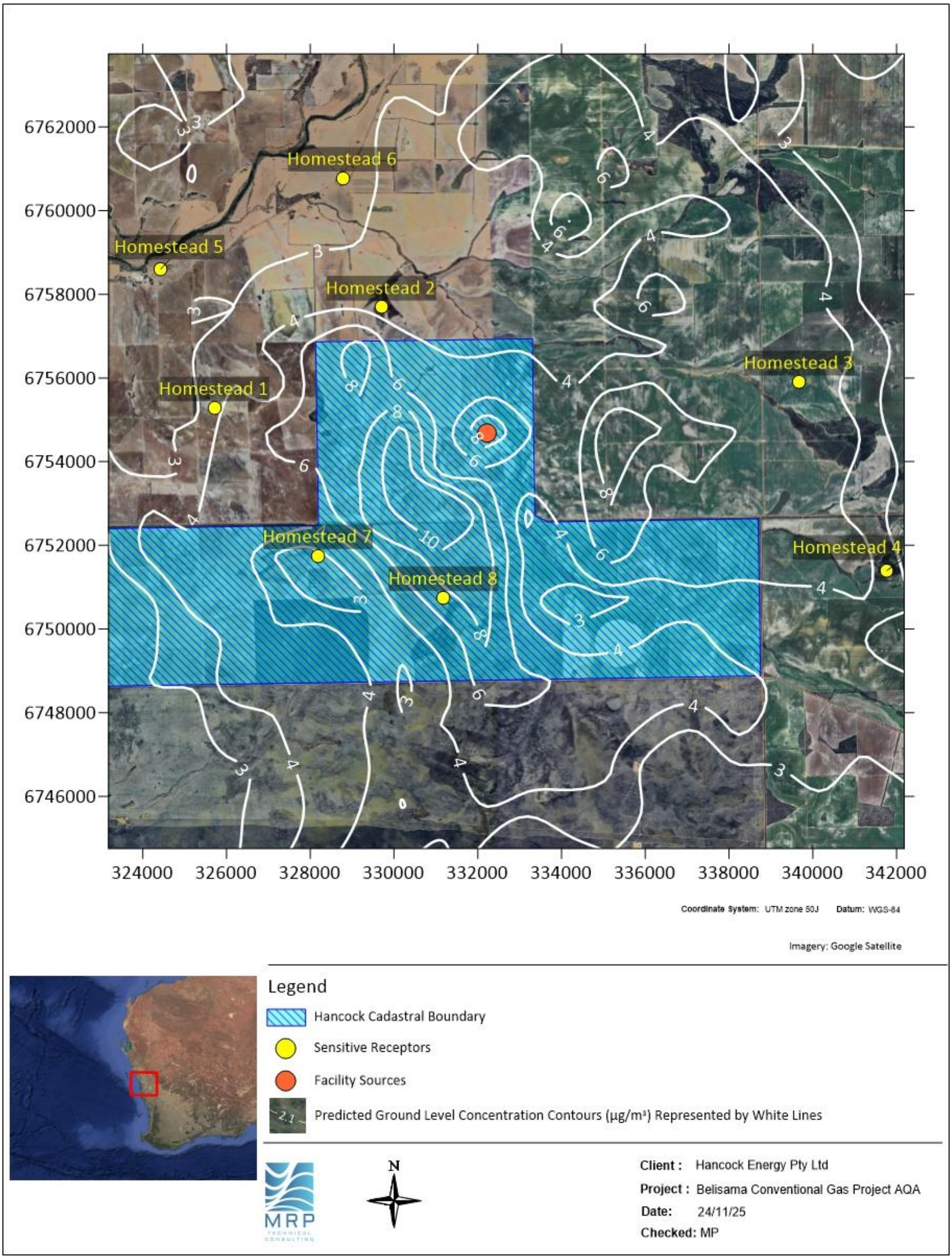

Figure 8-3: 99.9th percentile predicted 1-hour average GLCs of formaldehyde for Scenario 1

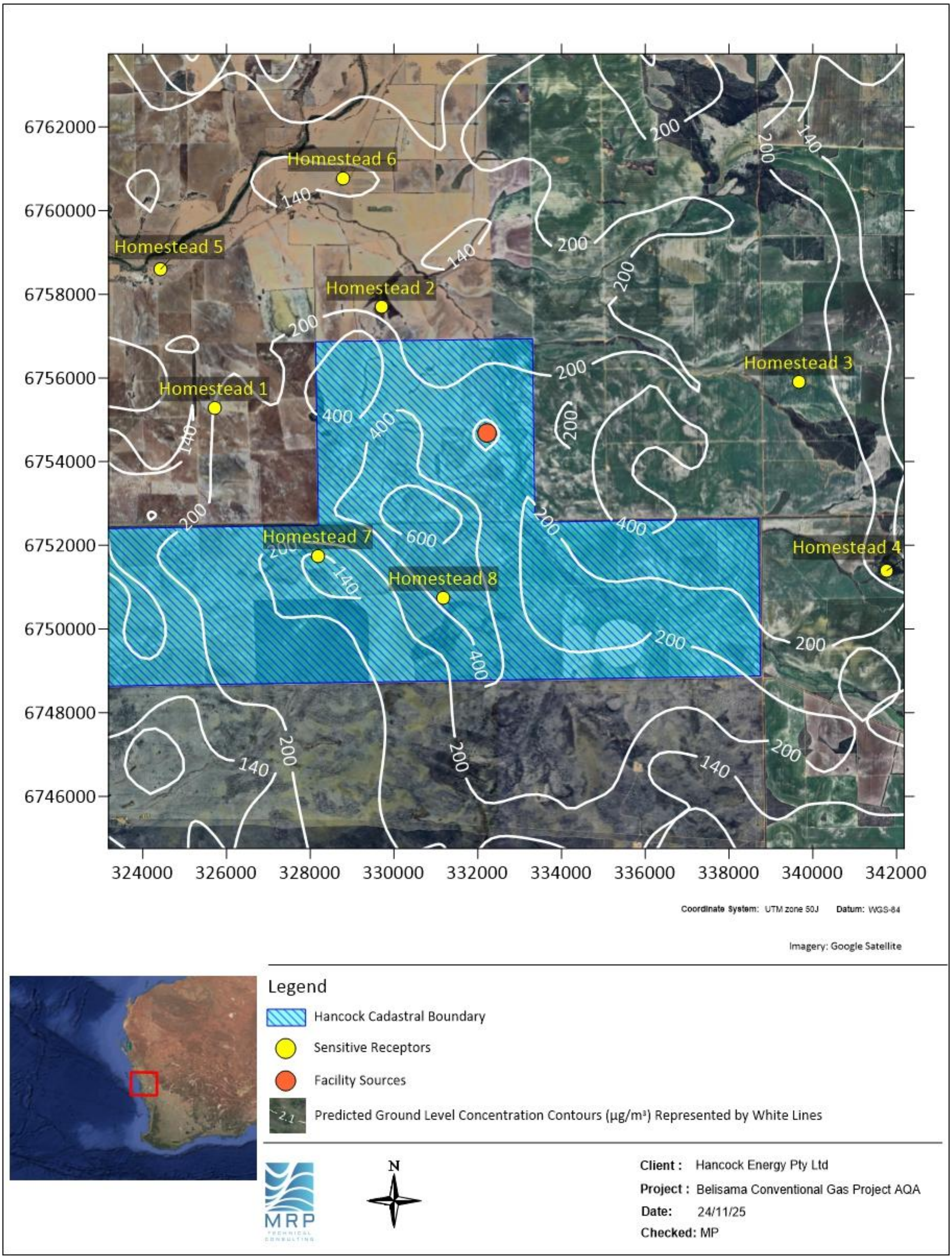

Figure 8-4: Maximum predicted 1-hour average GLCs of CO for Scenario 1

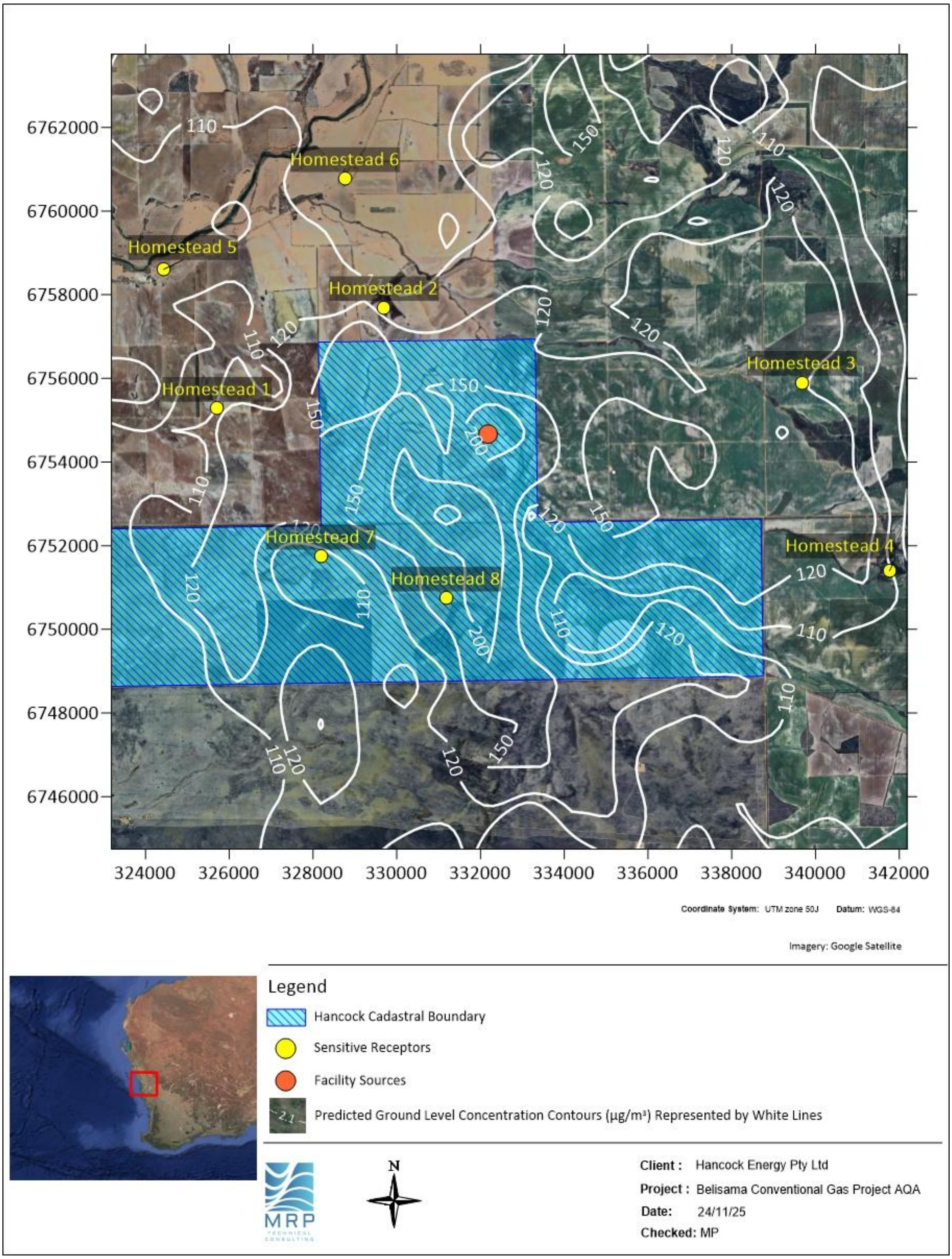

Figure 8-5: Maximum predicted 8-hour average GLCs of CO for Scenario 1

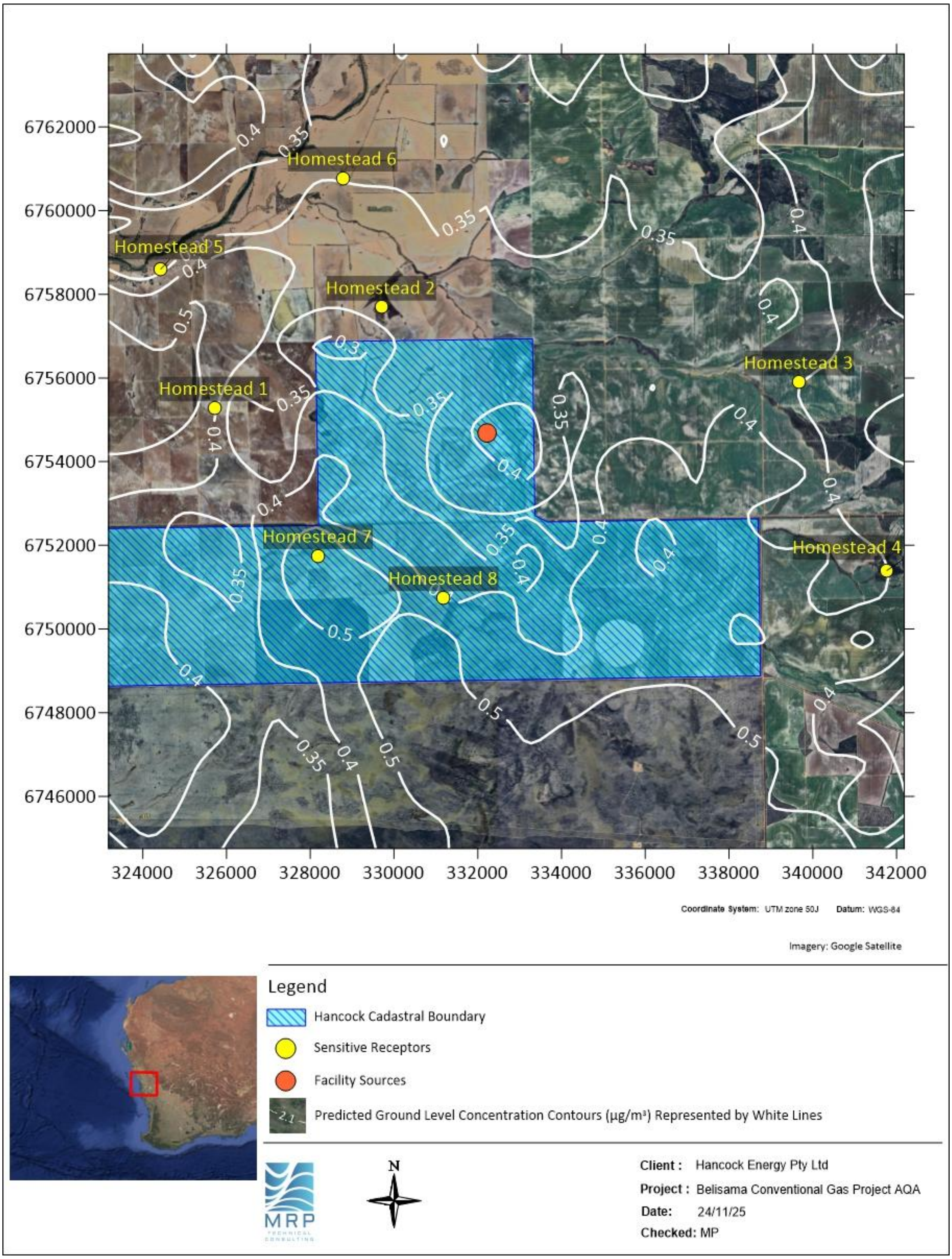

Figure 8-6: 99.9th percentile predicted 1-hour average GLCs of ethylbenzene for Scenario 1

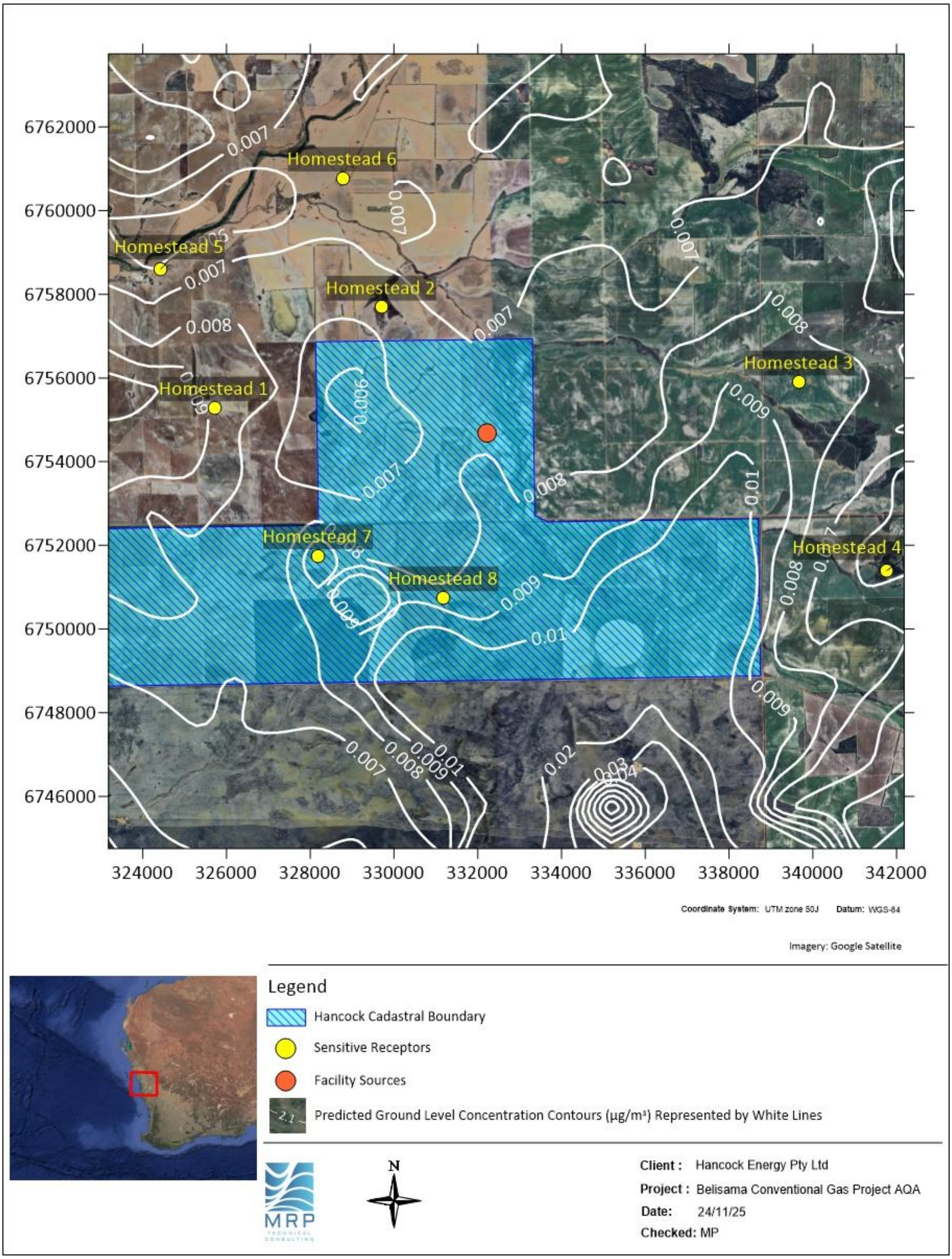

Figure 8-7: Predicted annual average GLCs of ethylbenzene for Scenario 1

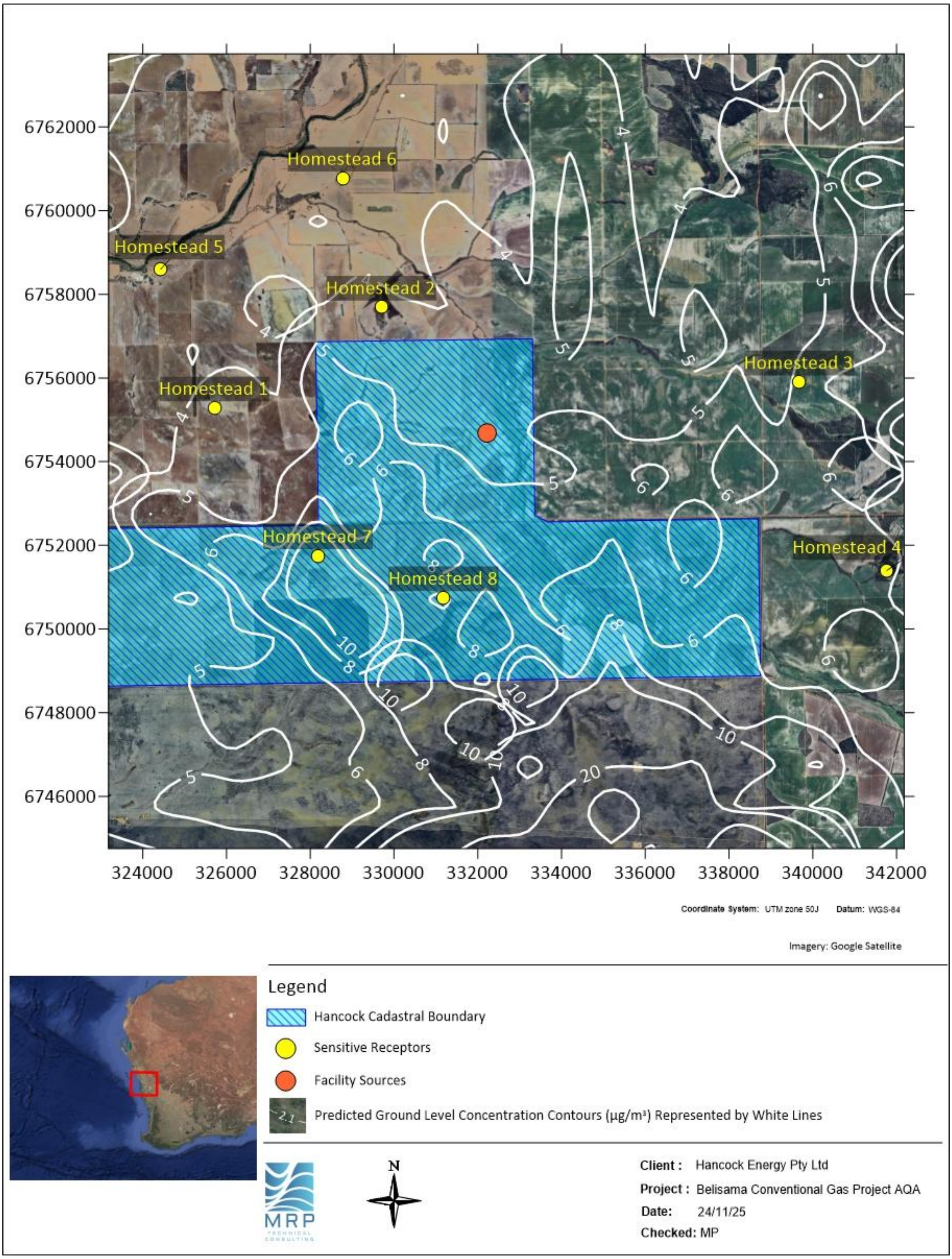

Figure 8-8: Maximum predicted 1-hour average GLCs of H_2S for Scenario 1

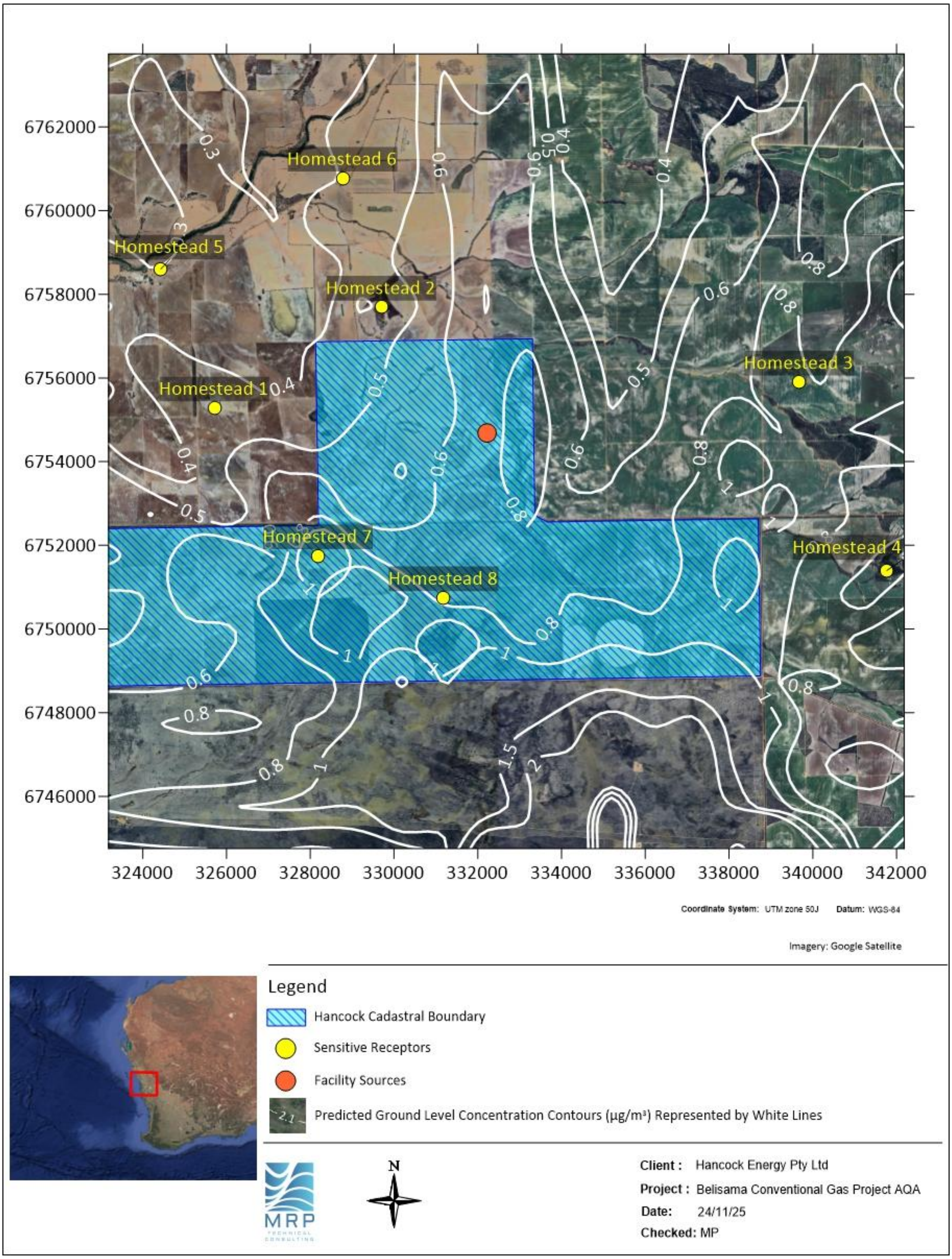

Figure 8-9: Maximum predicted 24-hour average GLCs of H_2S for Scenario 1

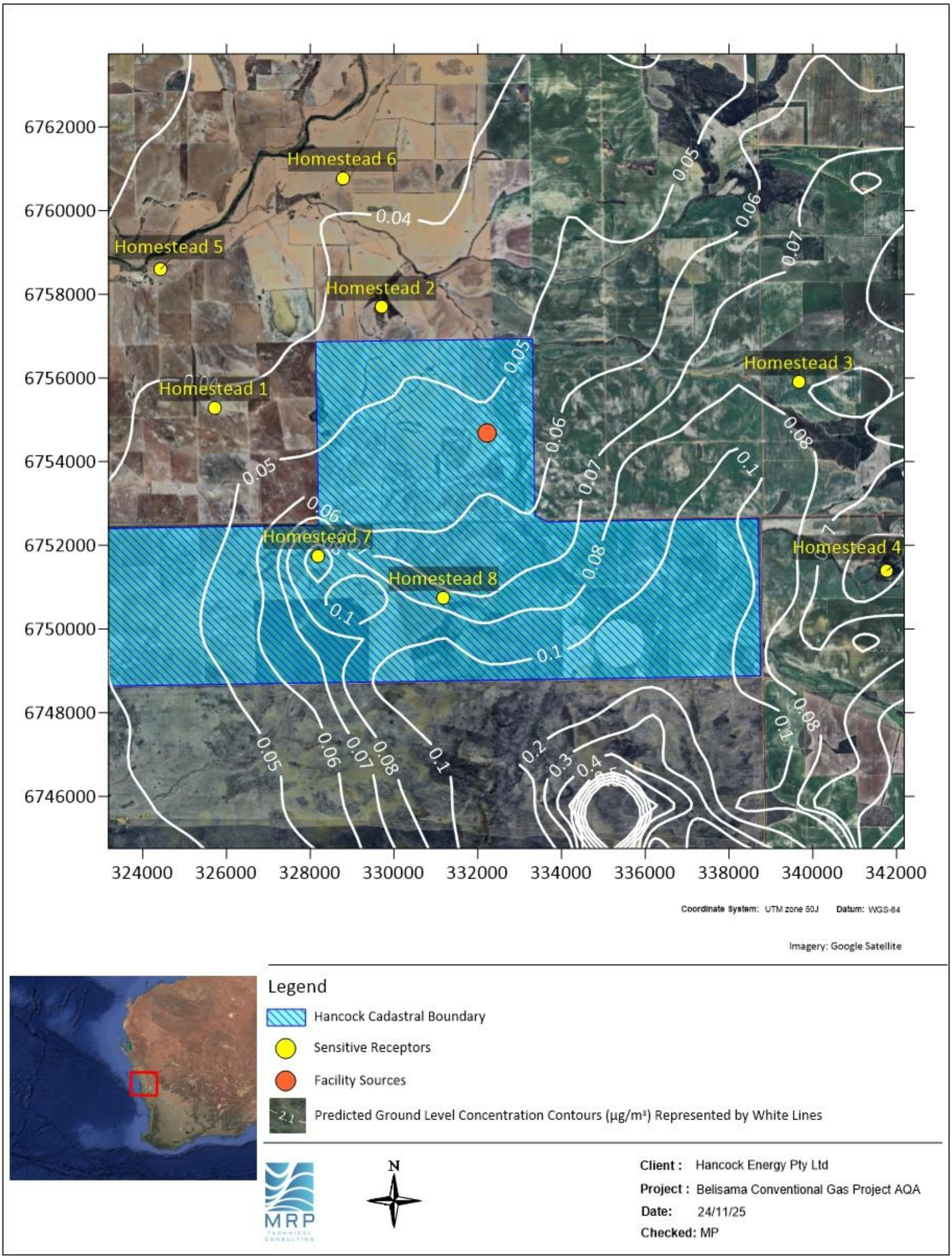

Figure 8-10: Predicted annual average GLCs of H_2S for Scenario 1

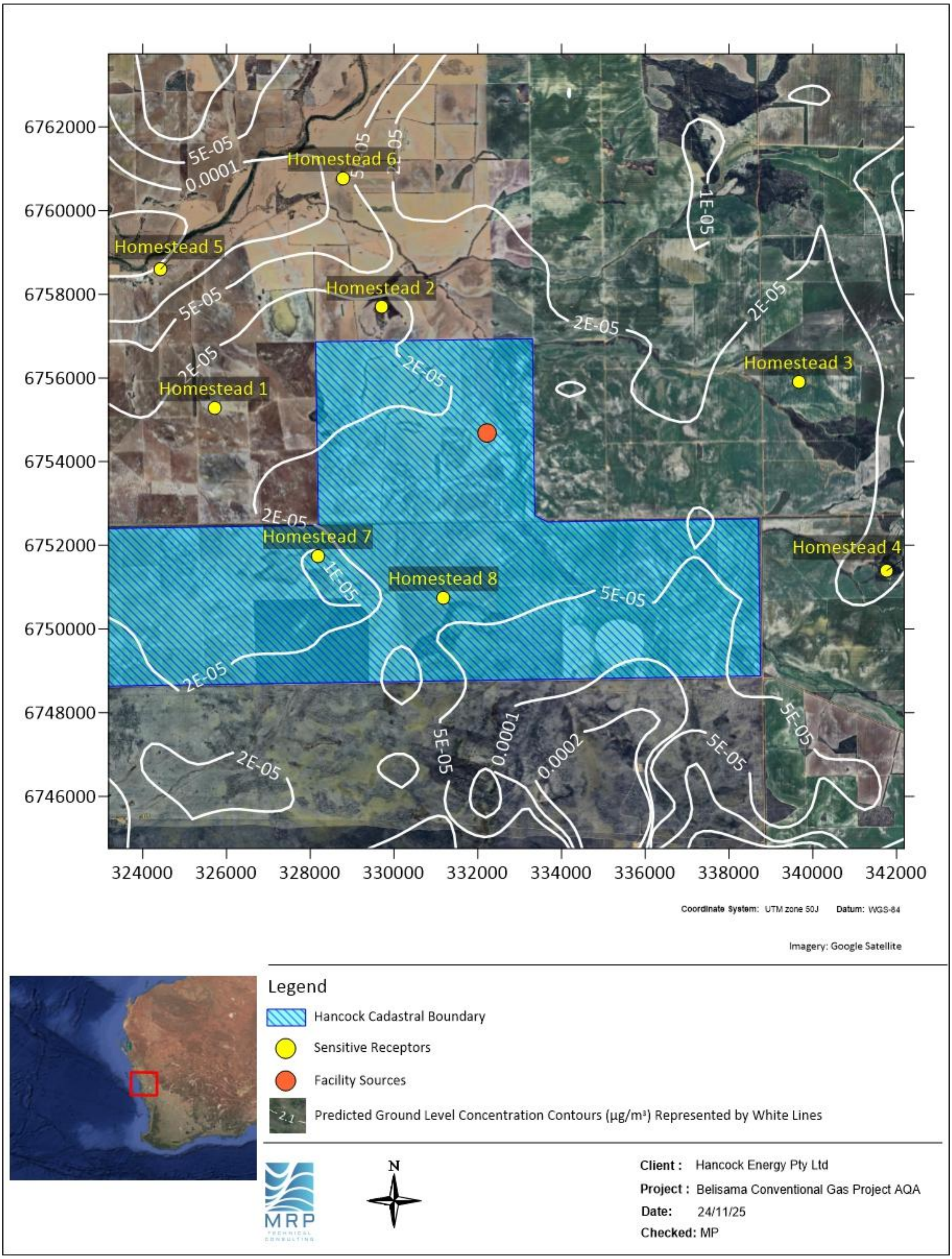

Figure 8-11: 99.9th percentile predicted 1-hour average GLCs of mercury for Scenario 1

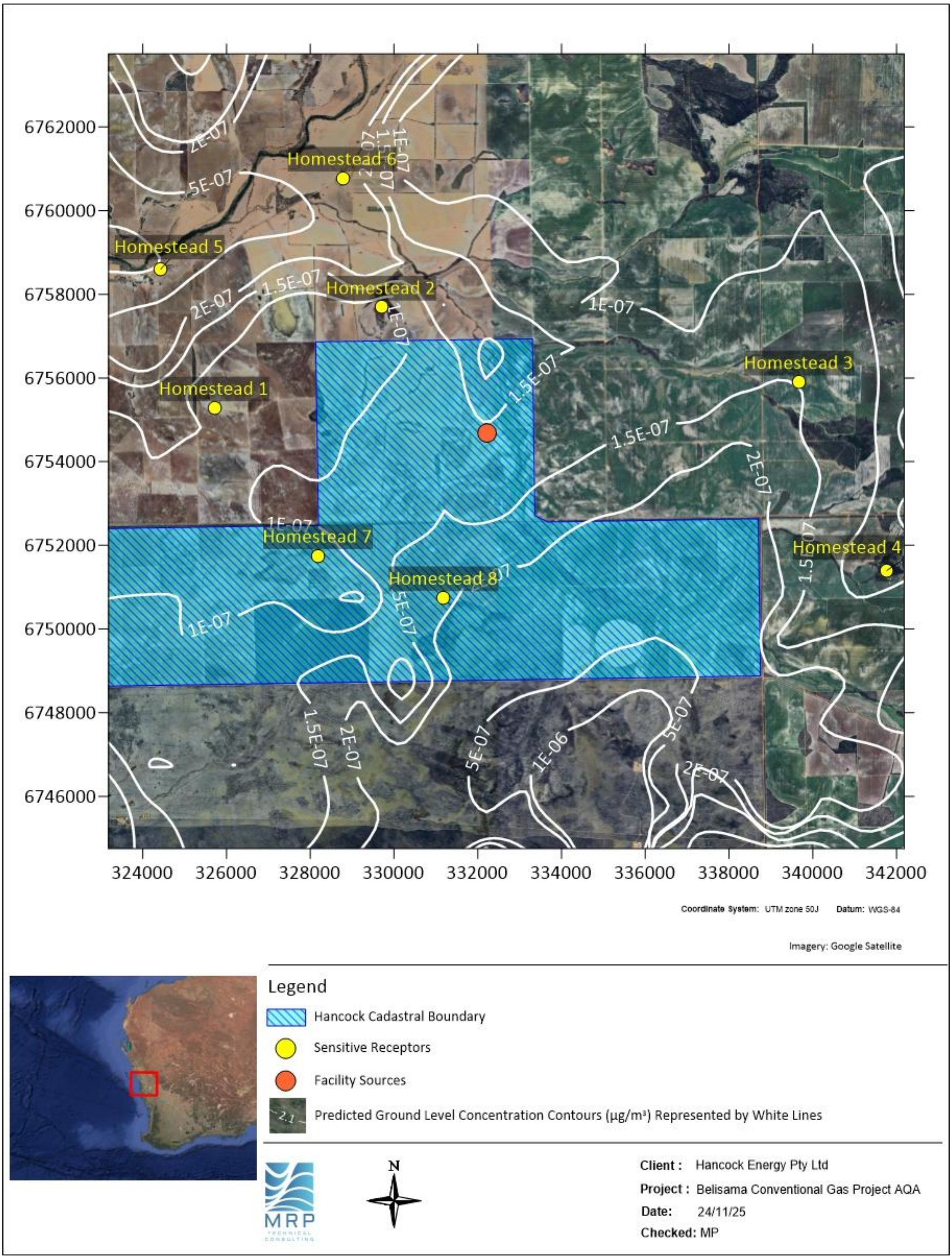

Figure 8-12: Predicted annual average GLCs of mercury for Scenario 1

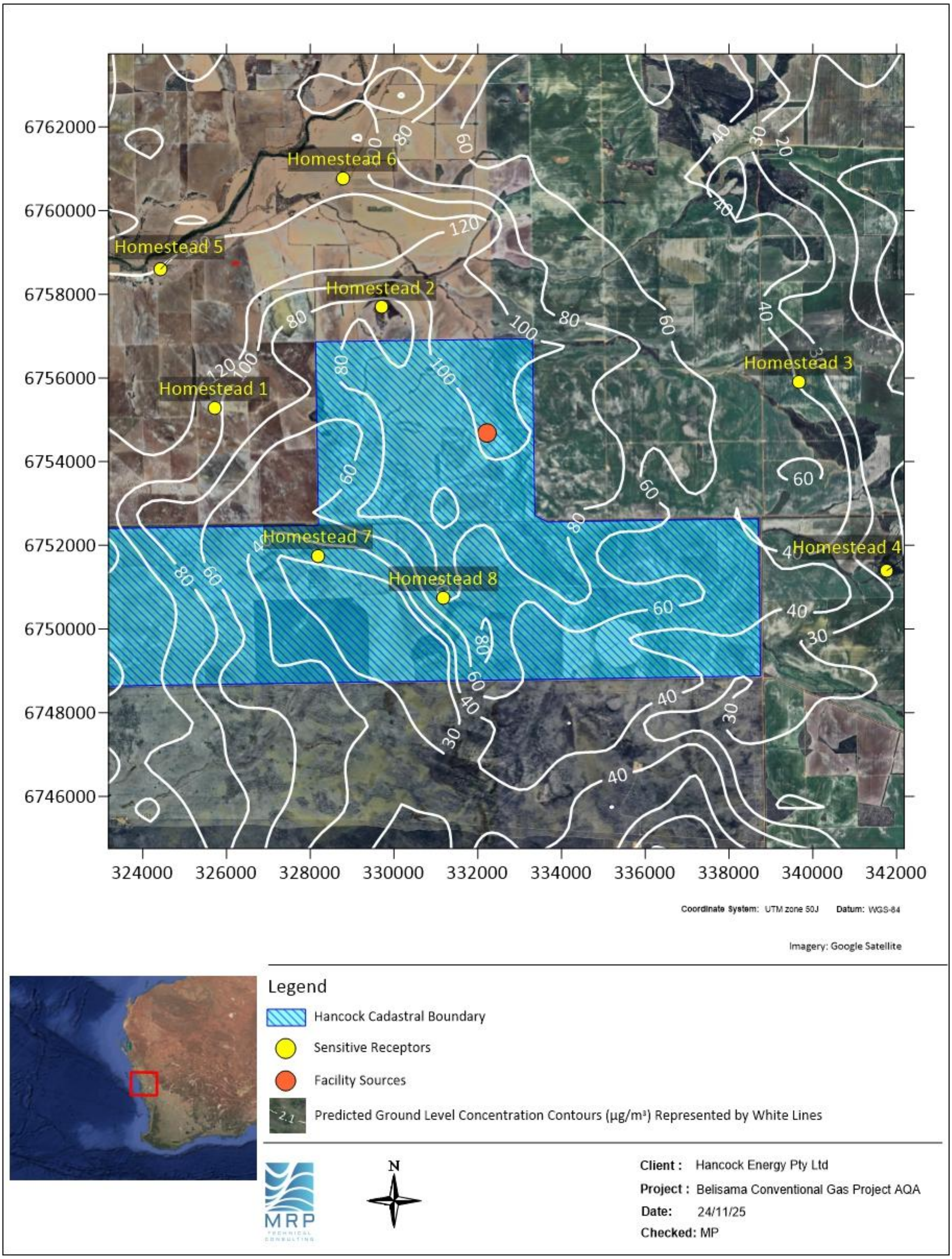

Figure 8-13: Maximum predicted 1-hour average GLCs of NO_2 for Scenario 1

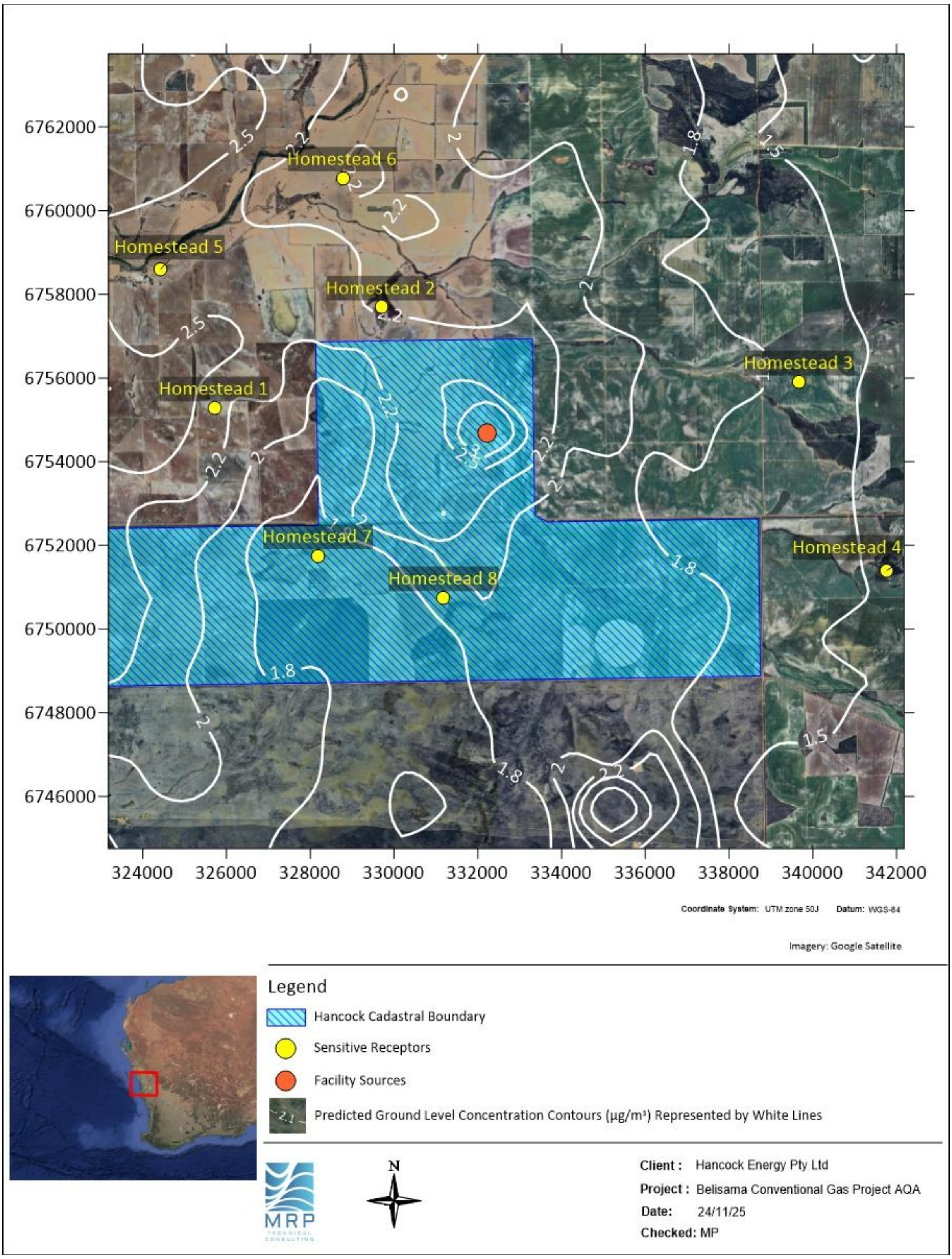

Figure 8-14: Predicted annual average GLCs of NO_2 for Scenario 1

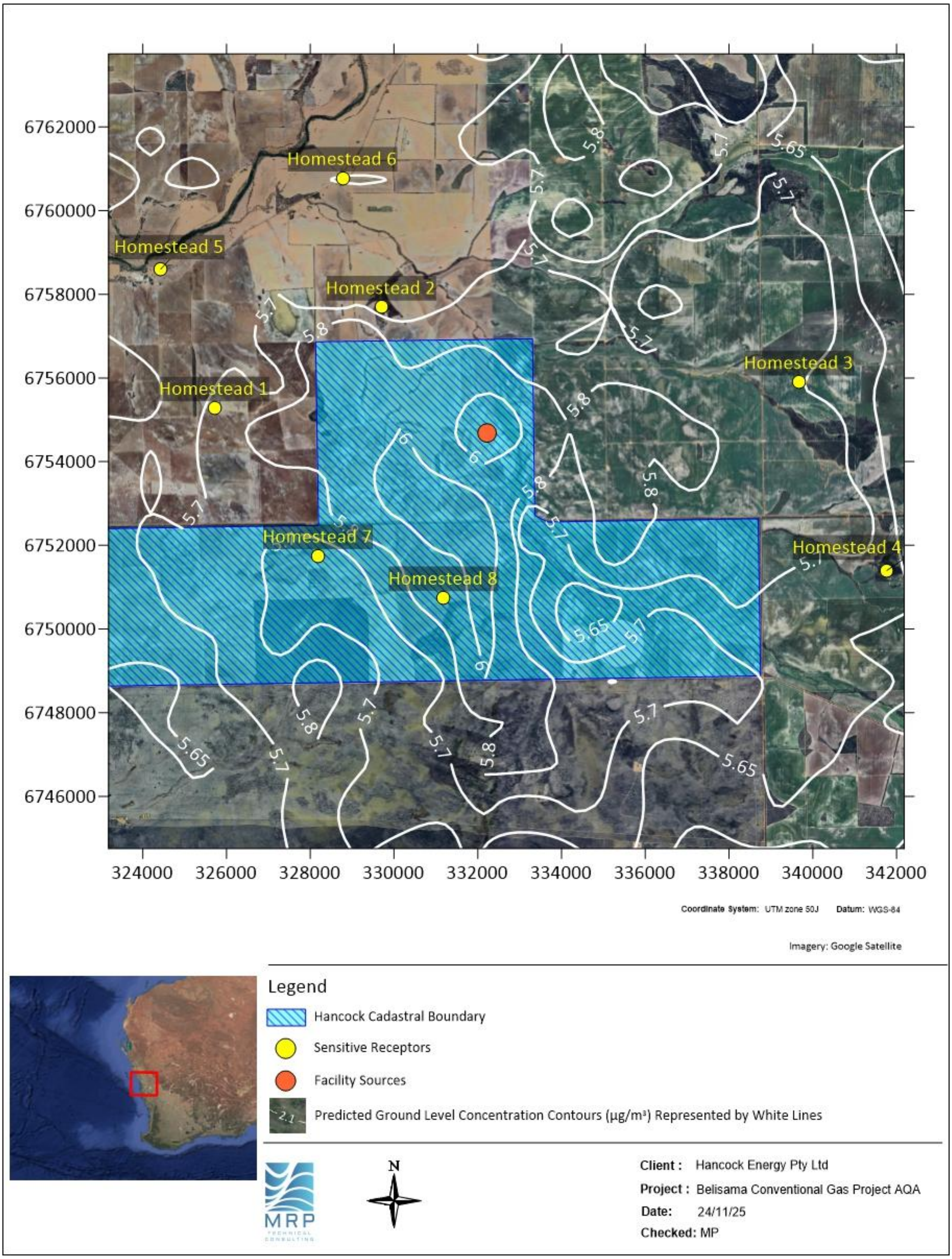

Figure 8-15: Maximum predicted 24-hour average GLCs of $PM_{2.5}$ for Scenario 1

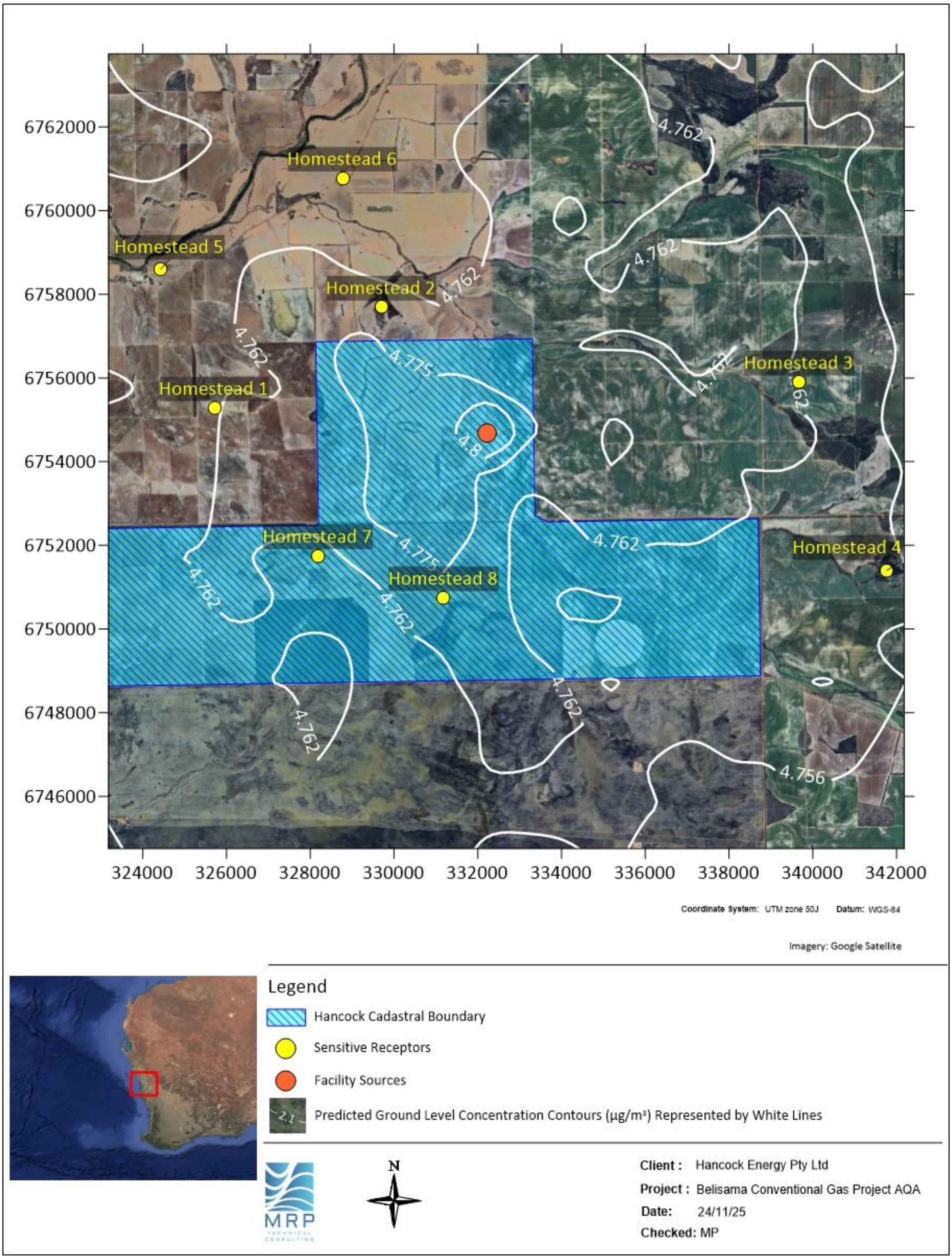

Figure 8-16: Predicted annual average GLCs of $PM_{2.5}$ for Scenario 1

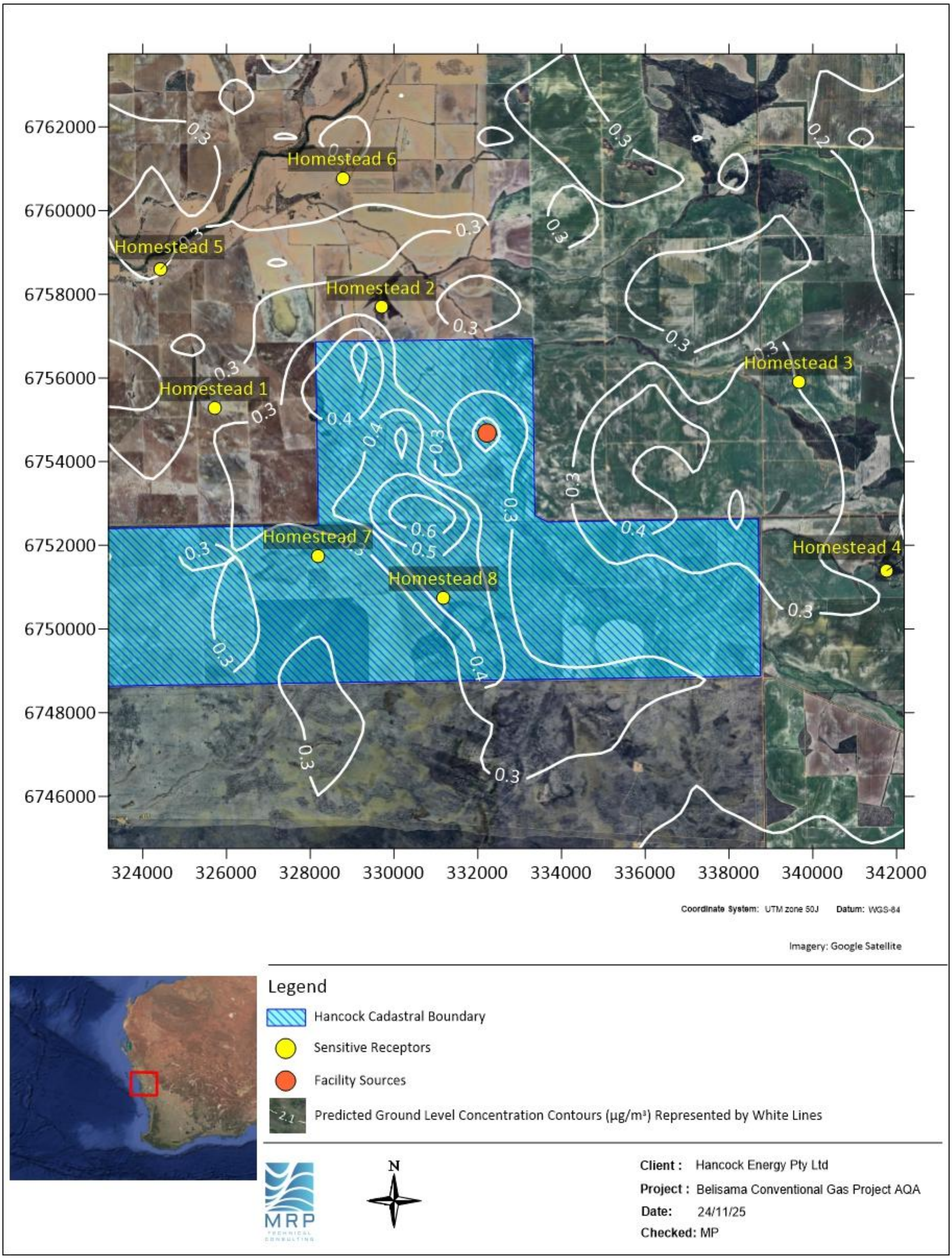

Figure 8-17: Maximum predicted 1-hour average GLCs of SO_2 for Scenario 1

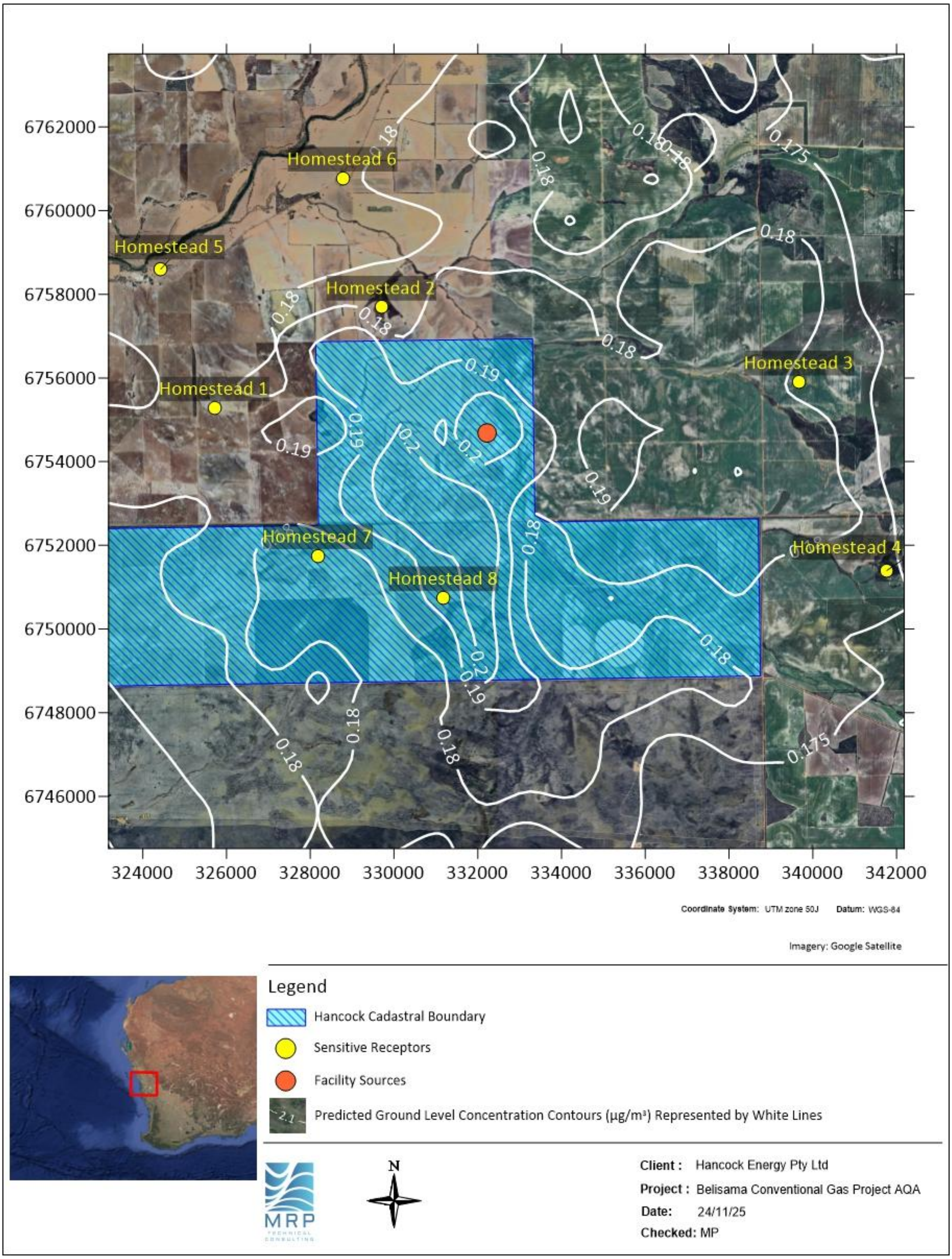

Figure 8-18: Maximum predicted 24-hour average GLCs of SO_2 for Scenario 1

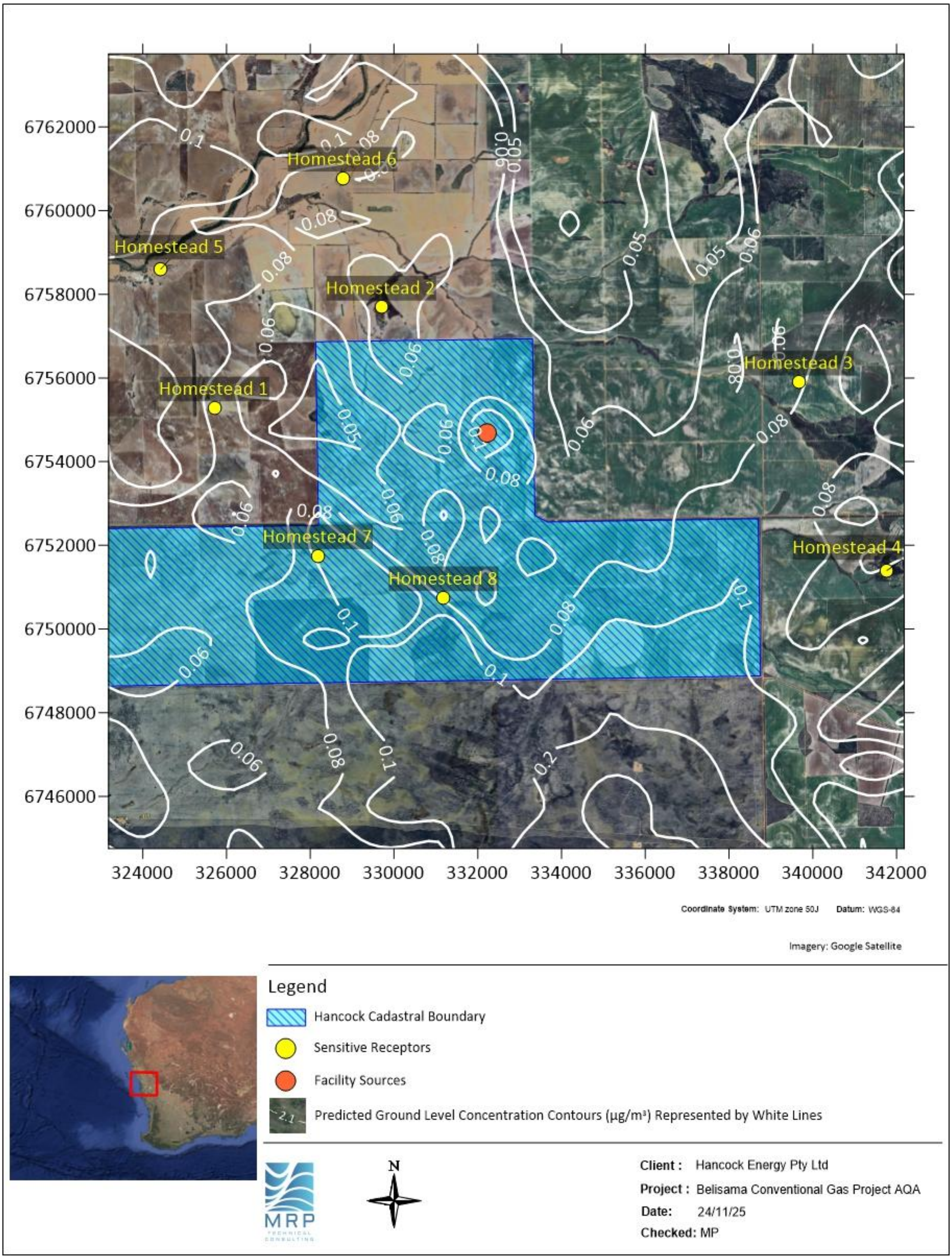

Figure 8-19: Maximum predicted 24-hour average GLCs of toluene for Scenario 1

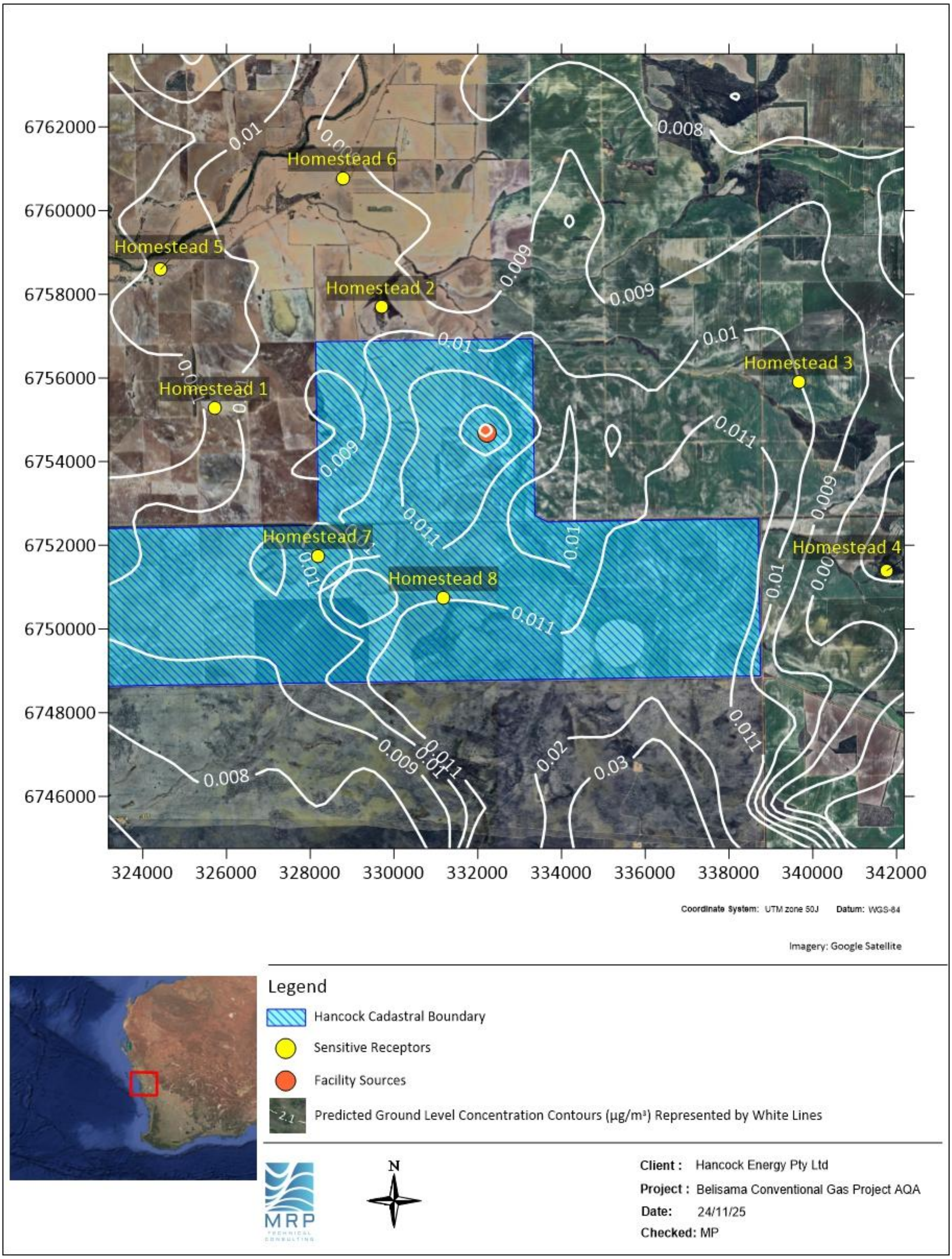

Figure 8-20: Predicted annual average GLCs of toluene for Scenario 1

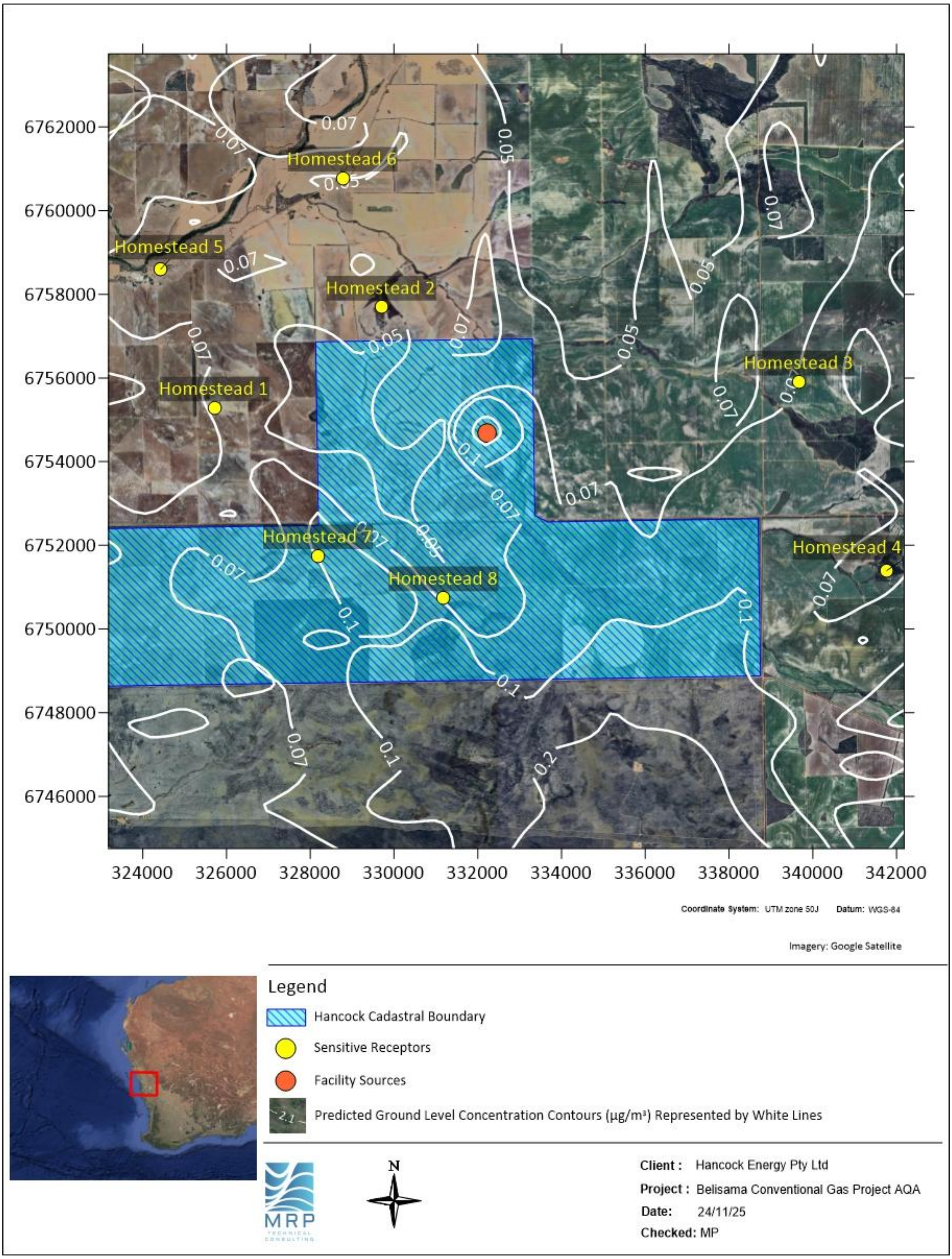

Figure 8-21: Maximum predicted 24-hour average GLCs of xylene for Scenario 1

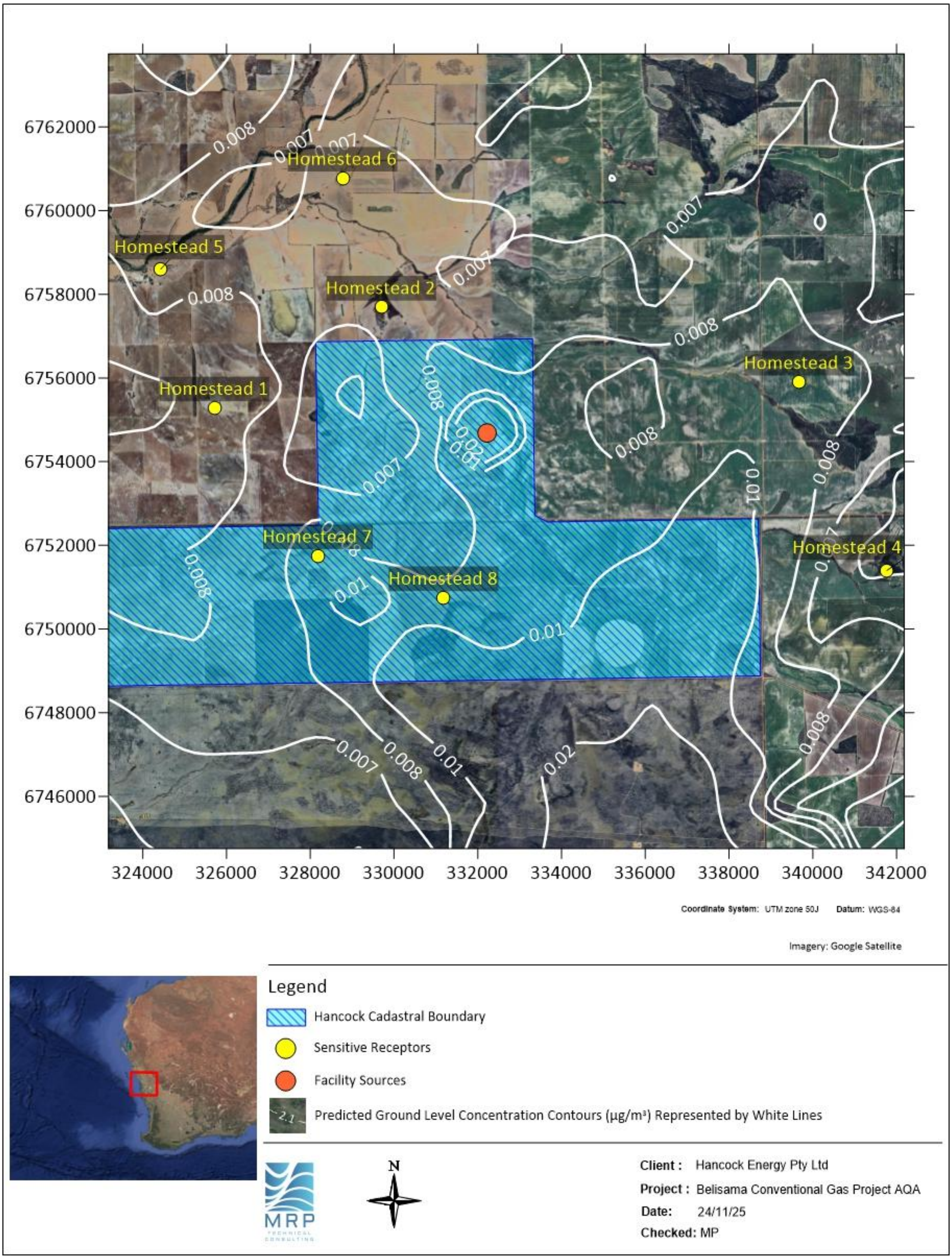

Figure 8-22: Predicted annual average GLCs of xylene for Scenario 1

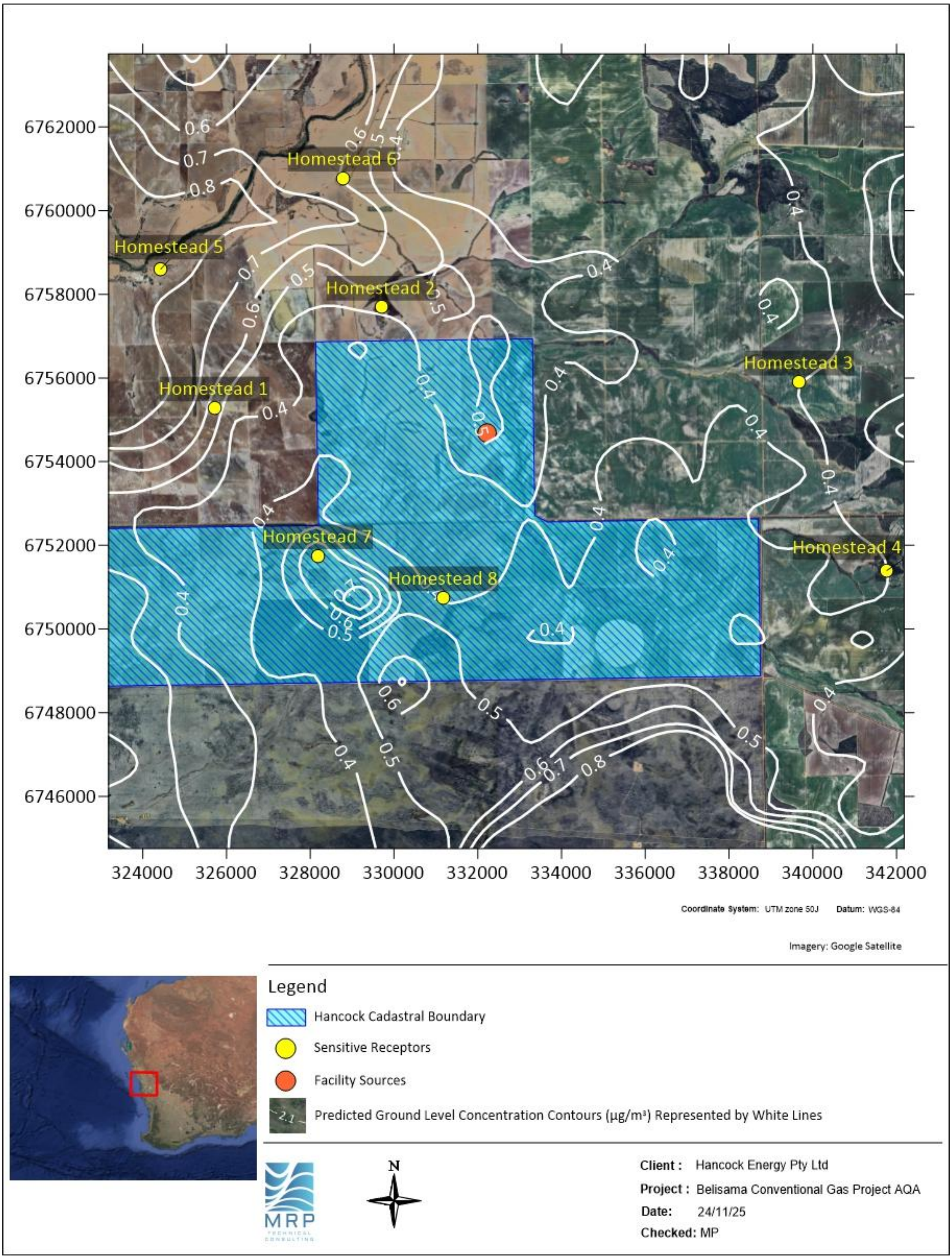

Figure 8-23: 99.9th percentile predicted 1-hour average GLCs of benzene for Scenario 2

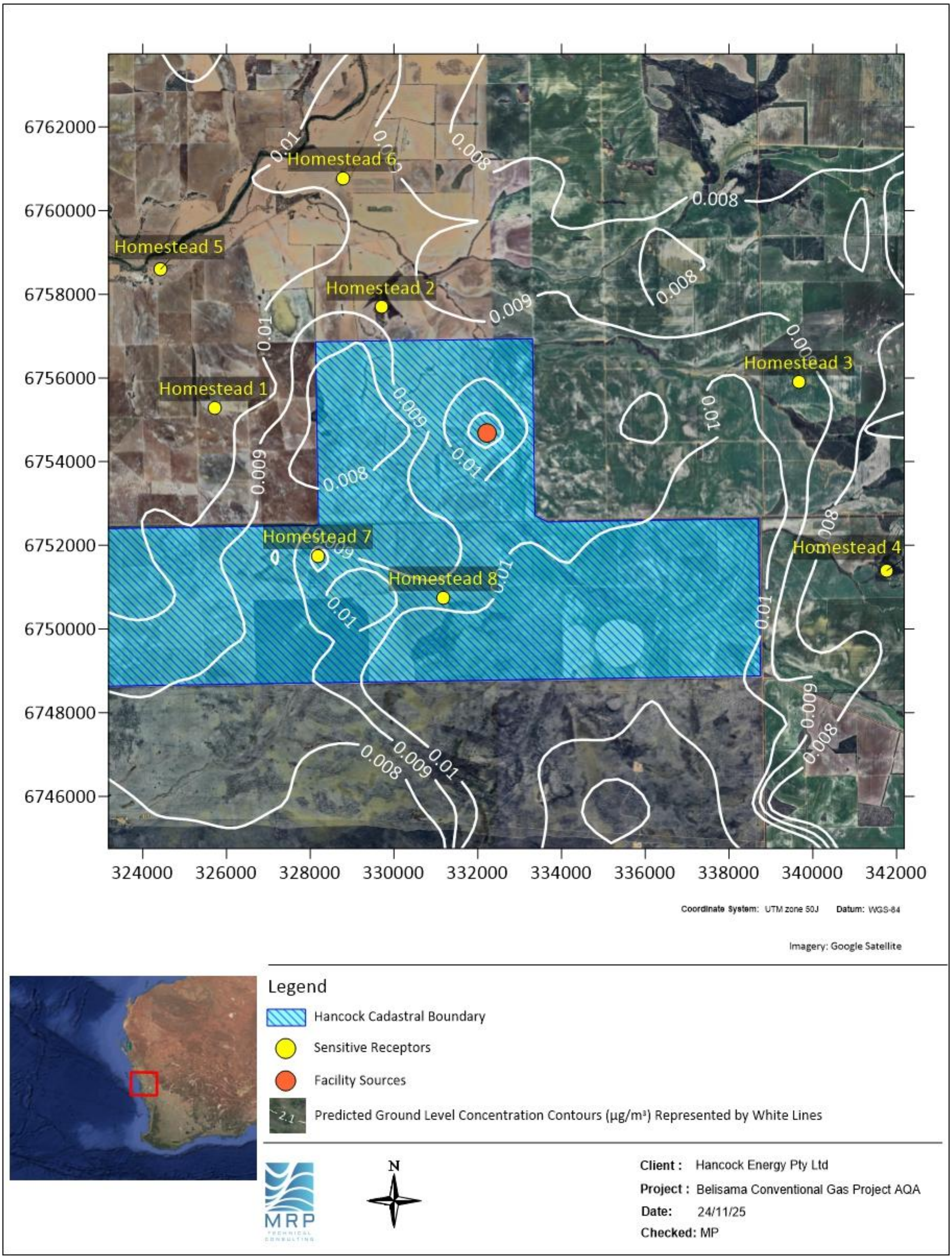

Figure 8-24: Predicted annual average GLCs of benzene for Scenario 2

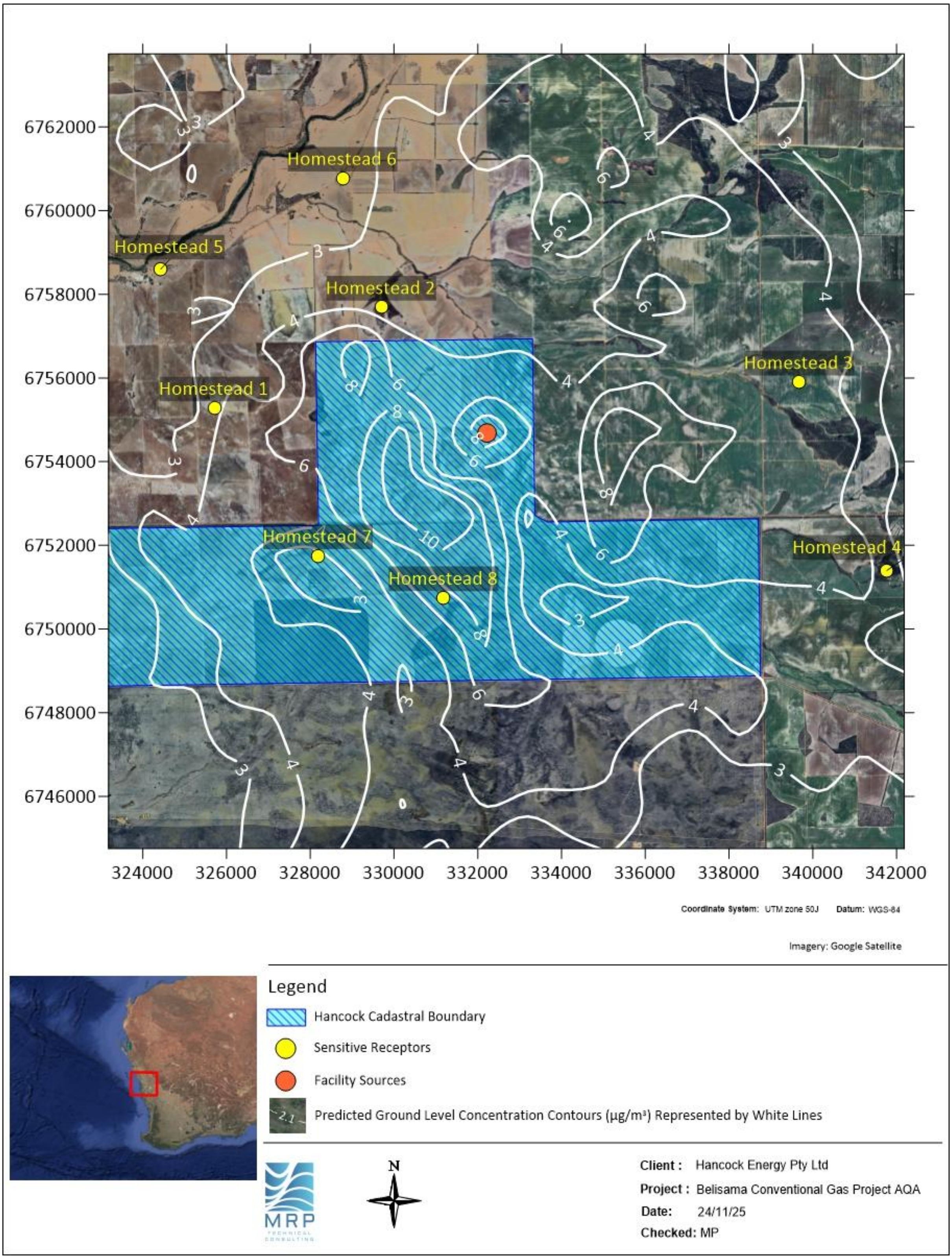

Figure 8-25: 99.9th percentile predicted 1-hour average GLCs of formaldehyde for Scenario 2

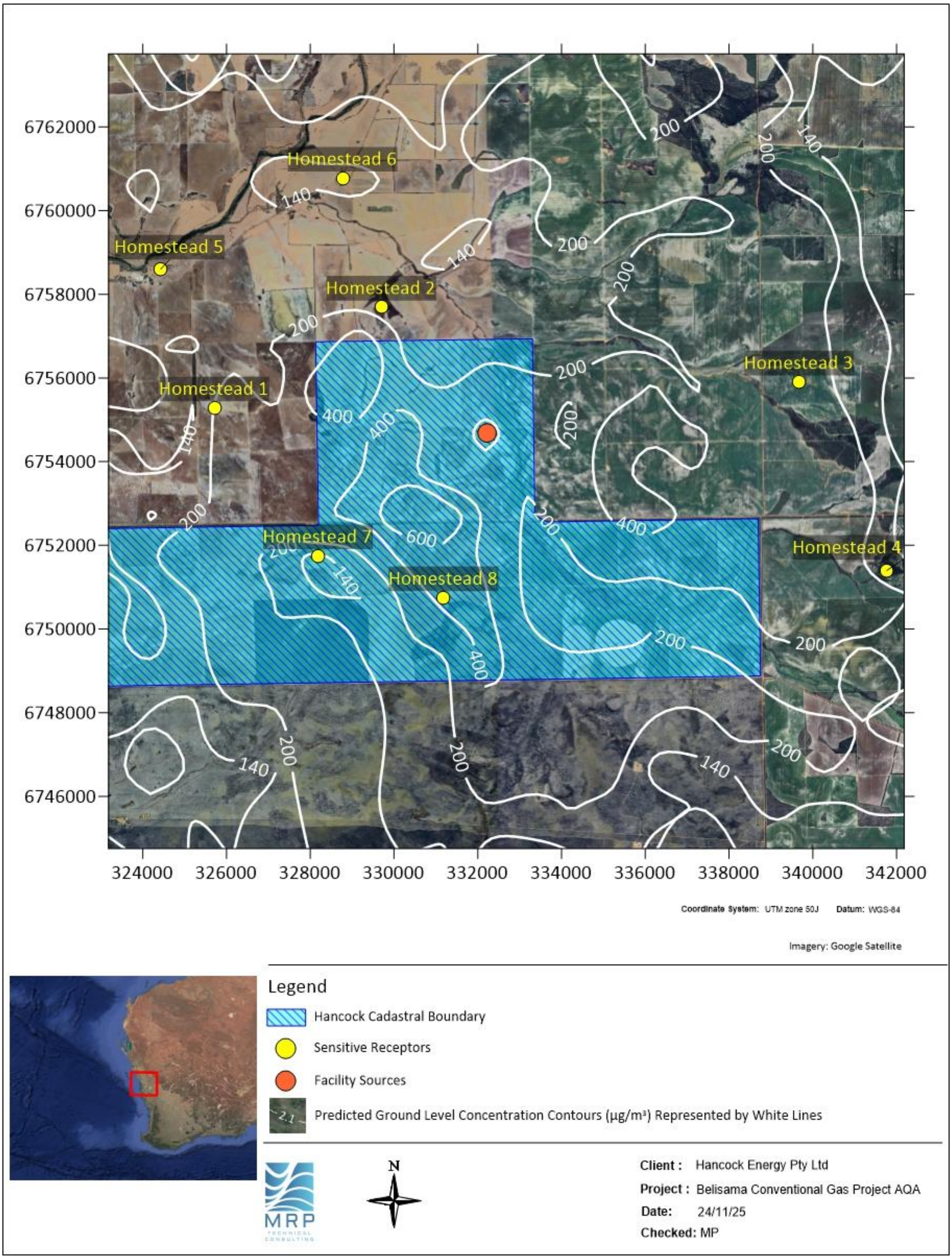

Figure 8-26: Maximum predicted 1-hour average GLCs of CO for Scenario 2

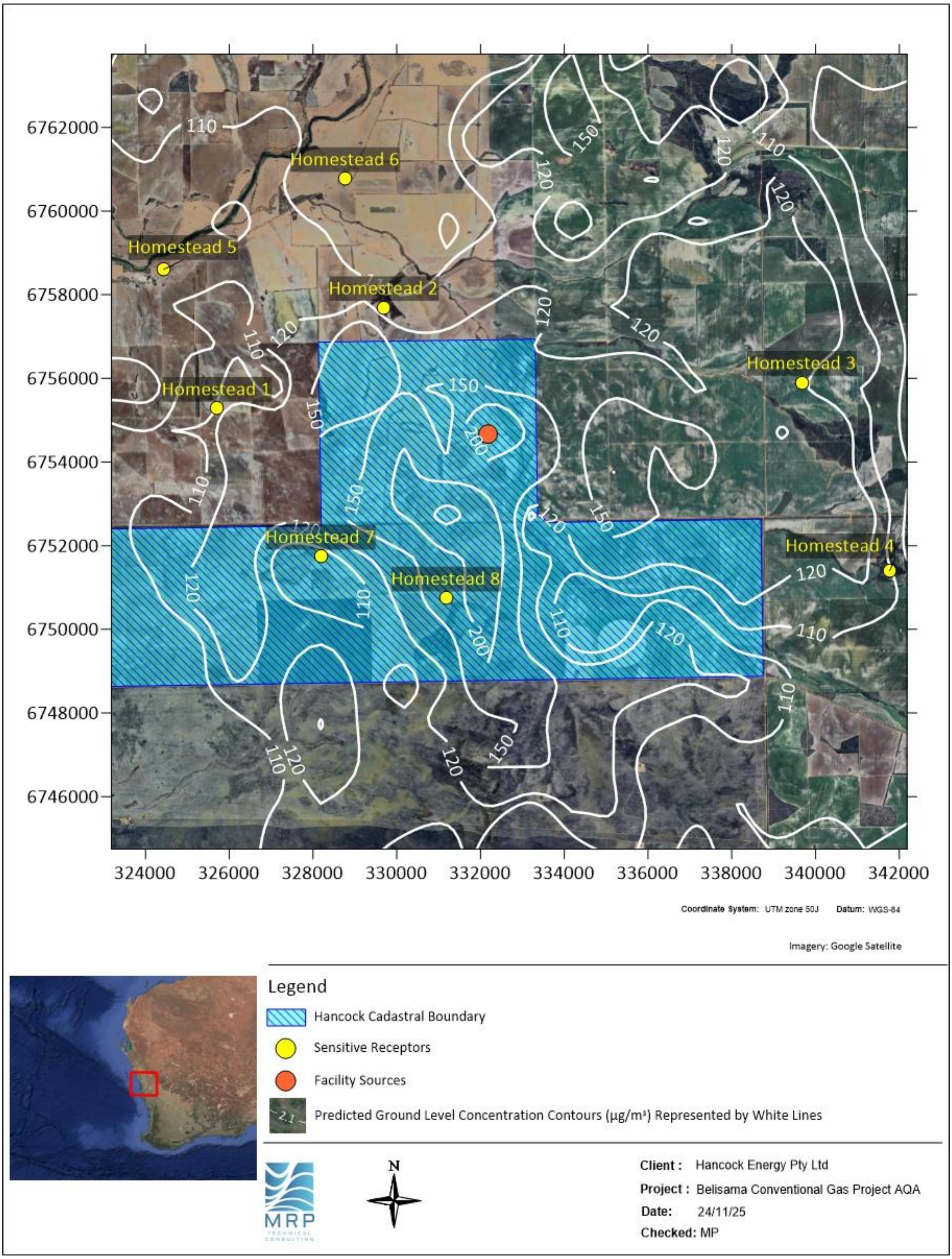

Figure 8-27: Maximum predicted 8-hour average GLCs of CO for Scenario 2

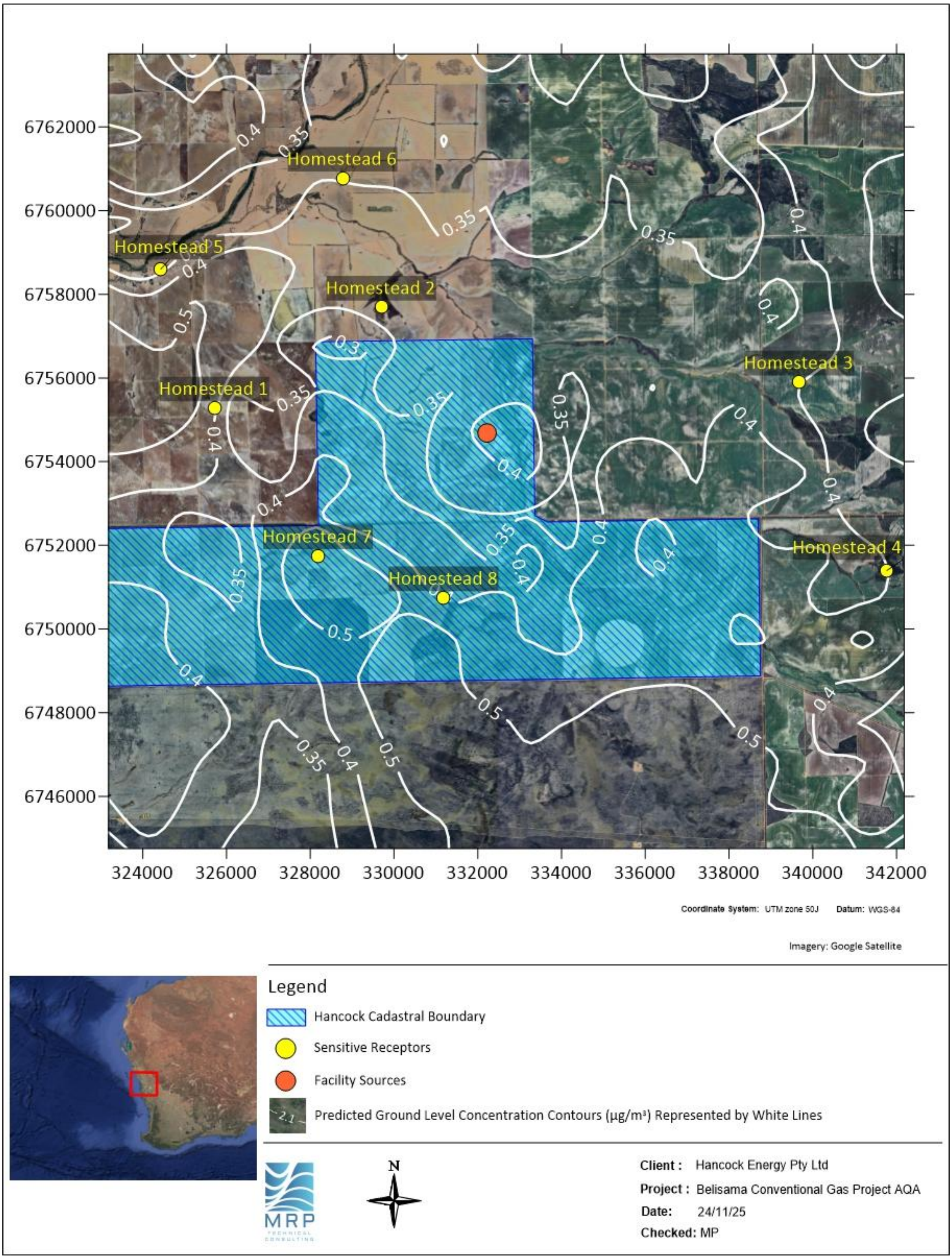

Figure 8-28: 99.9th percentile predicted 1-hour average GLCs of ethylbenzene for Scenario 2

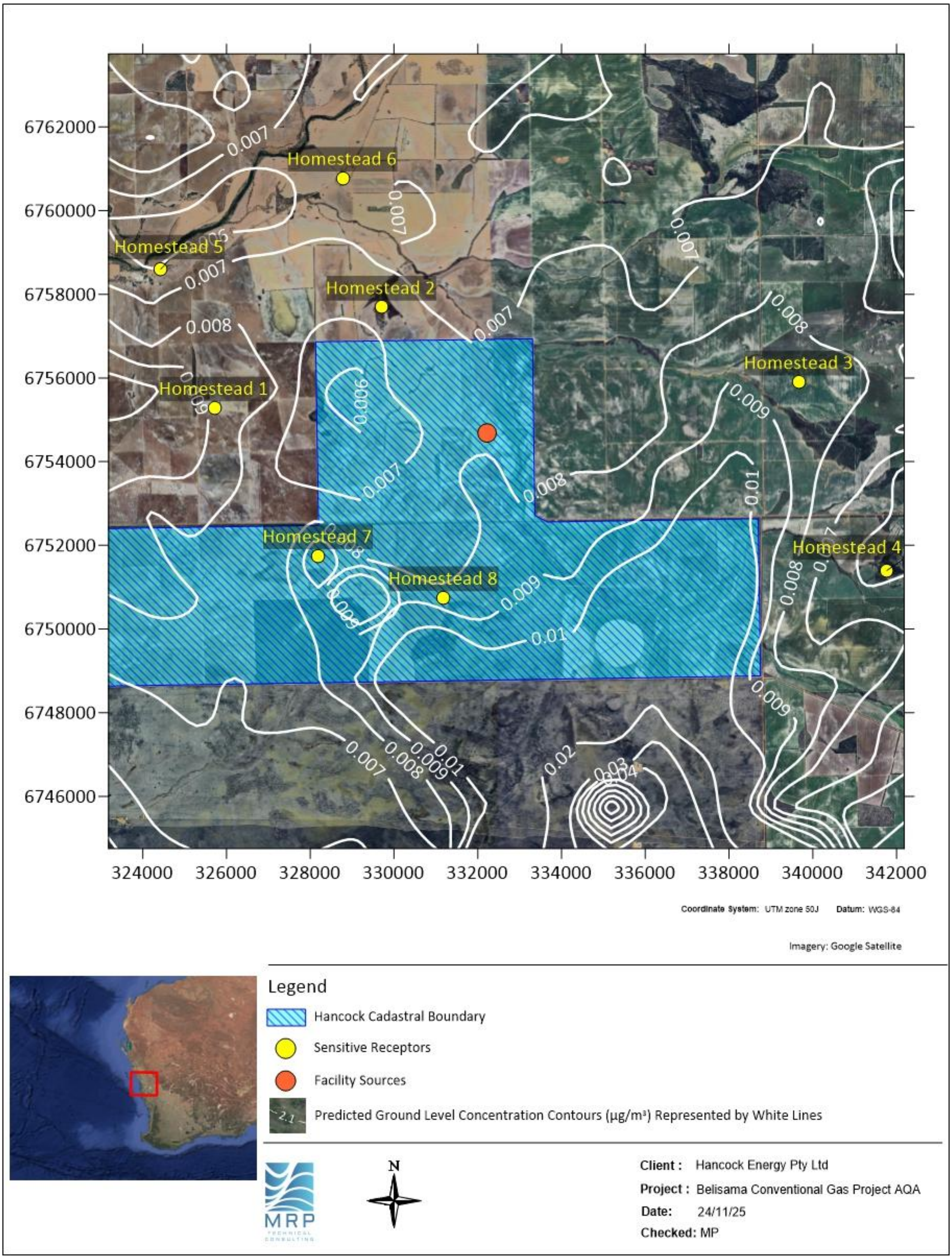

Figure 8-29: Predicted annual average GLCs of ethylbenzene for Scenario 2

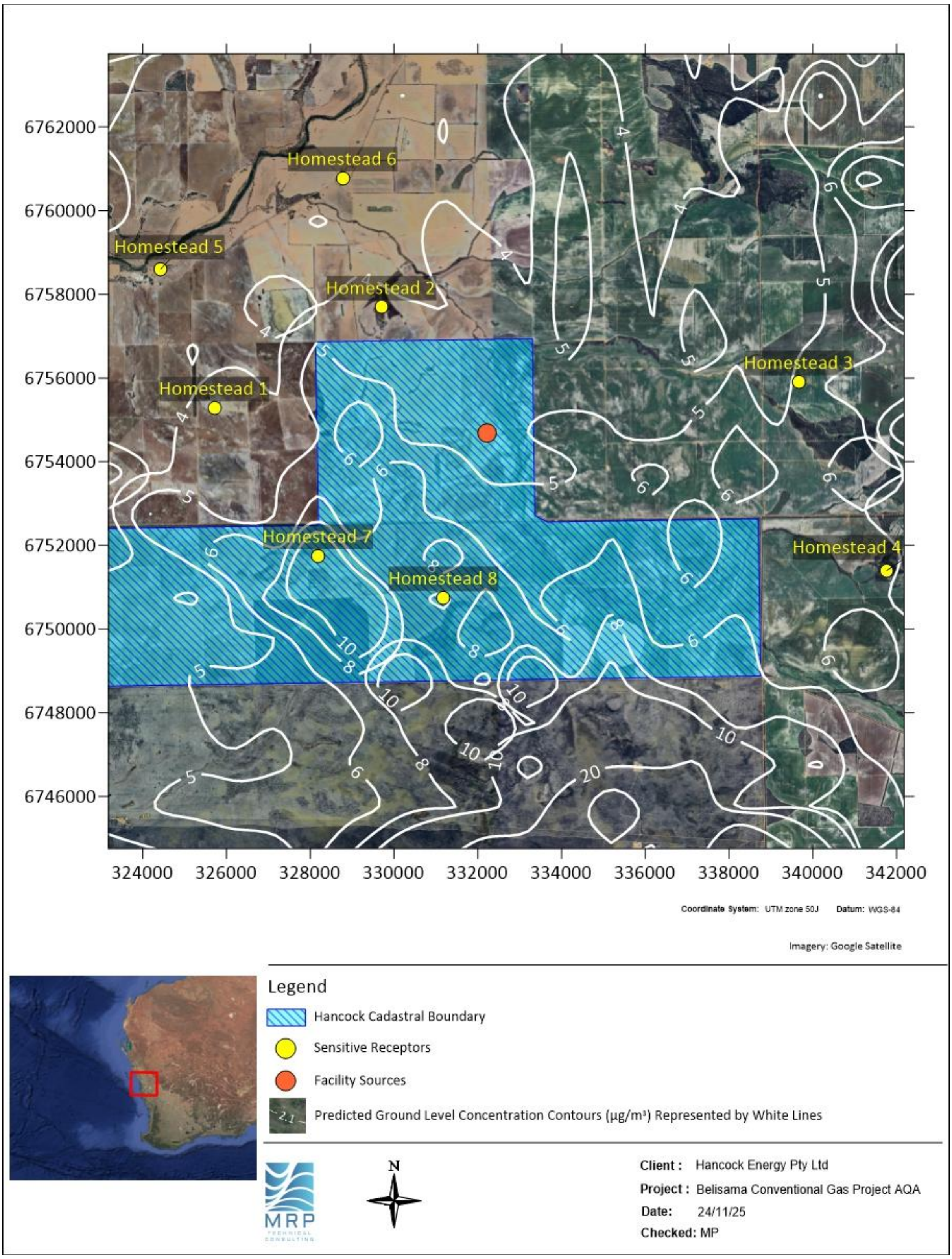

Figure 8-30: Maximum predicted 1-hour average GLCs of H_2S for Scenario 2

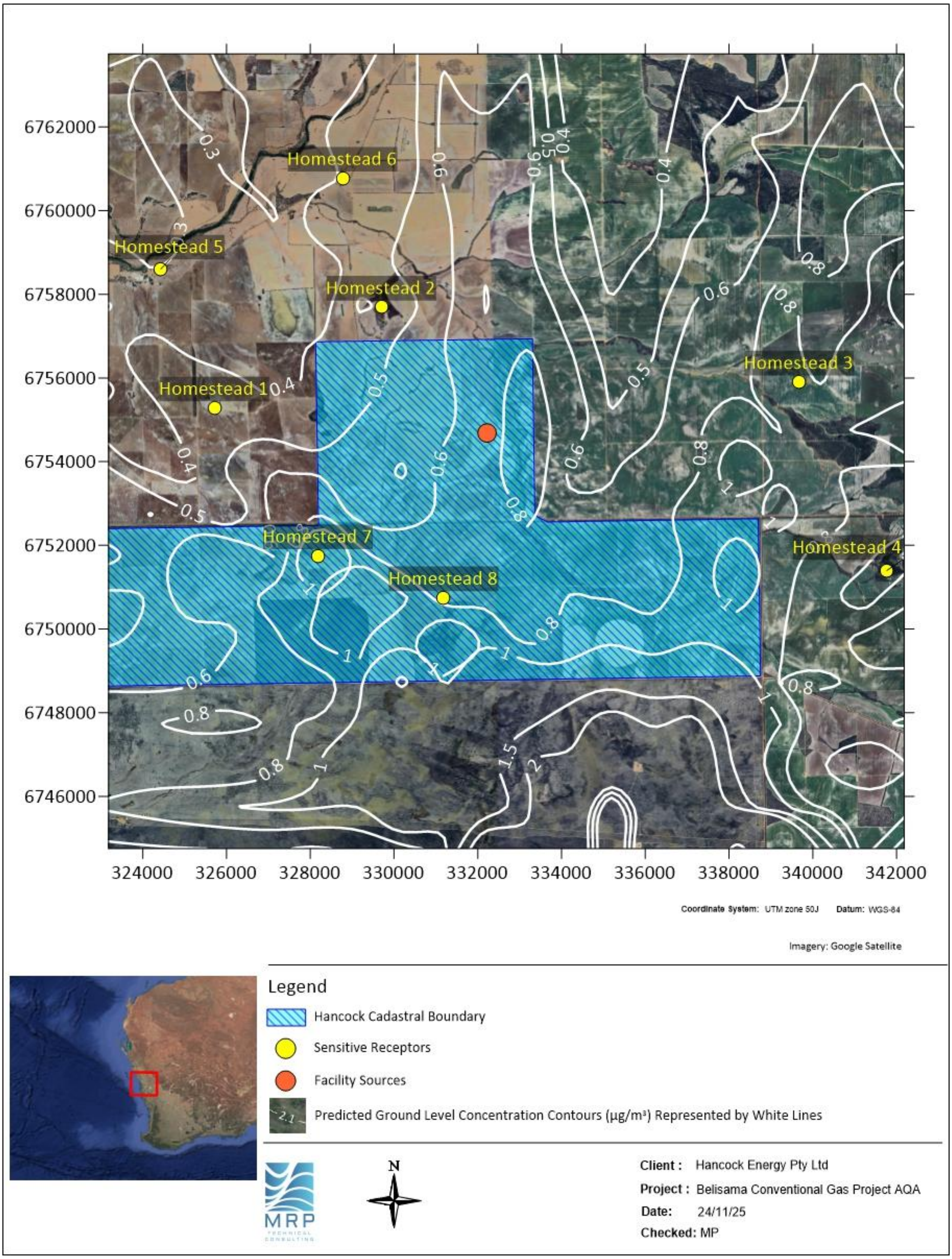

Figure 8-31: Maximum predicted 24-hour average GLCs of H_2S for Scenario 2

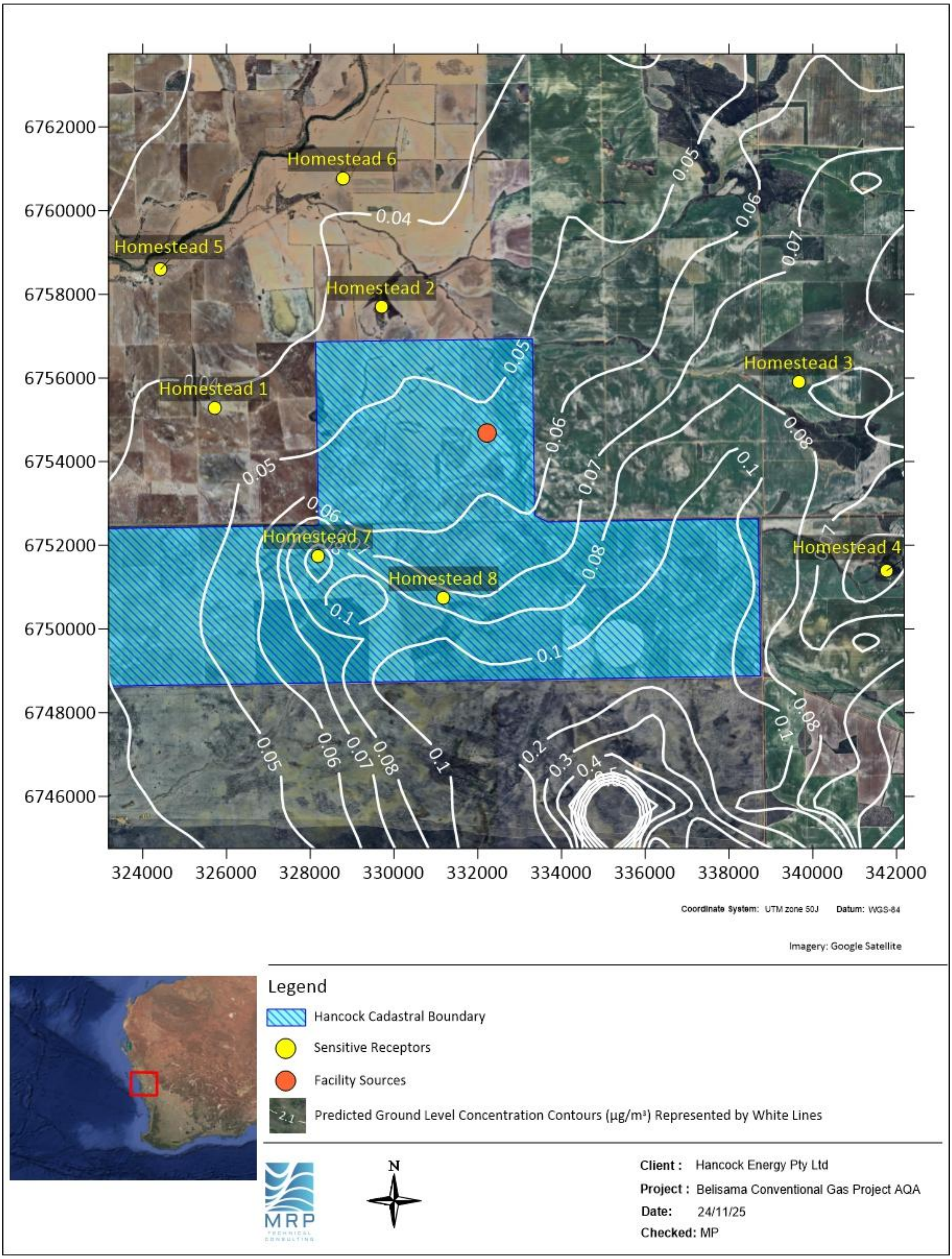

Figure 8-32: Predicted annual average GLCs of H_2S for Scenario 2

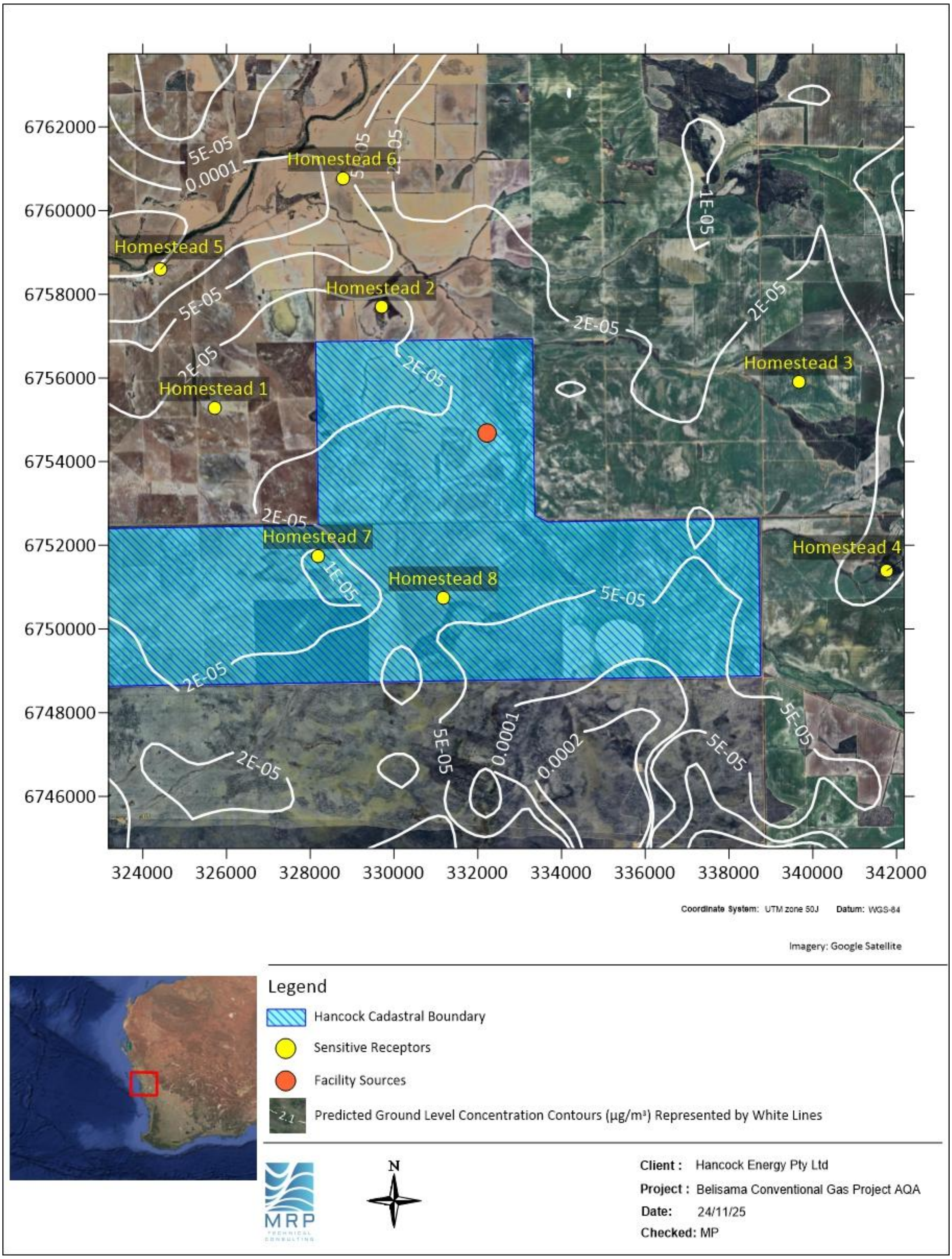

Figure 8-33: 99.9th percentile predicted 1-hour average GLCs of mercury for Scenario 2

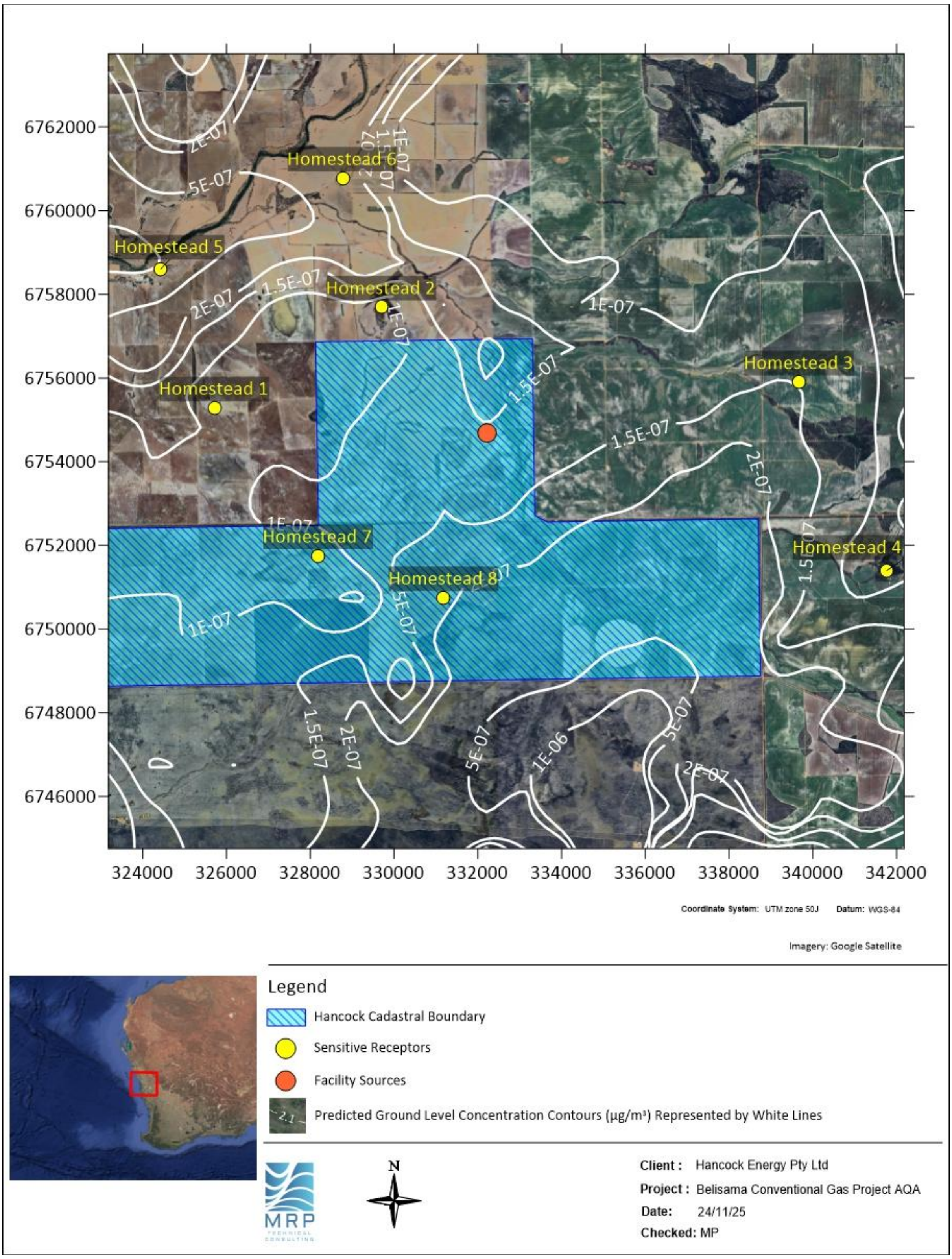

Figure 8-34: Predicted annual average GLCs of mercury for Scenario 2

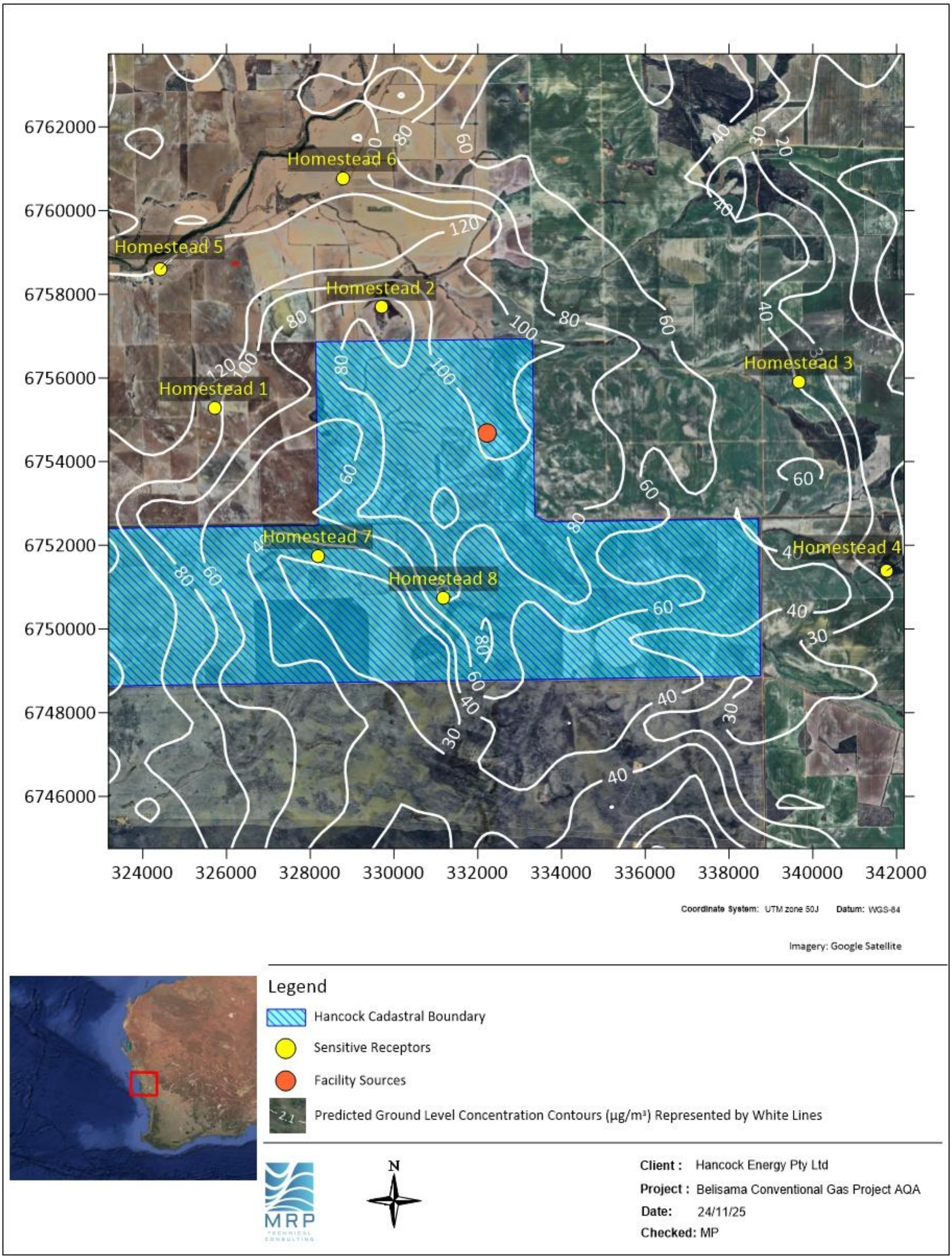

Figure 8-35: Maximum predicted 1-hour average GLCs of NO_2 for Scenario 2

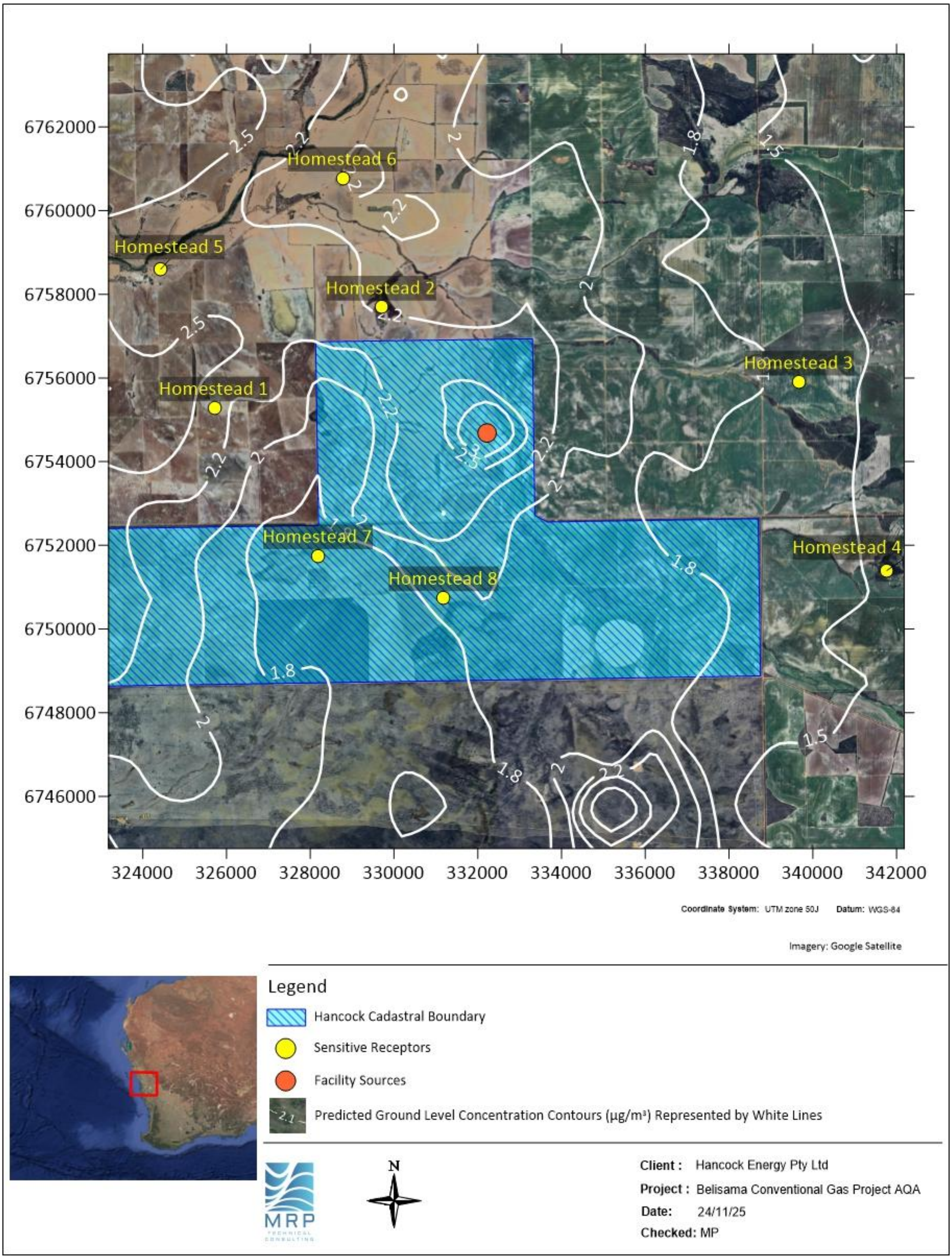

Figure 8-36: Predicted annual average GLCs of NO_2 for Scenario 2

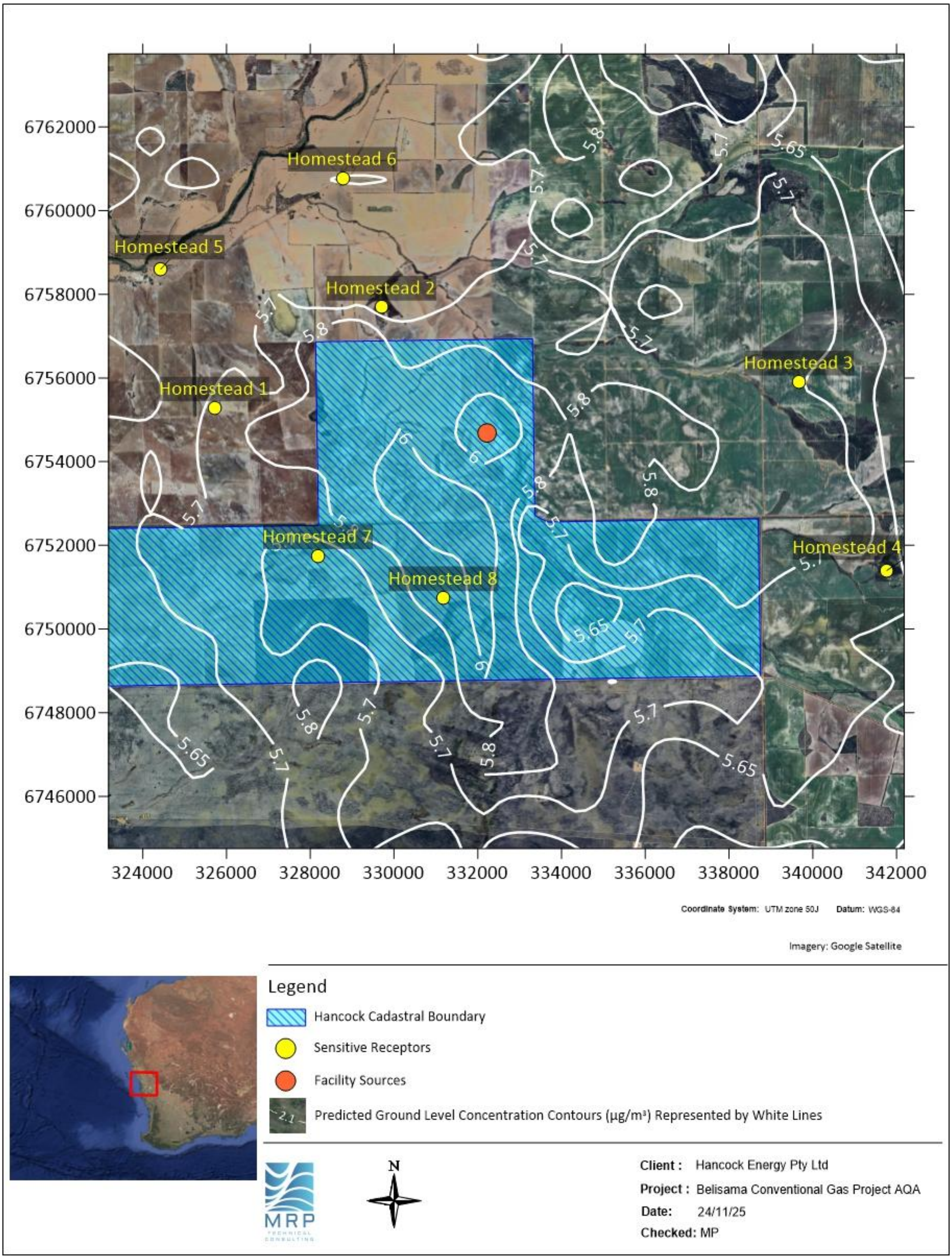

Figure 8-37: Maximum predicted 24-hour average GLCs of $PM_{2.5}$ for Scenario 2

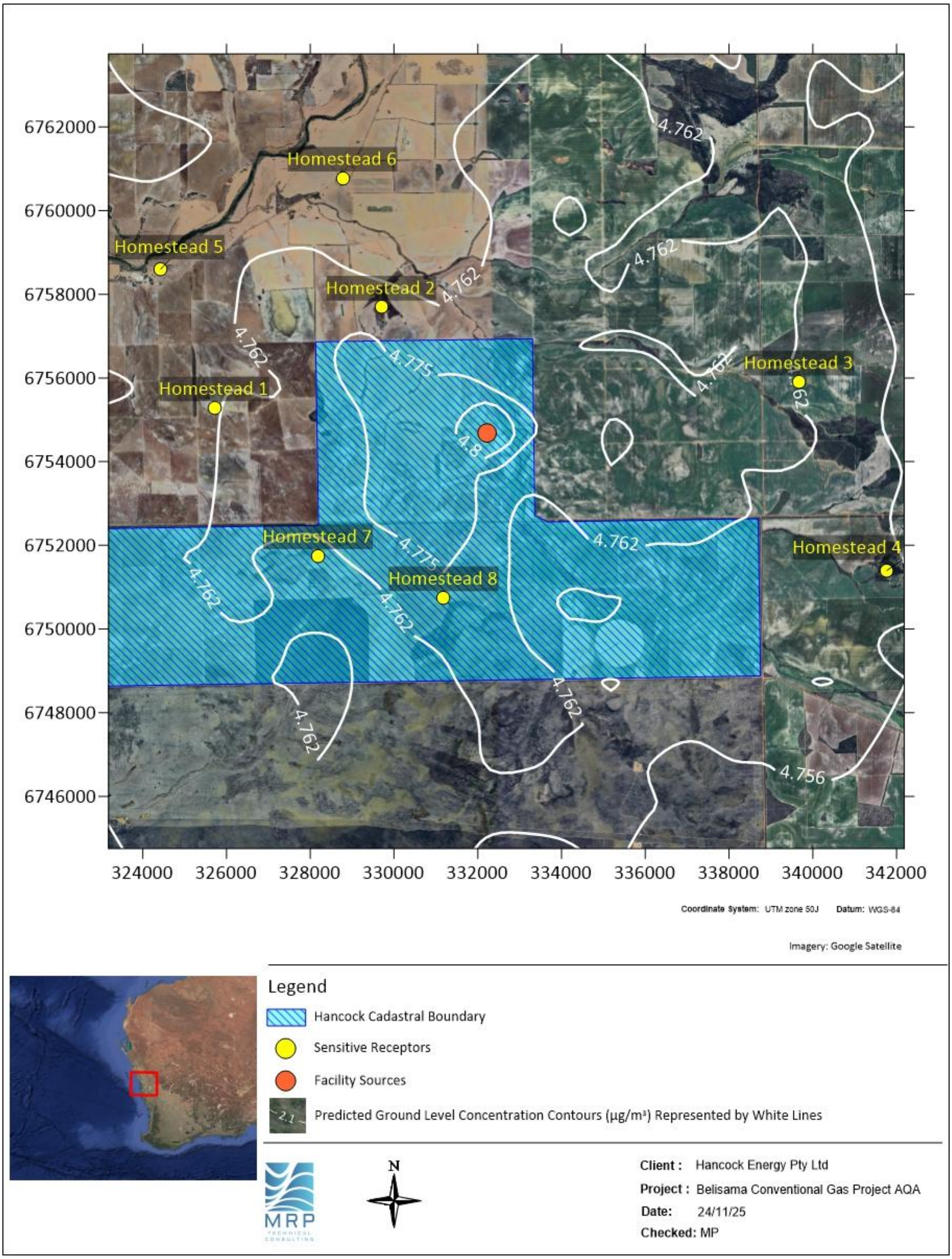

Figure 8-38: Predicted annual average GLCs of $PM_{2.5}$ for Scenario 2

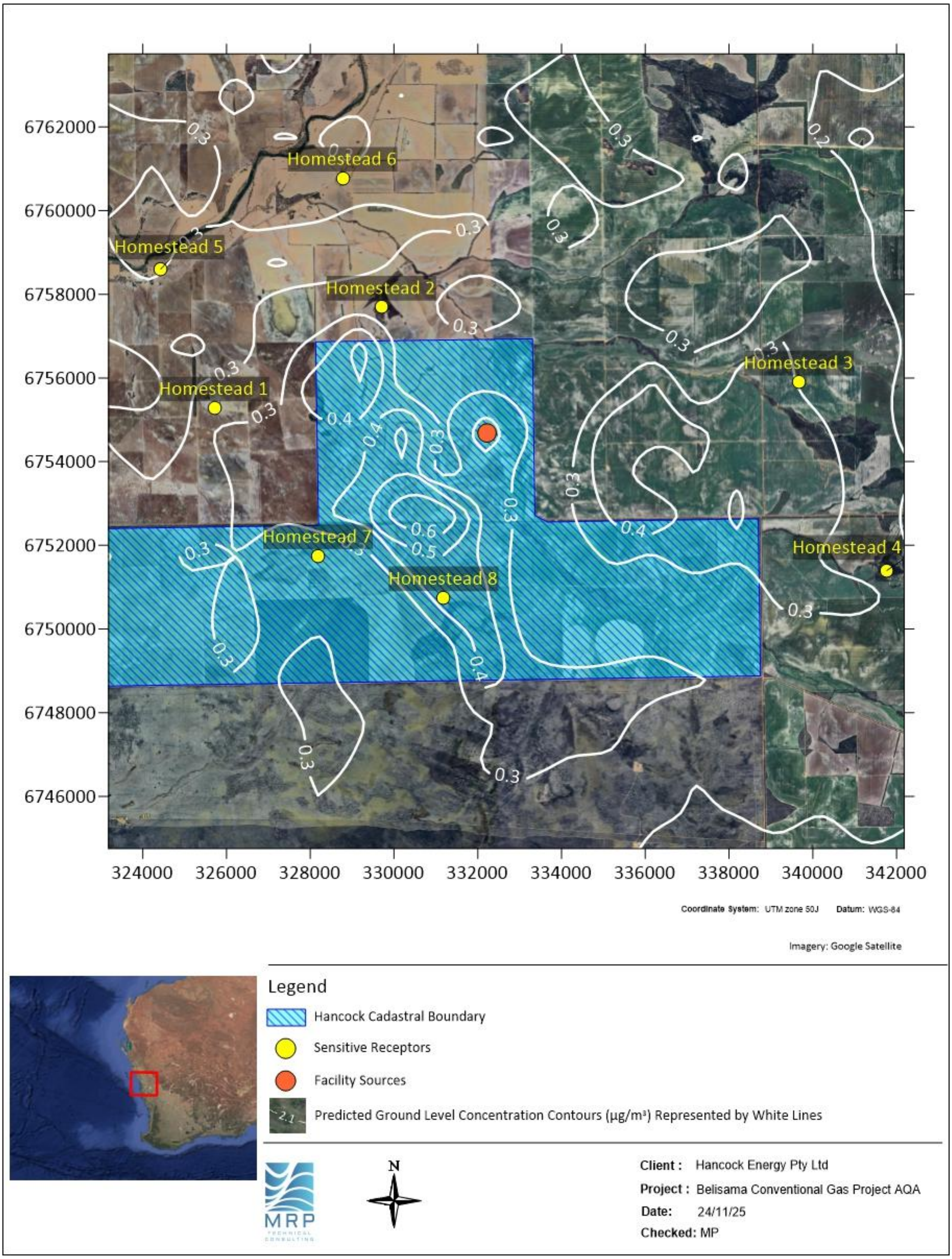

Figure 8-39: Maximum predicted 1-hour average GLCs of SO_2 for Scenario 2

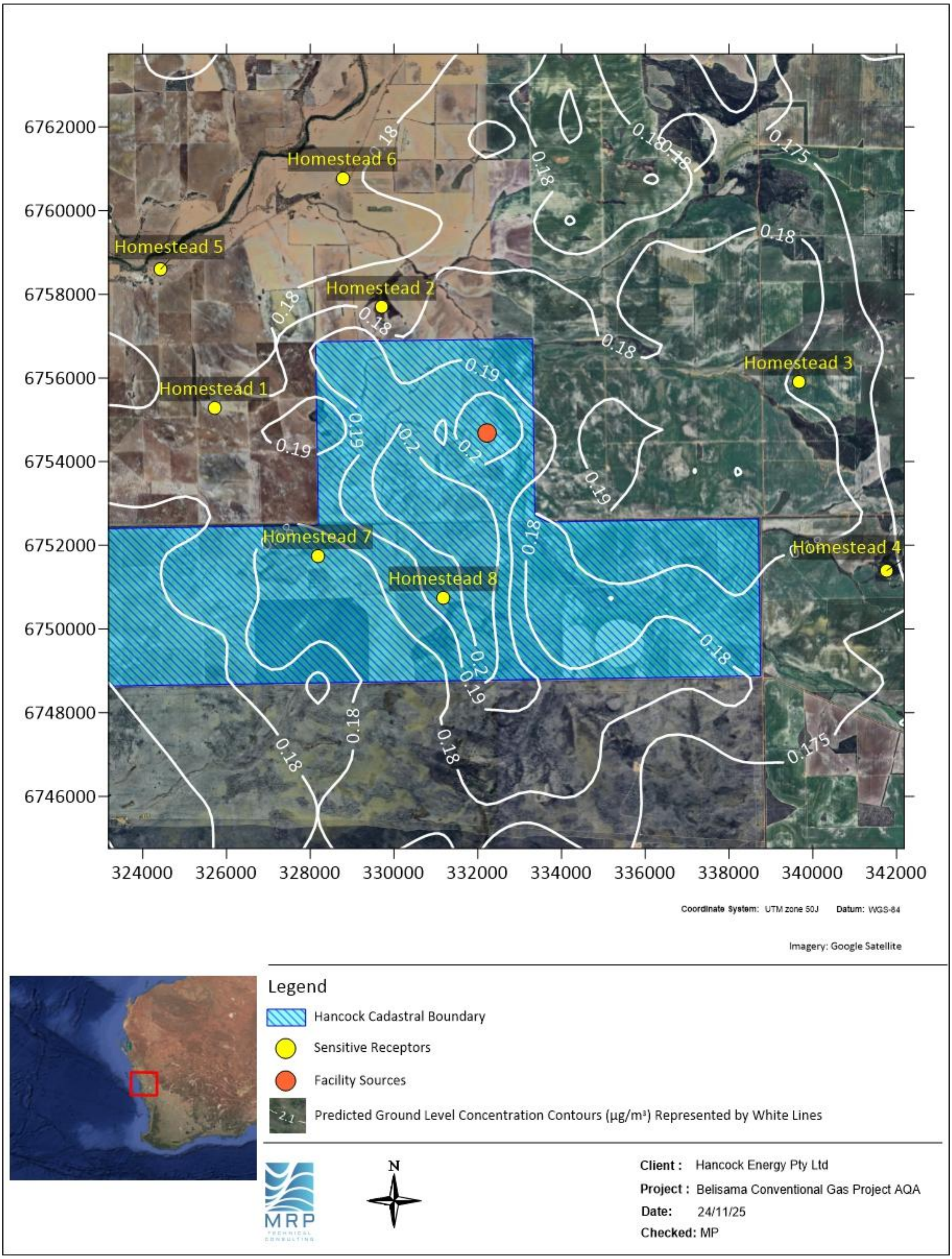

Figure 8-40: Maximum predicted 24-hour average GLCs of SO_2 for Scenario 2

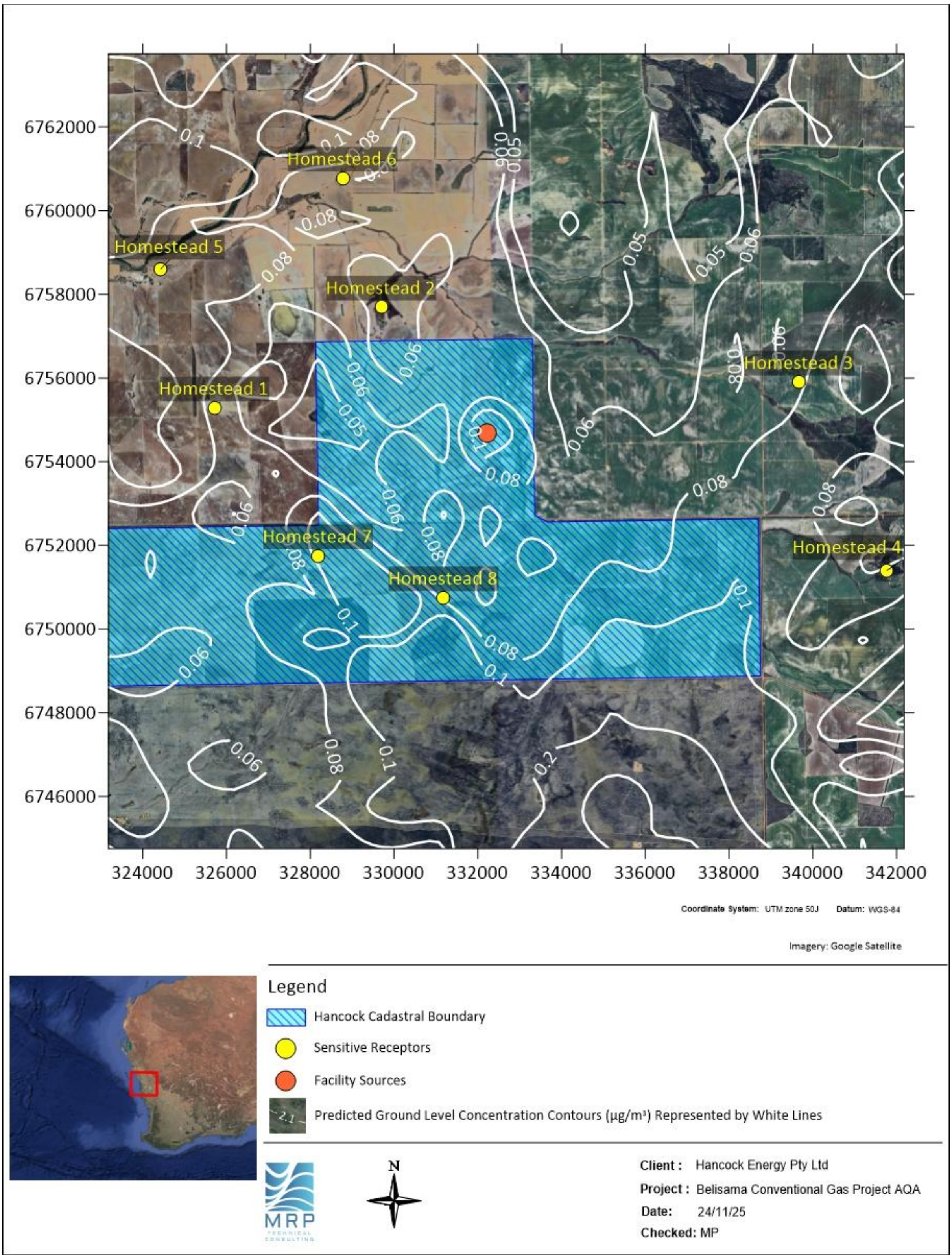

Figure 8-41: Maximum predicted 24-hour average GLCs of toluene for Scenario 2

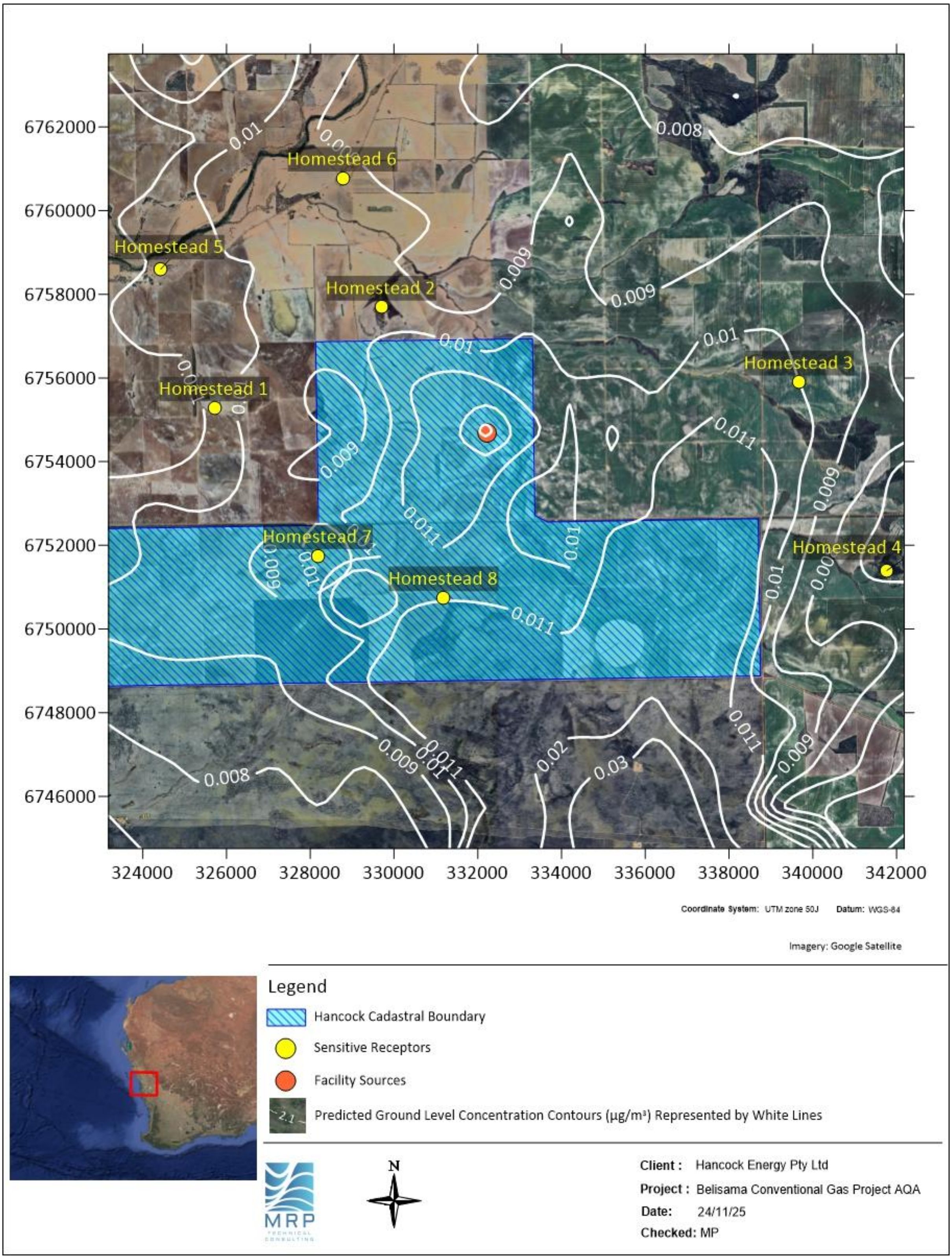

Figure 8-42: Predicted annual average GLCs of toluene for Scenario 2

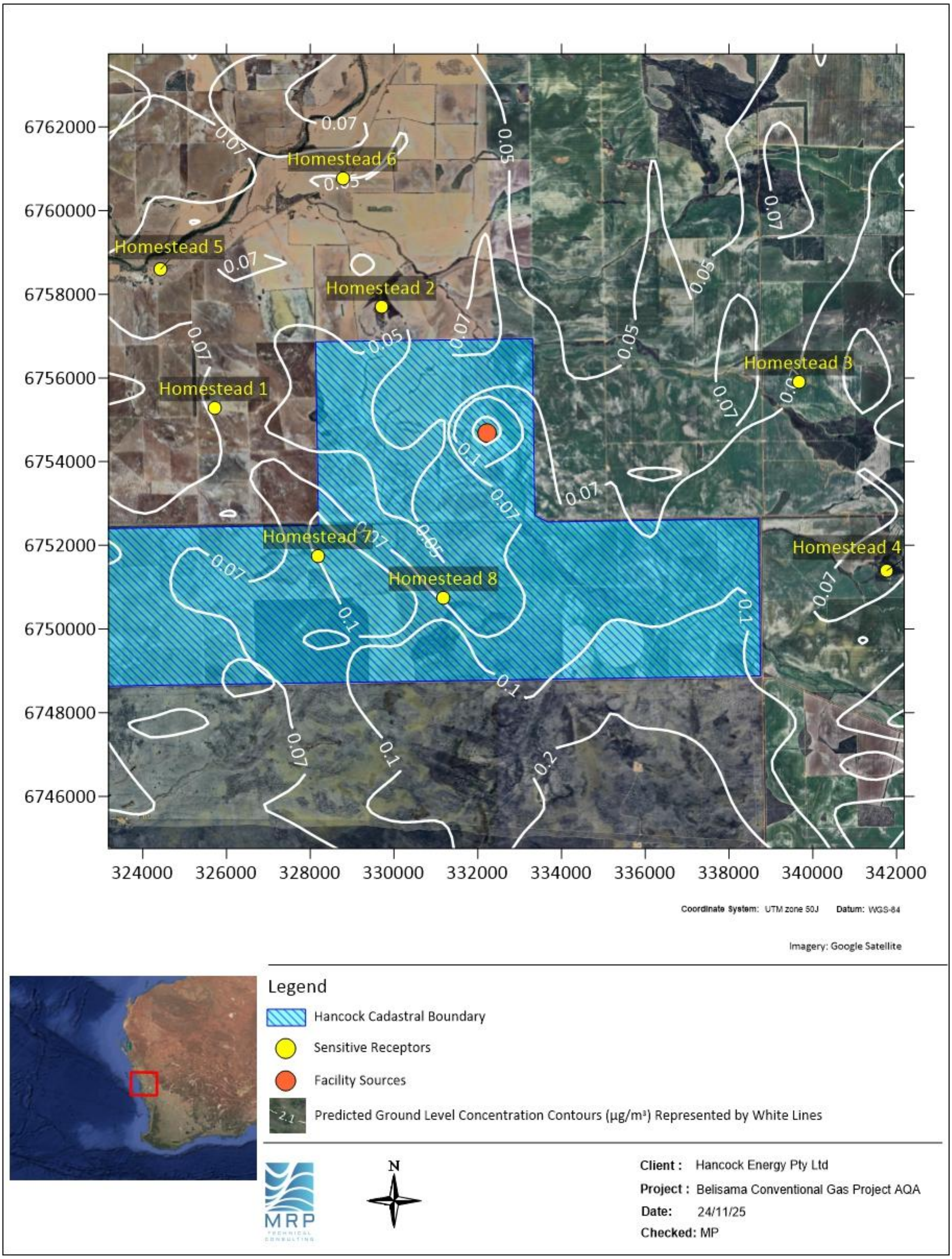

Figure 8-43: Maximum predicted 24-hour average GLCs of xylene for Scenario 2

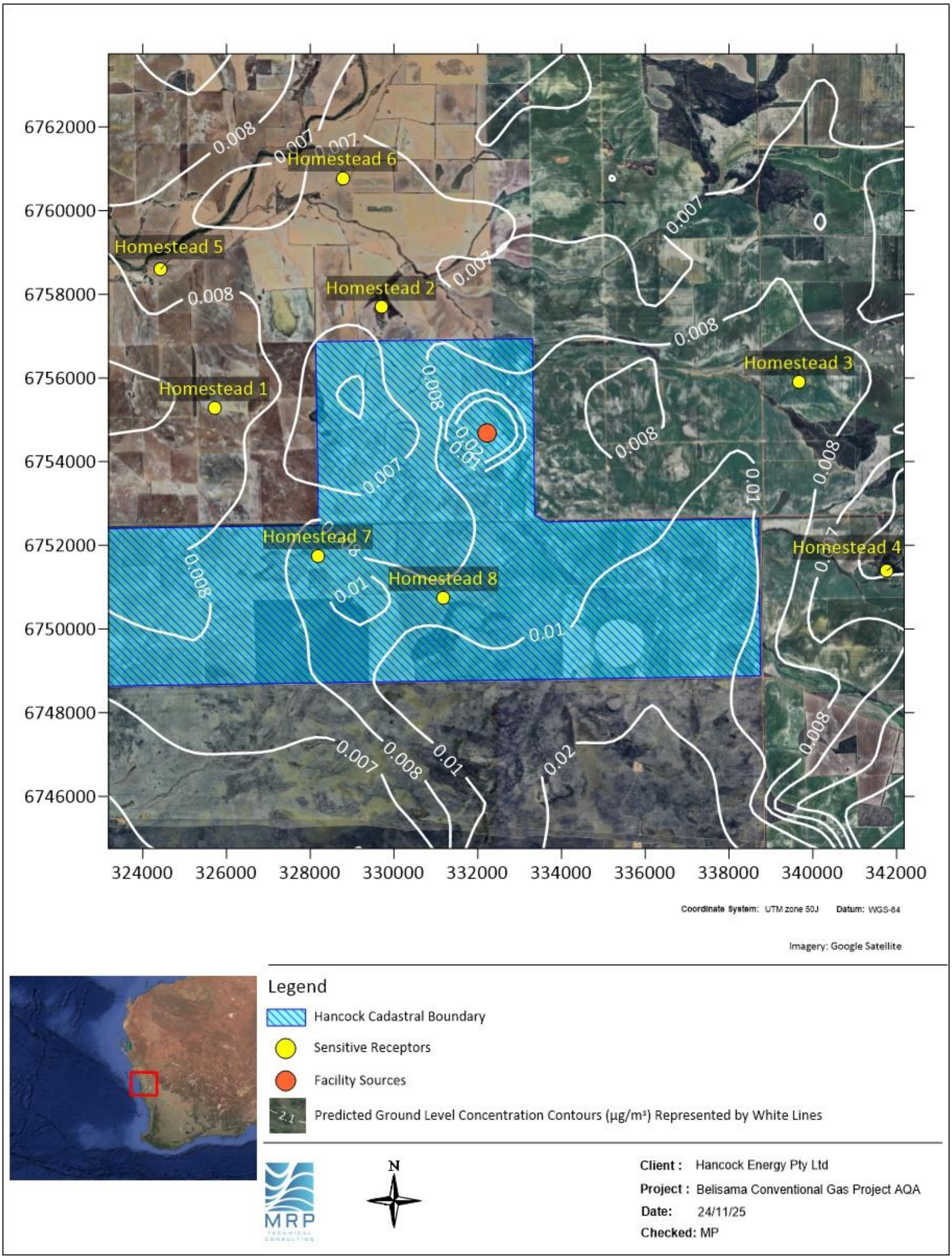

Figure 8-44: Predicted annual average GLCs of xylene for Scenario 2

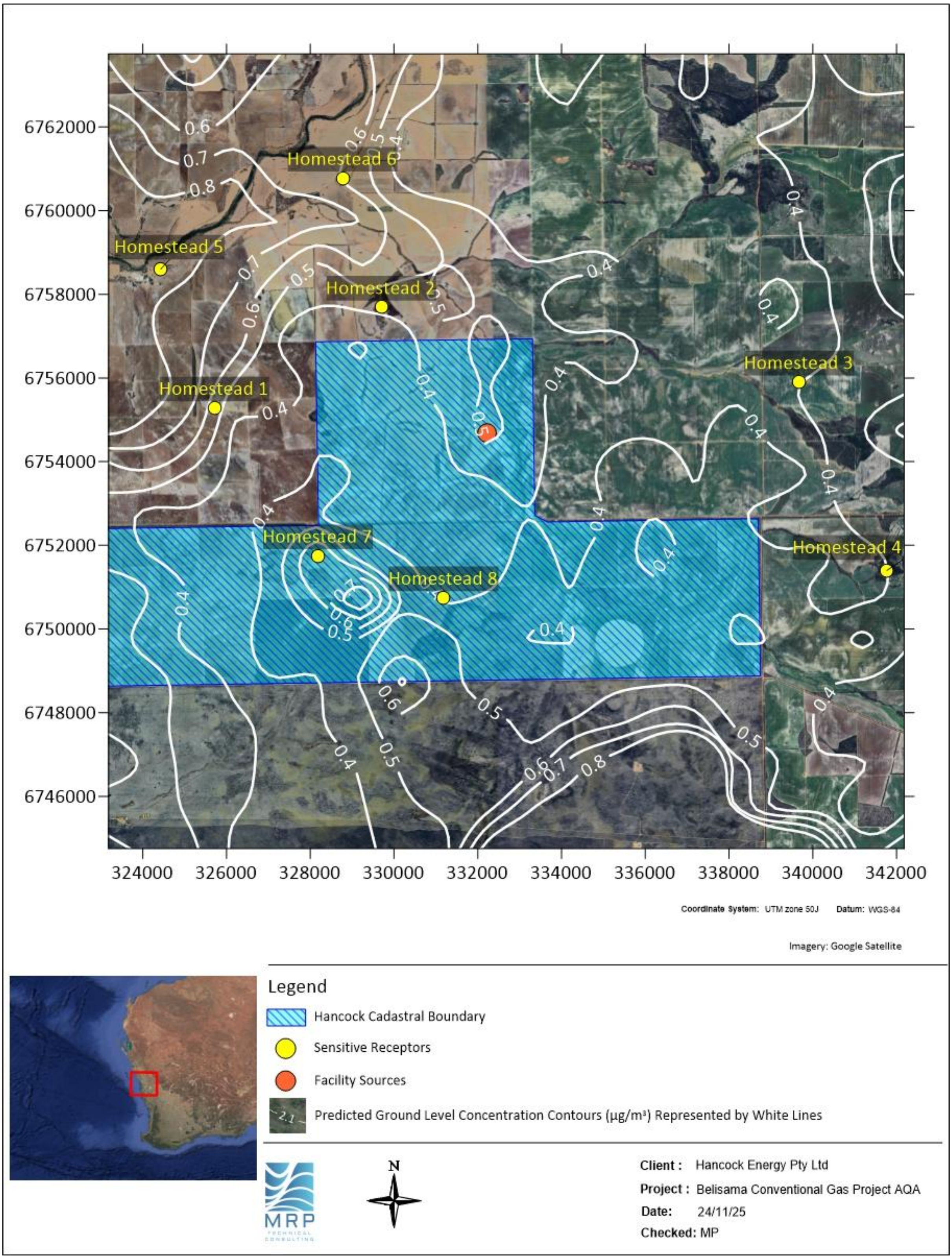

Figure 8-45: 99.9th percentile predicted 1-hour average GLCs of benzene for Scenario 3

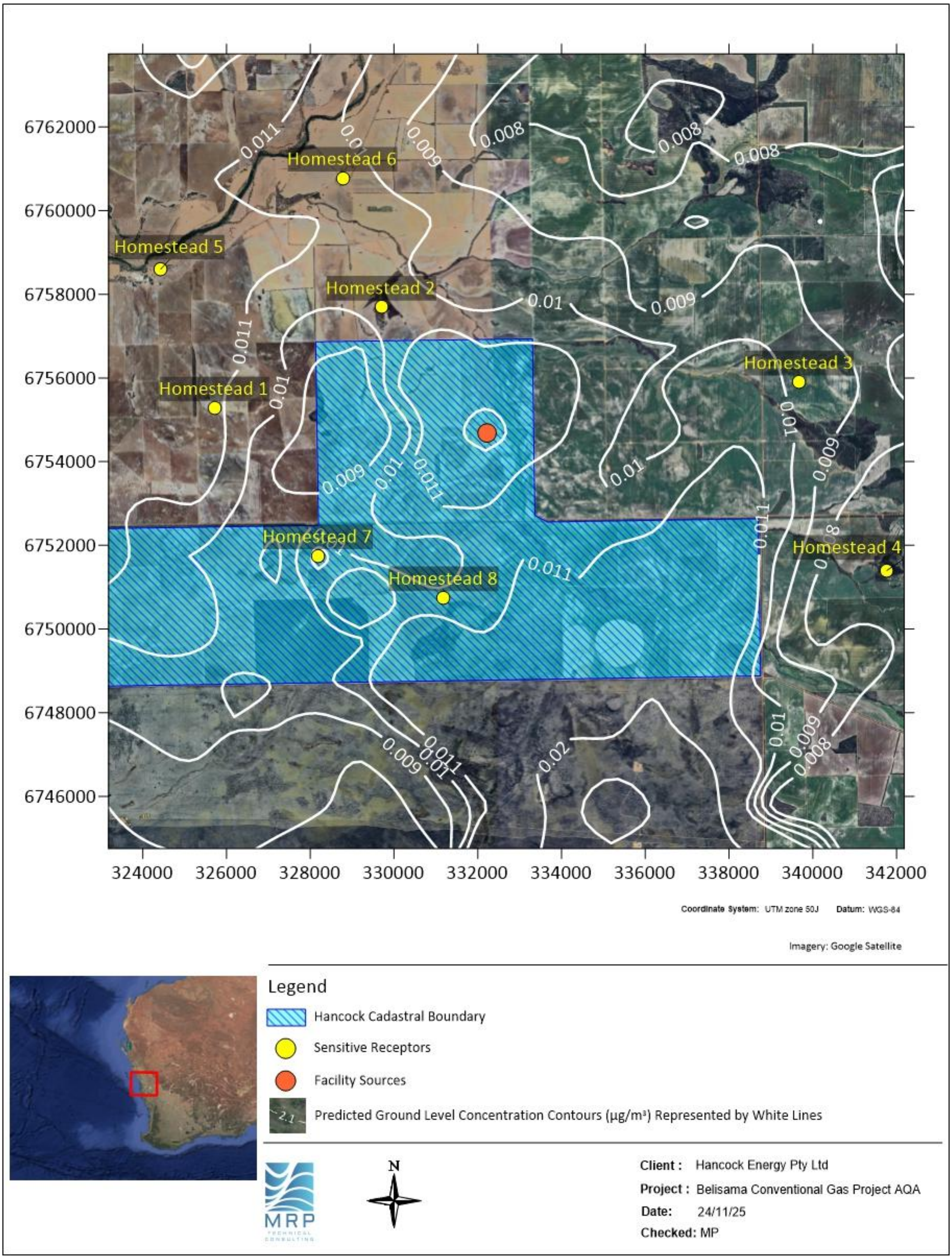

Figure 8-46: Predicted annual average GLCs of benzene for Scenario 3

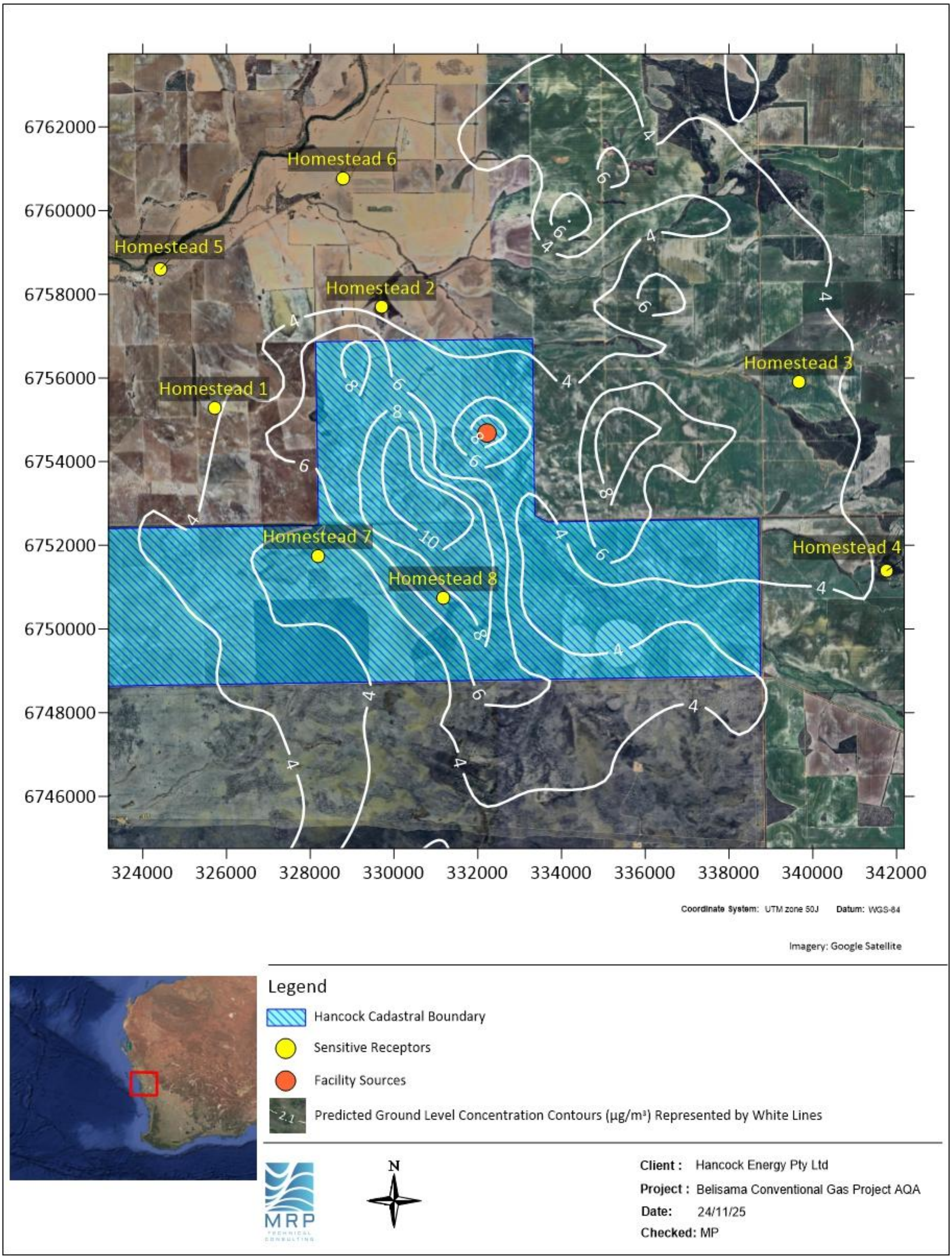

Figure 8-47: 99.9th percentile predicted 1-hour average GLCs of formaldehyde for Scenario 3

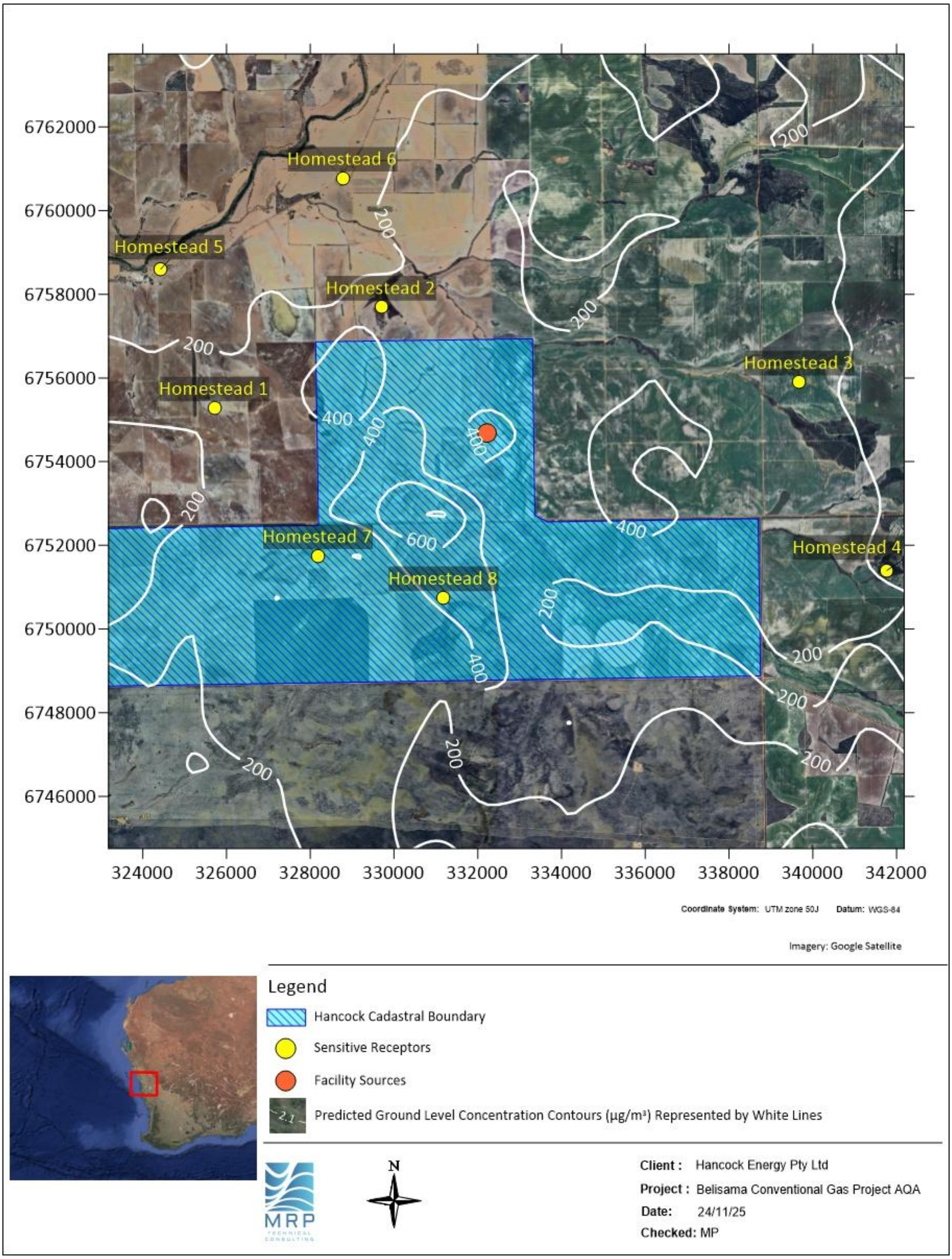

Figure 8-48: Maximum predicted 1-hour average GLCs of CO for Scenario 3

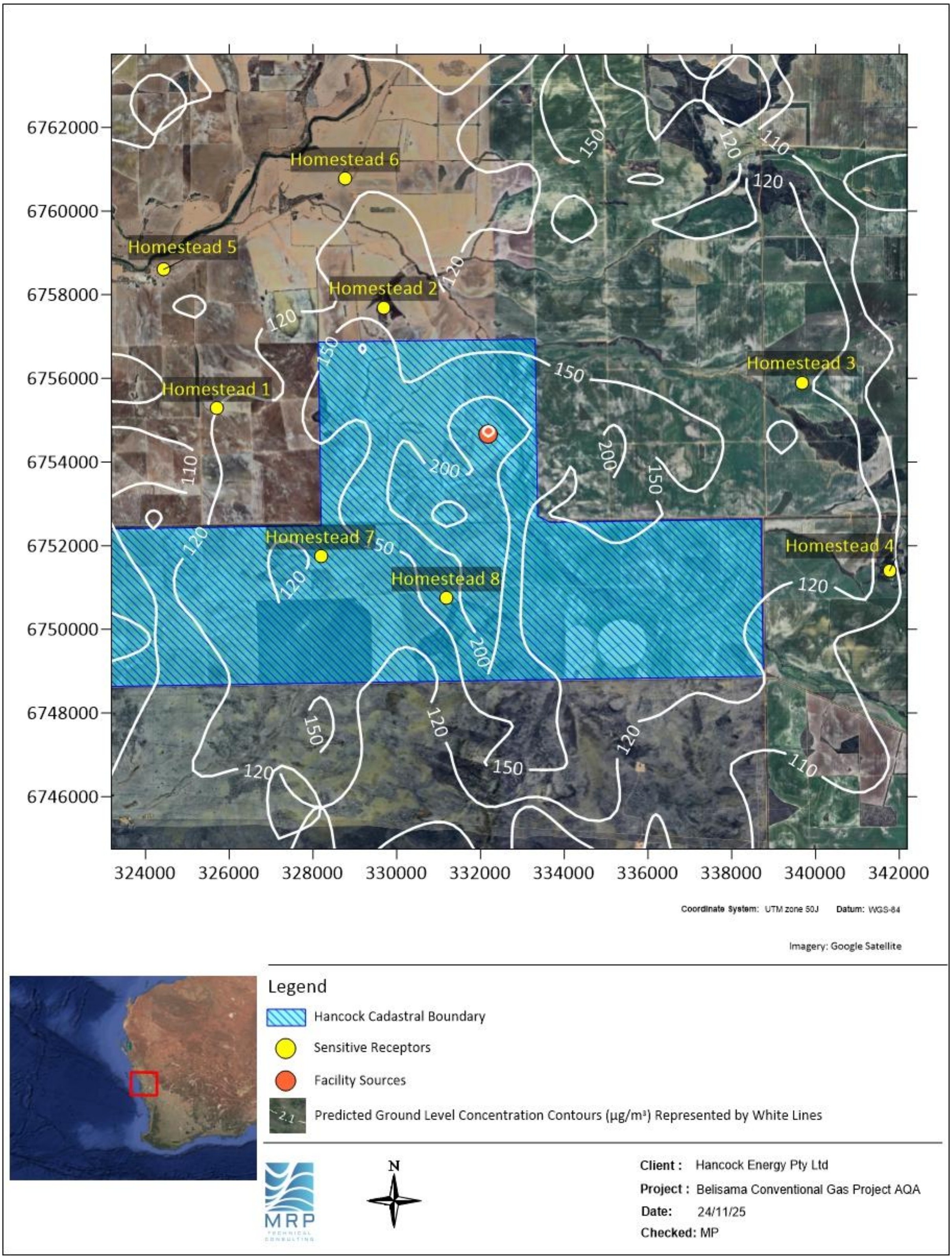

Figure 8-49: Maximum predicted 8-hour average GLCs of CO for Scenario 3

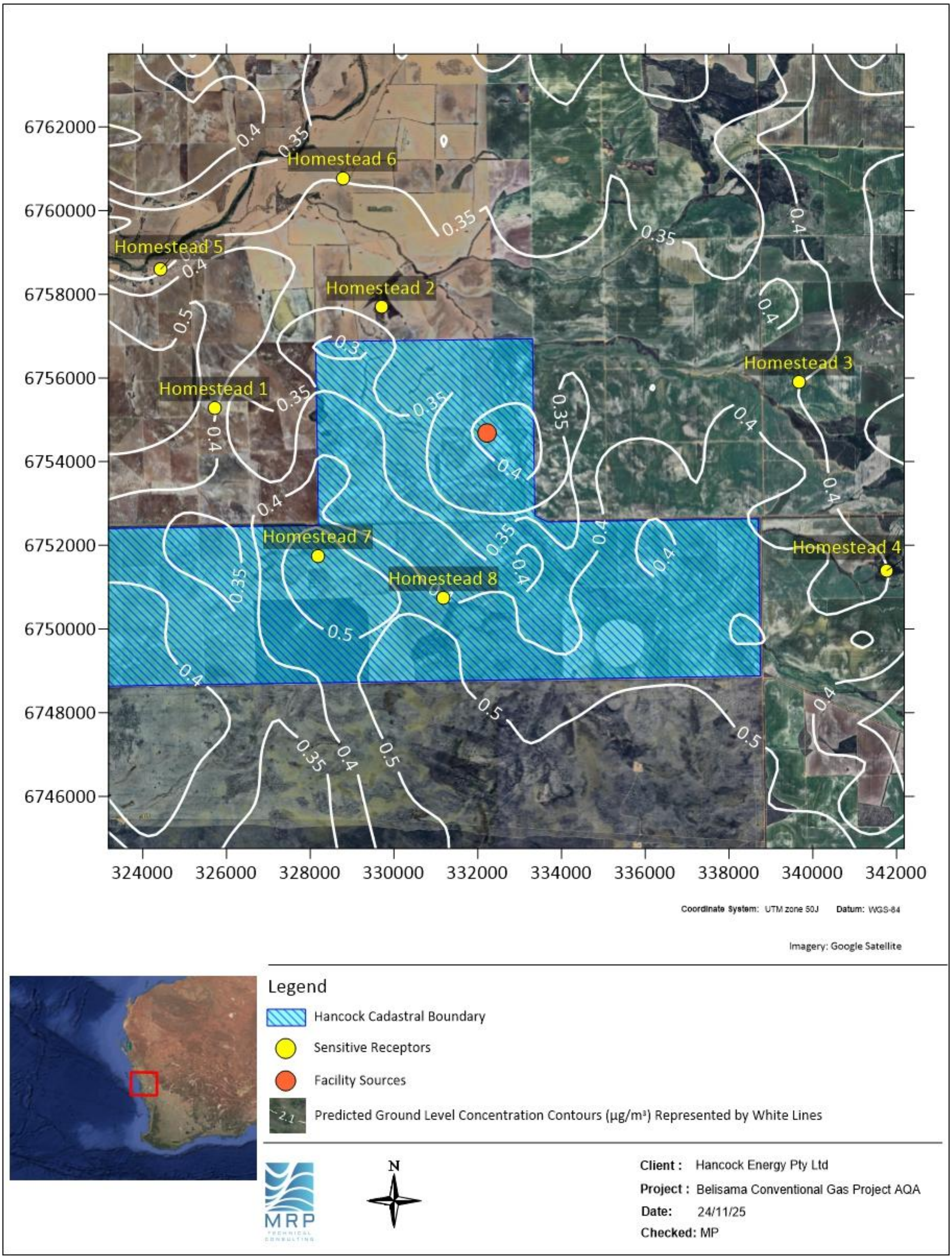

Figure 8-50: 99.9th percentile predicted 1-hour average GLCs of ethylbenzene for Scenario 3

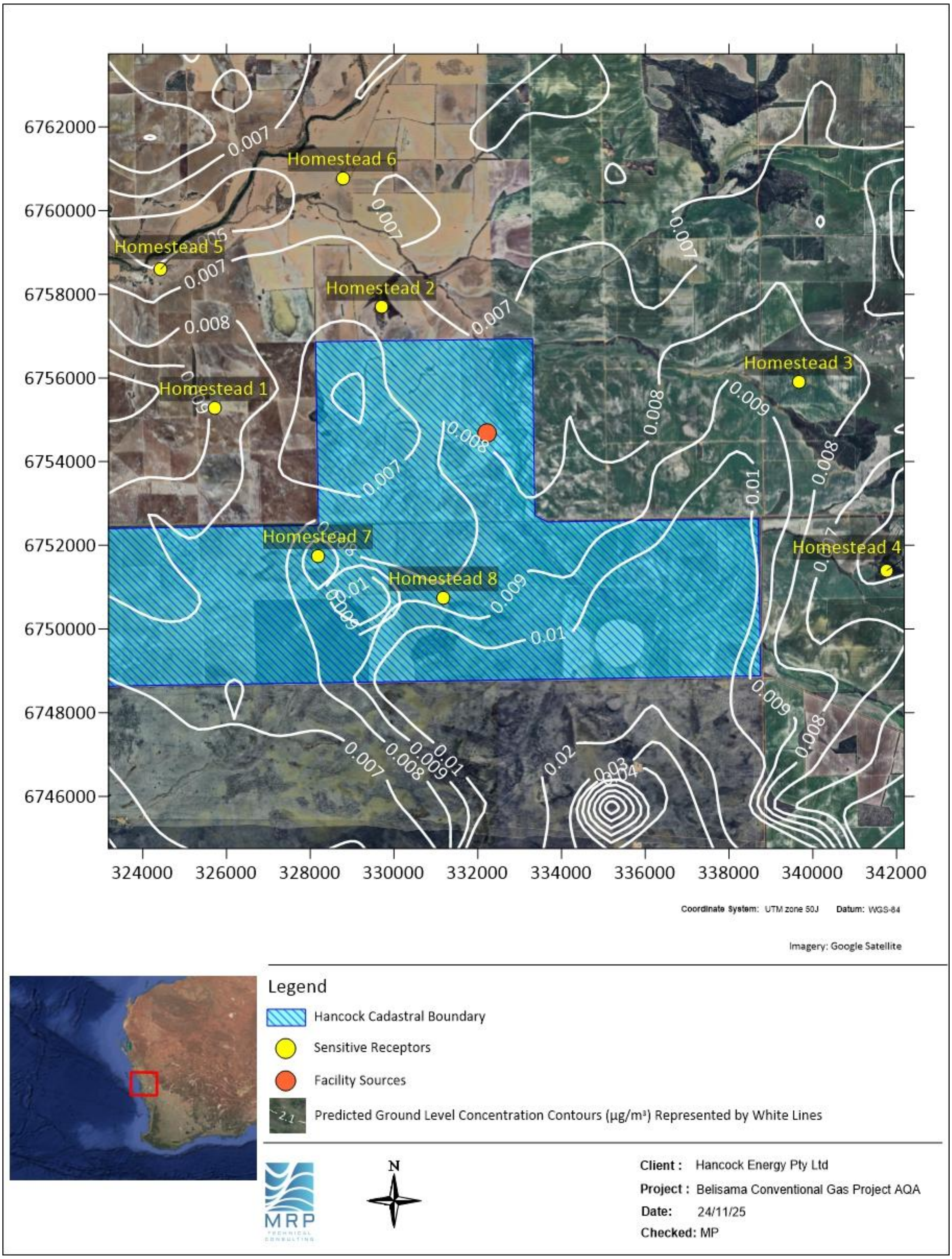

Figure 8-51: Predicted annual average GLCs of ethylbenzene for Scenario 3

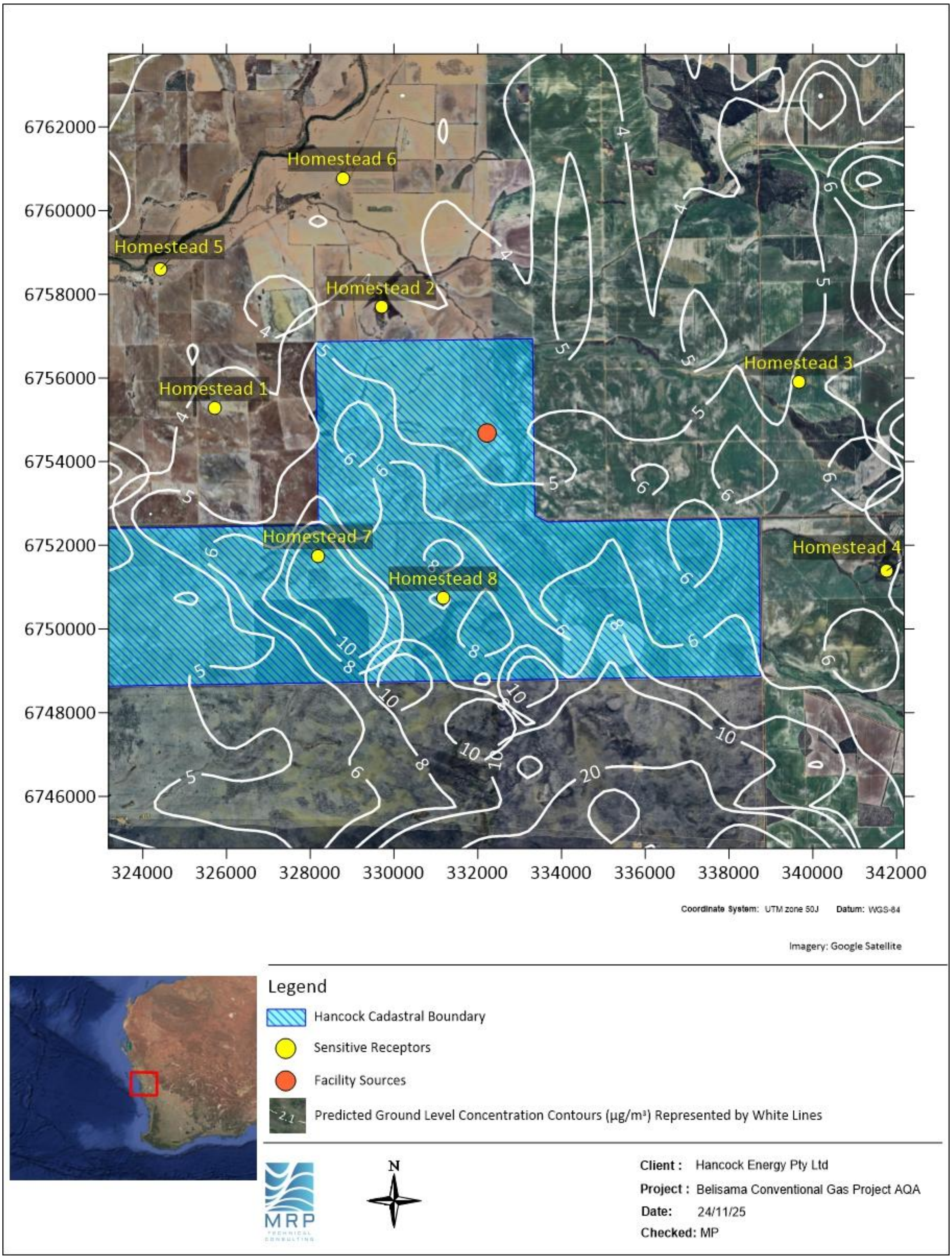

Figure 8-52: Maximum predicted 1-hour average GLCs of H_2S for Scenario 3

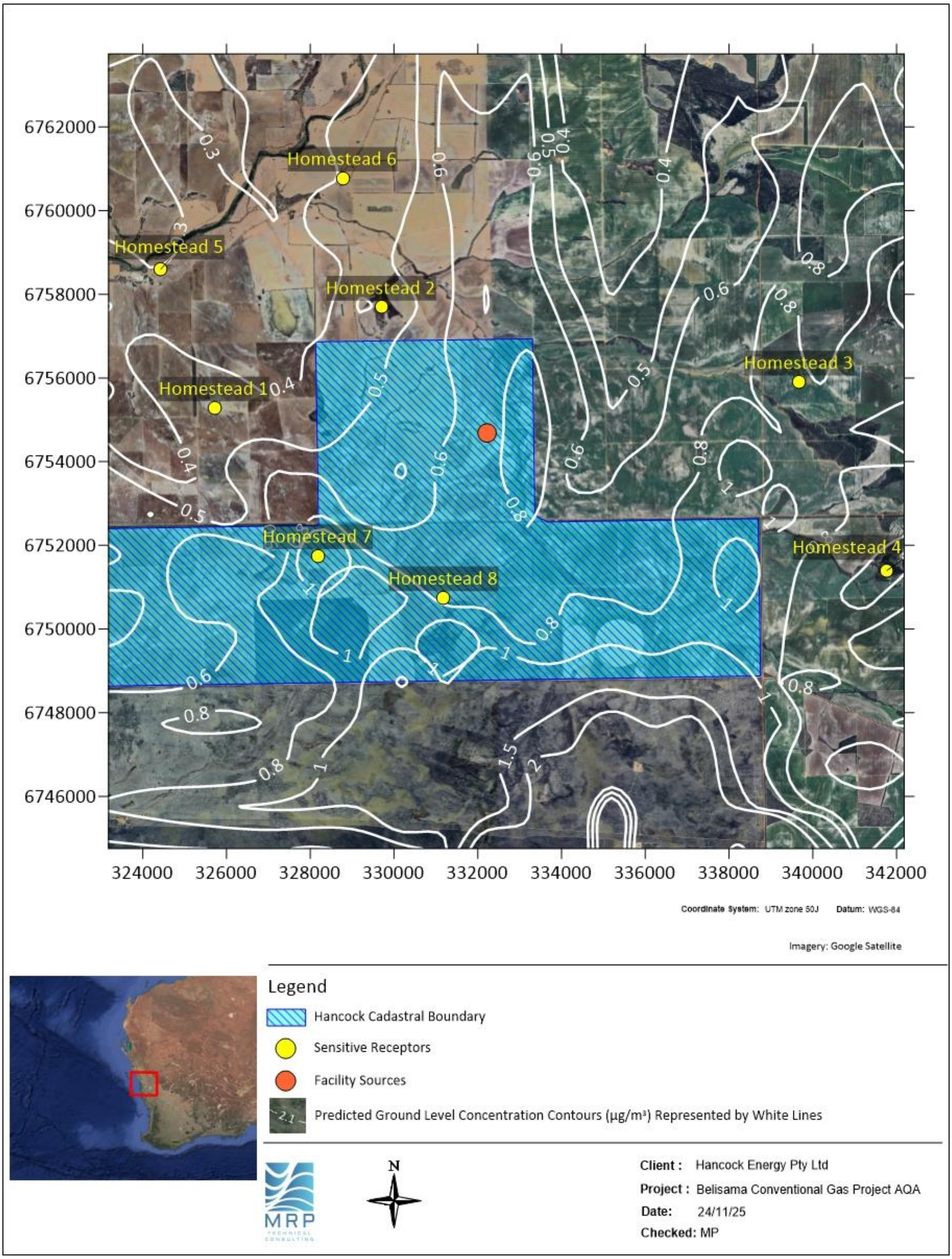

Figure 8-53: Maximum predicted 24-hour average GLCs of H_2S for Scenario 3

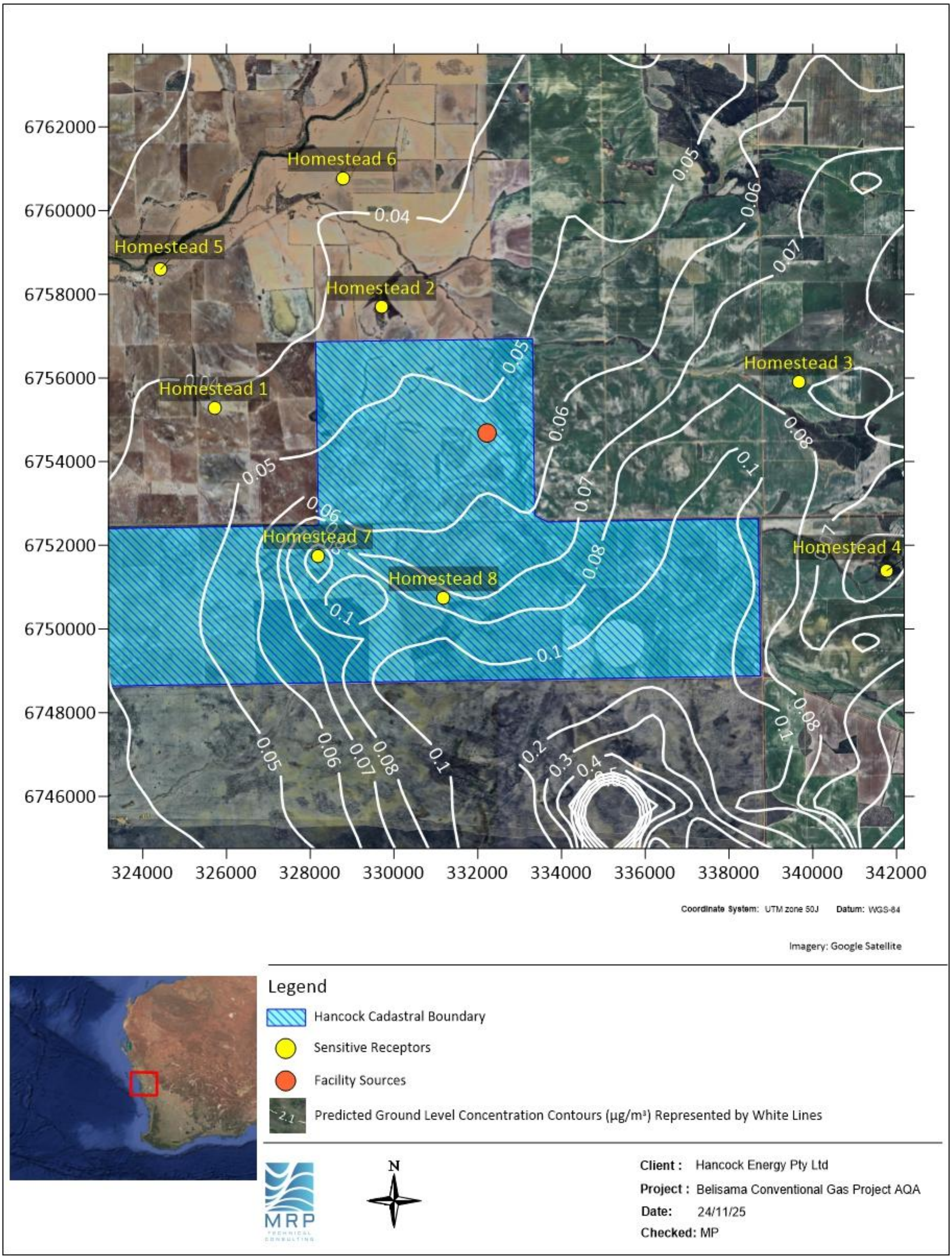

Figure 8-54: Predicted annual average GLCs of H_2S for Scenario 3

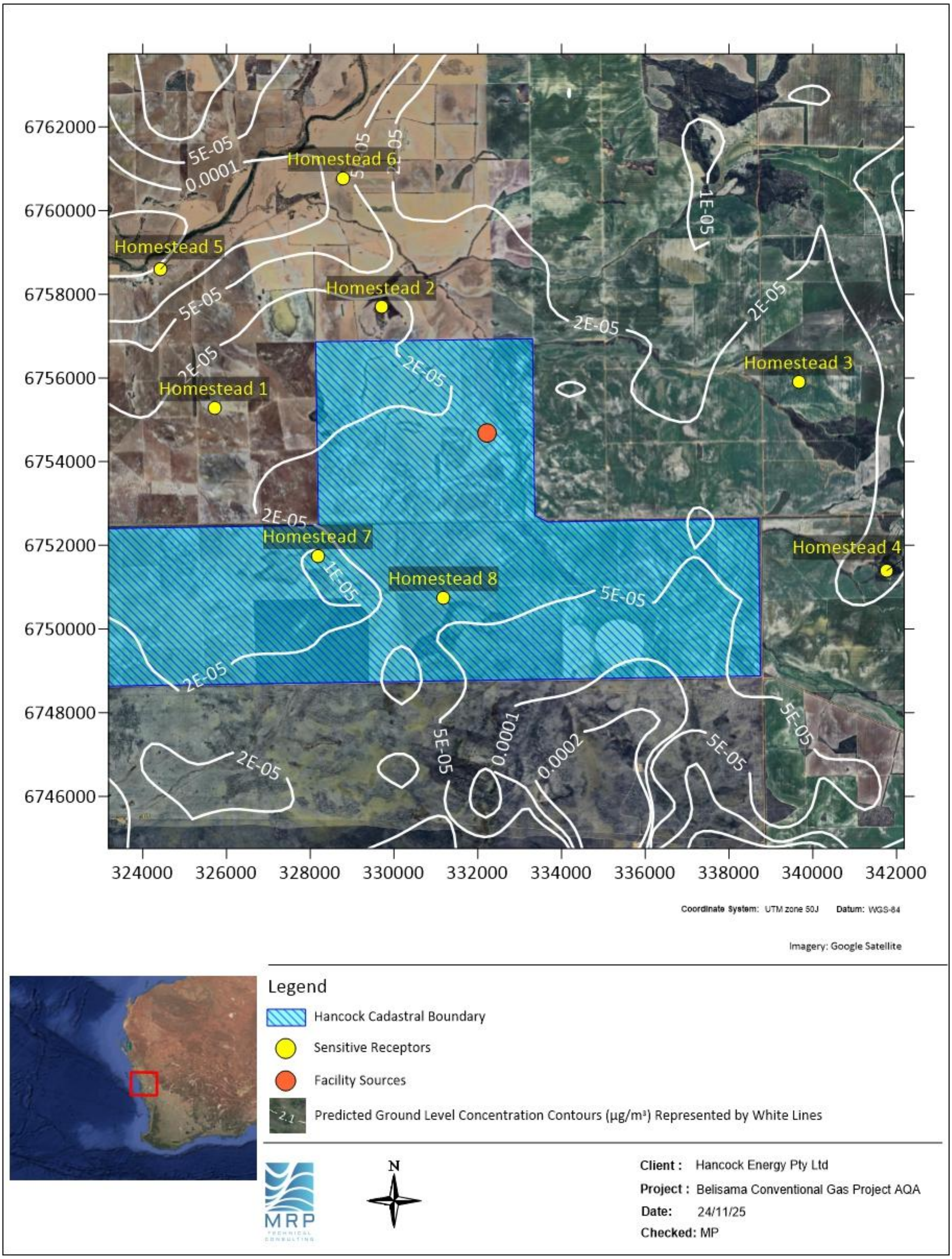

Figure 8-55: 99.9th percentile predicted 1-hour average GLCs of mercury for Scenario 3

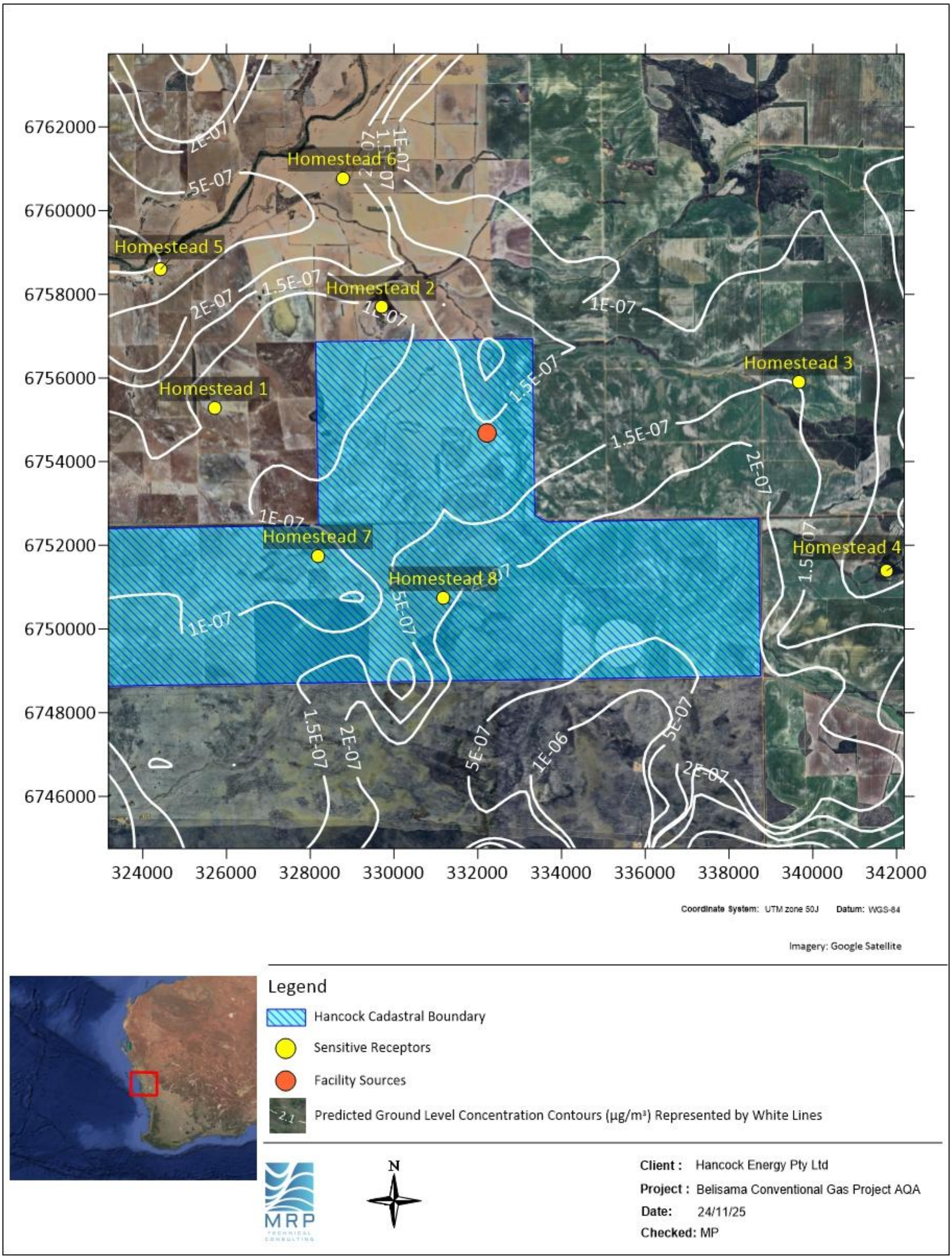

Figure 8-56: Predicted annual average GLCs of mercury for Scenario 3

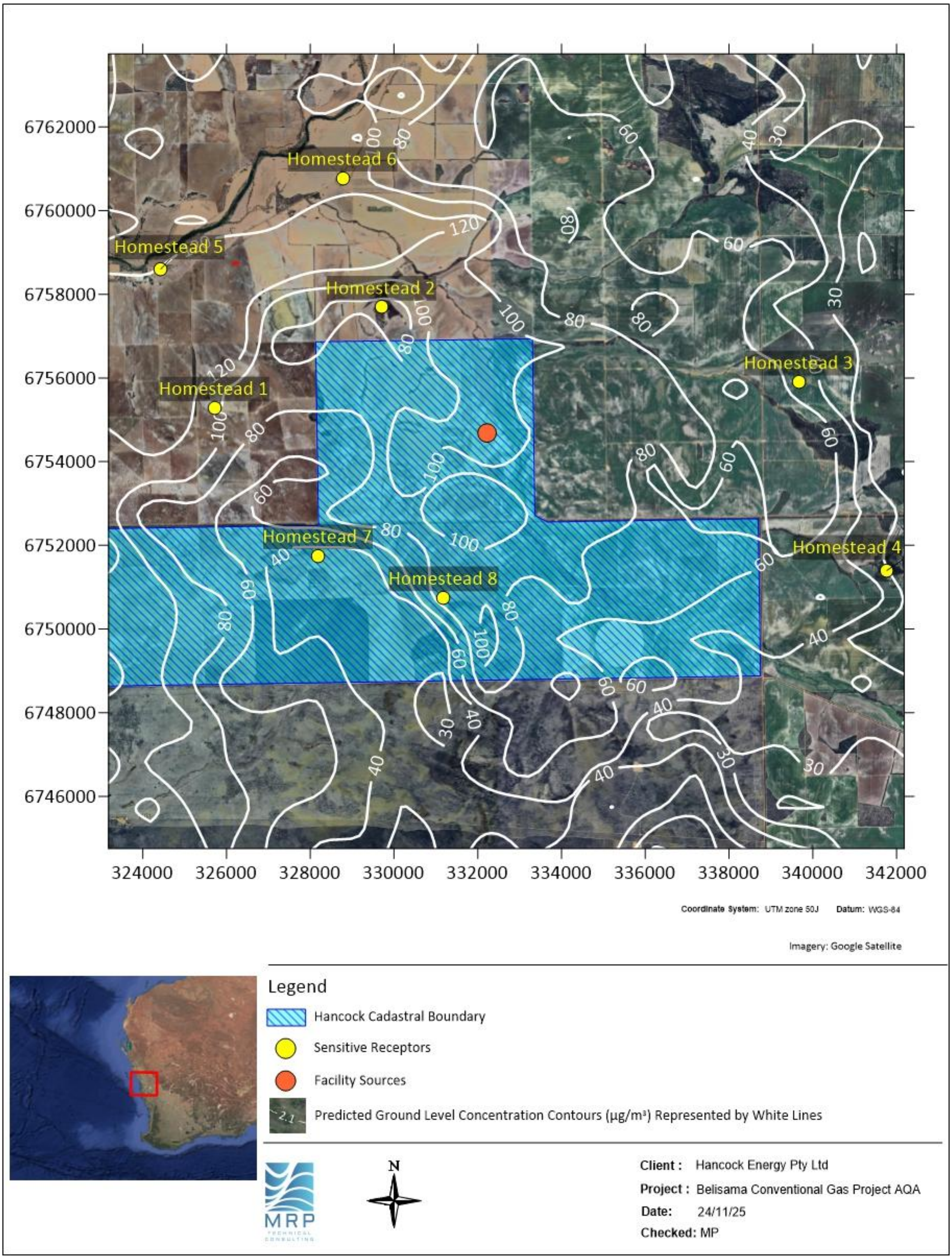

Figure 8-57: Maximum predicted 1-hour average GLCs of NO_2 for Scenario 3

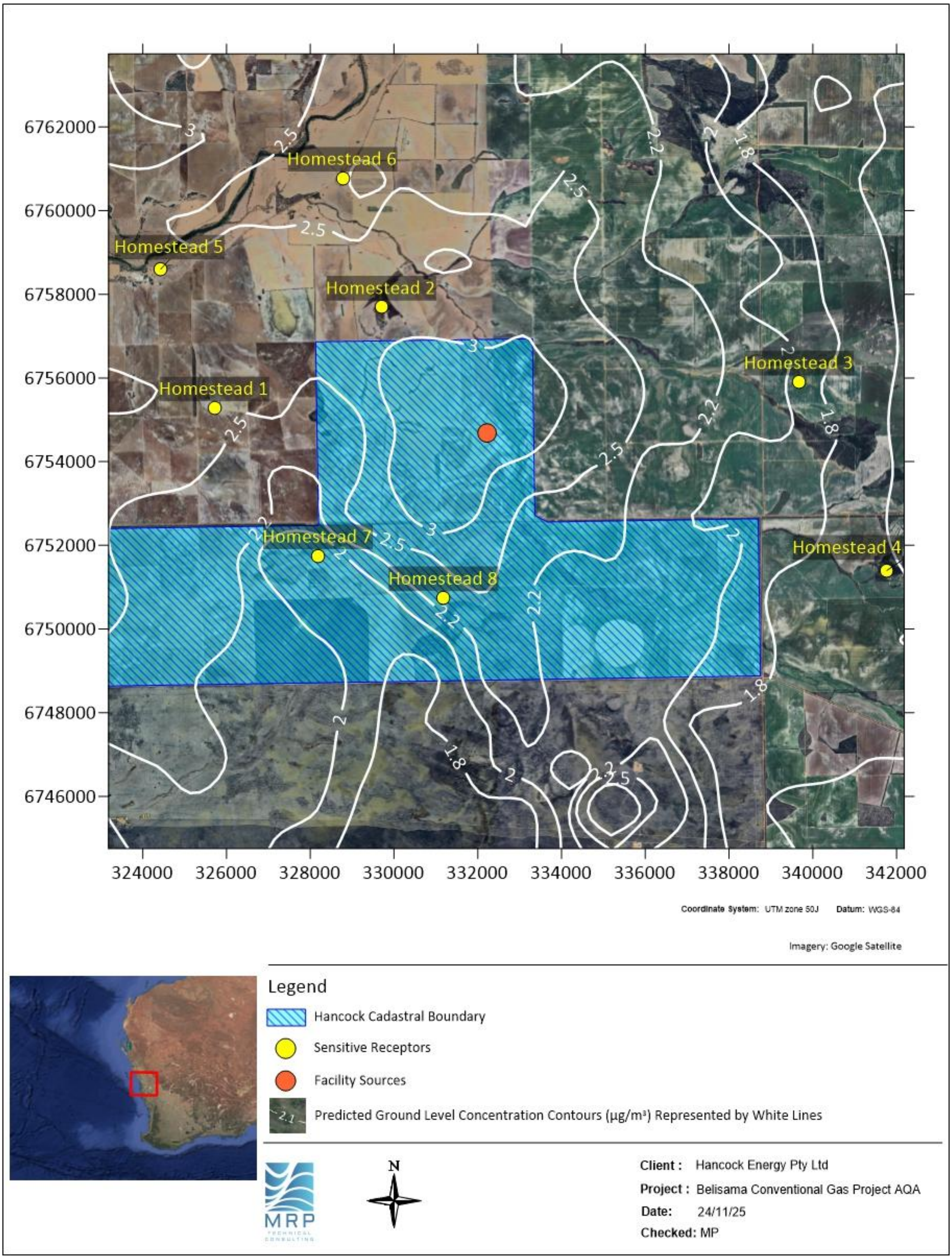

Figure 8-58: Predicted annual average GLCs of NO_2 for Scenario 3

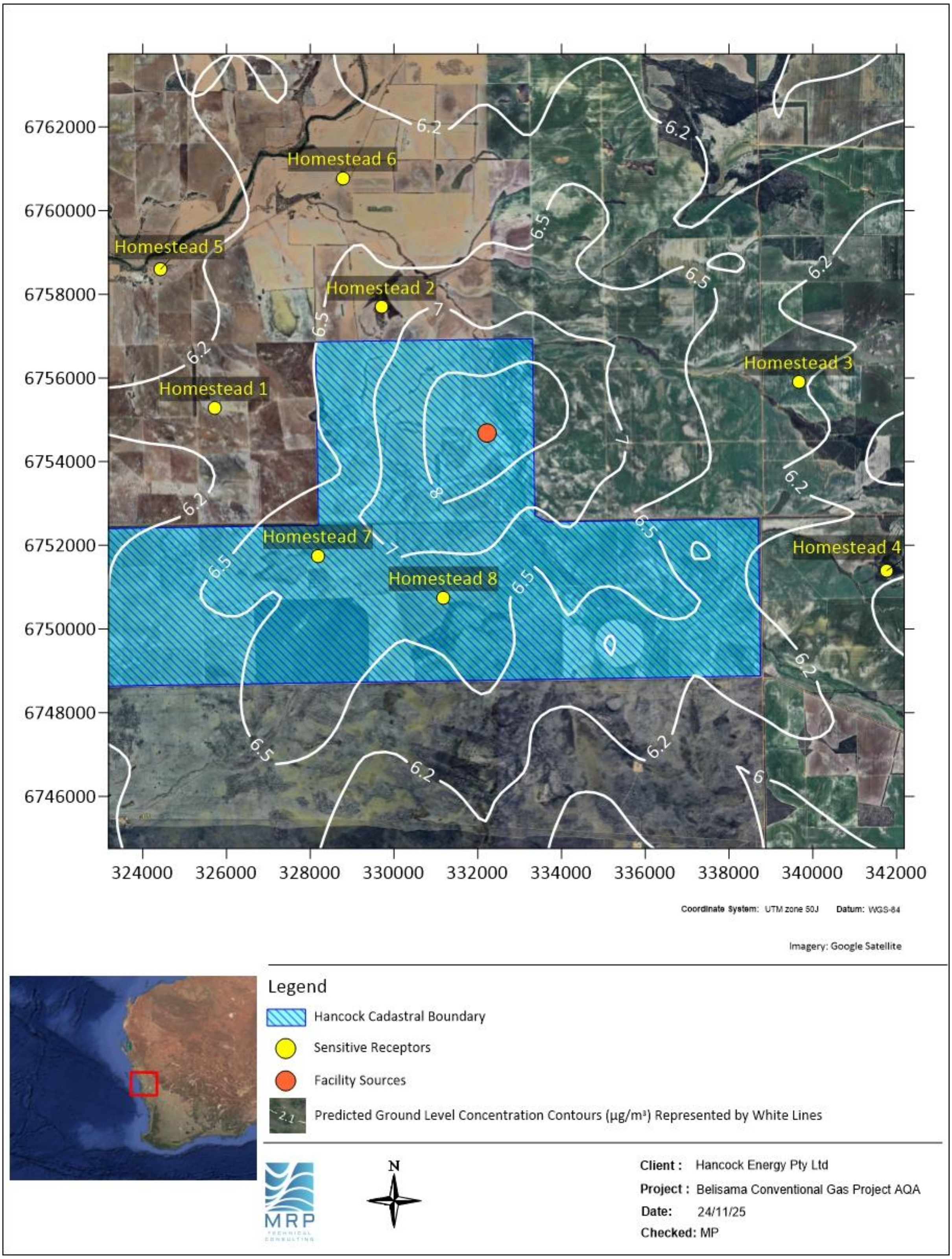

Figure 8-59: Maximum predicted 24-hour average GLCs of $PM_{2.5}$ for Scenario 3

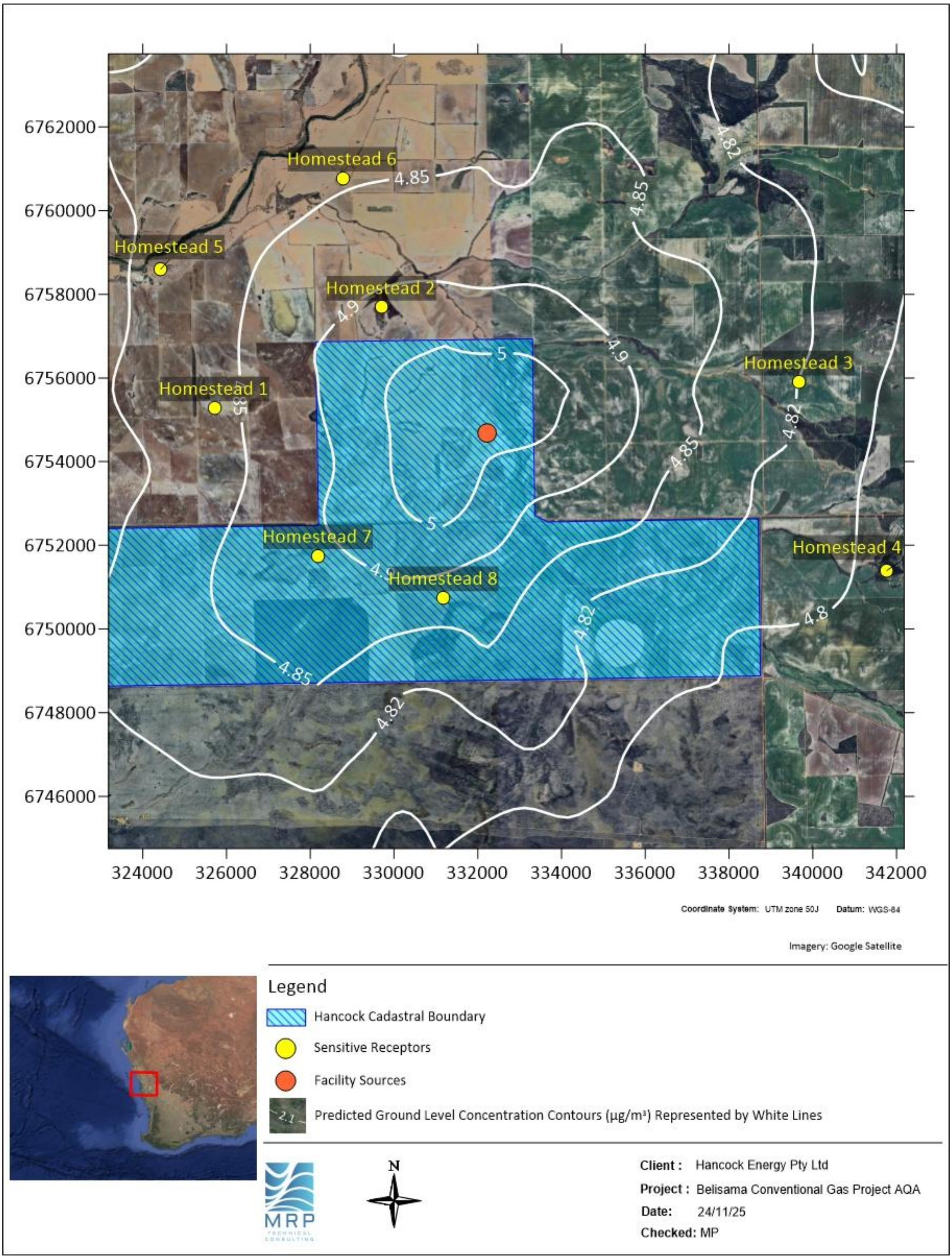

Figure 8-60: Predicted annual average GLCs of $PM_{2.5}$ for Scenario 3

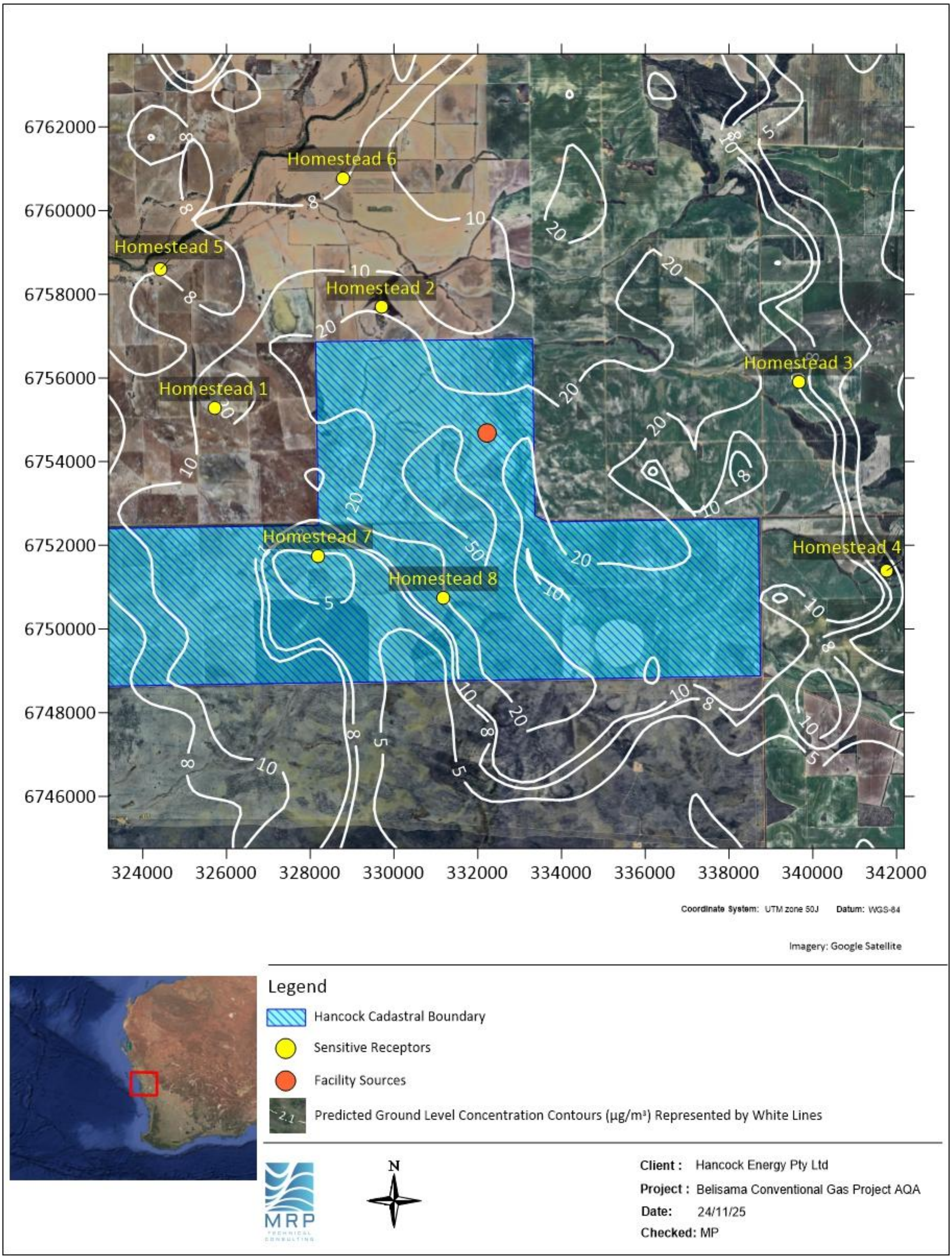

Figure 8-61: Maximum predicted 1-hour average GLCs of SO_2 for Scenario 3

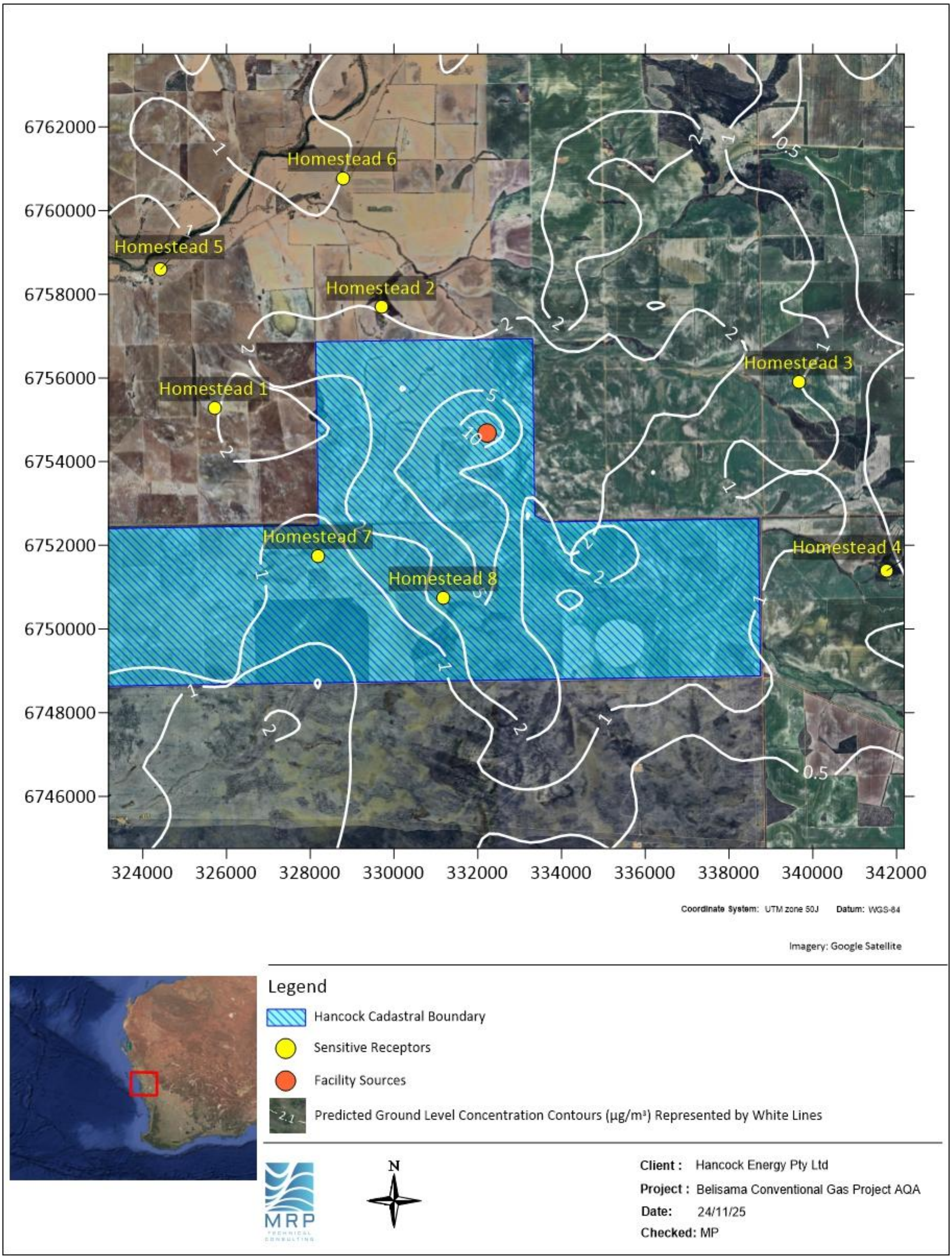

Figure 8-62: Maximum predicted 24-hour average GLCs of SO_2 for Scenario 3

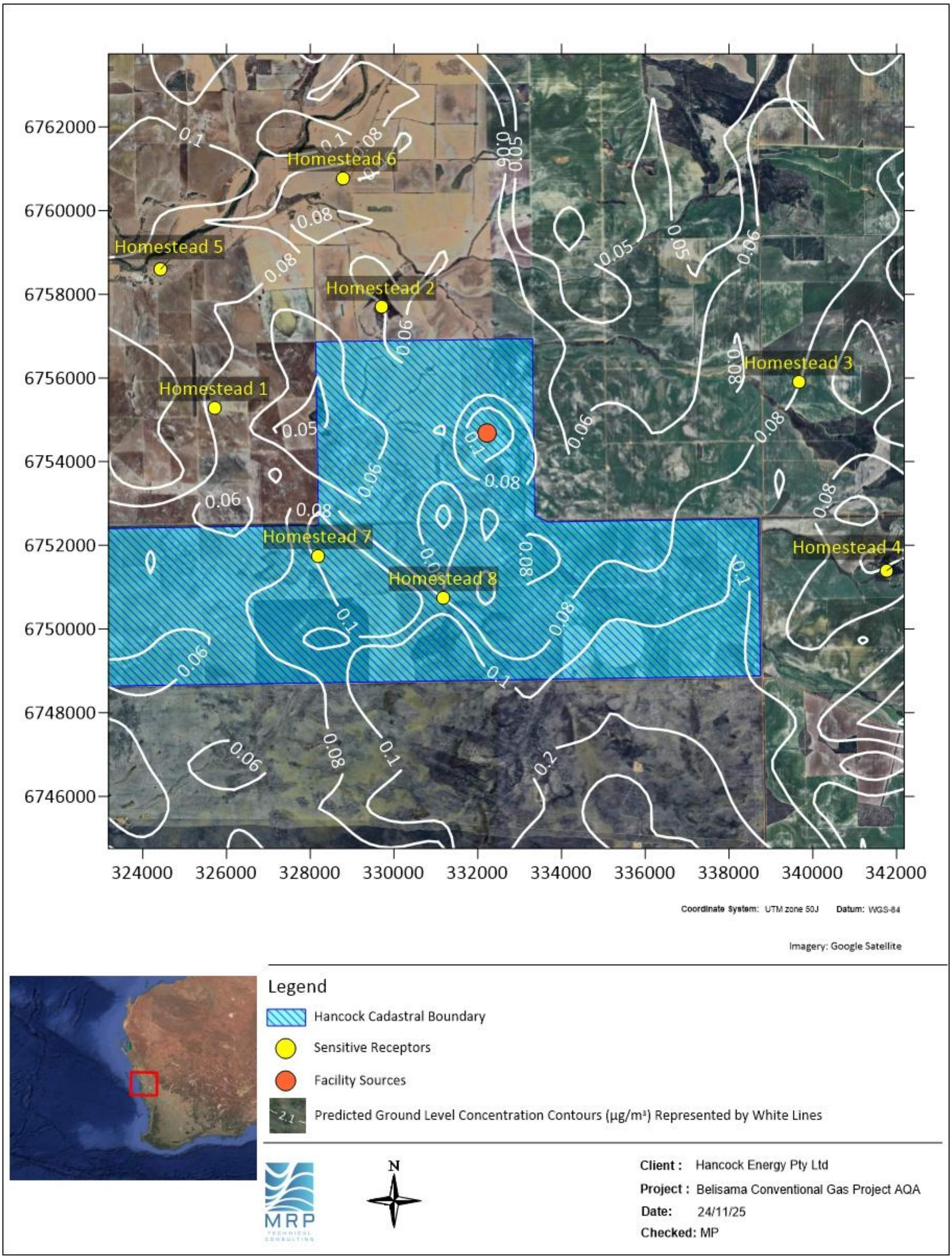

Figure 8-63: Maximum predicted 24-hour average GLCs of toluene for Scenario 3

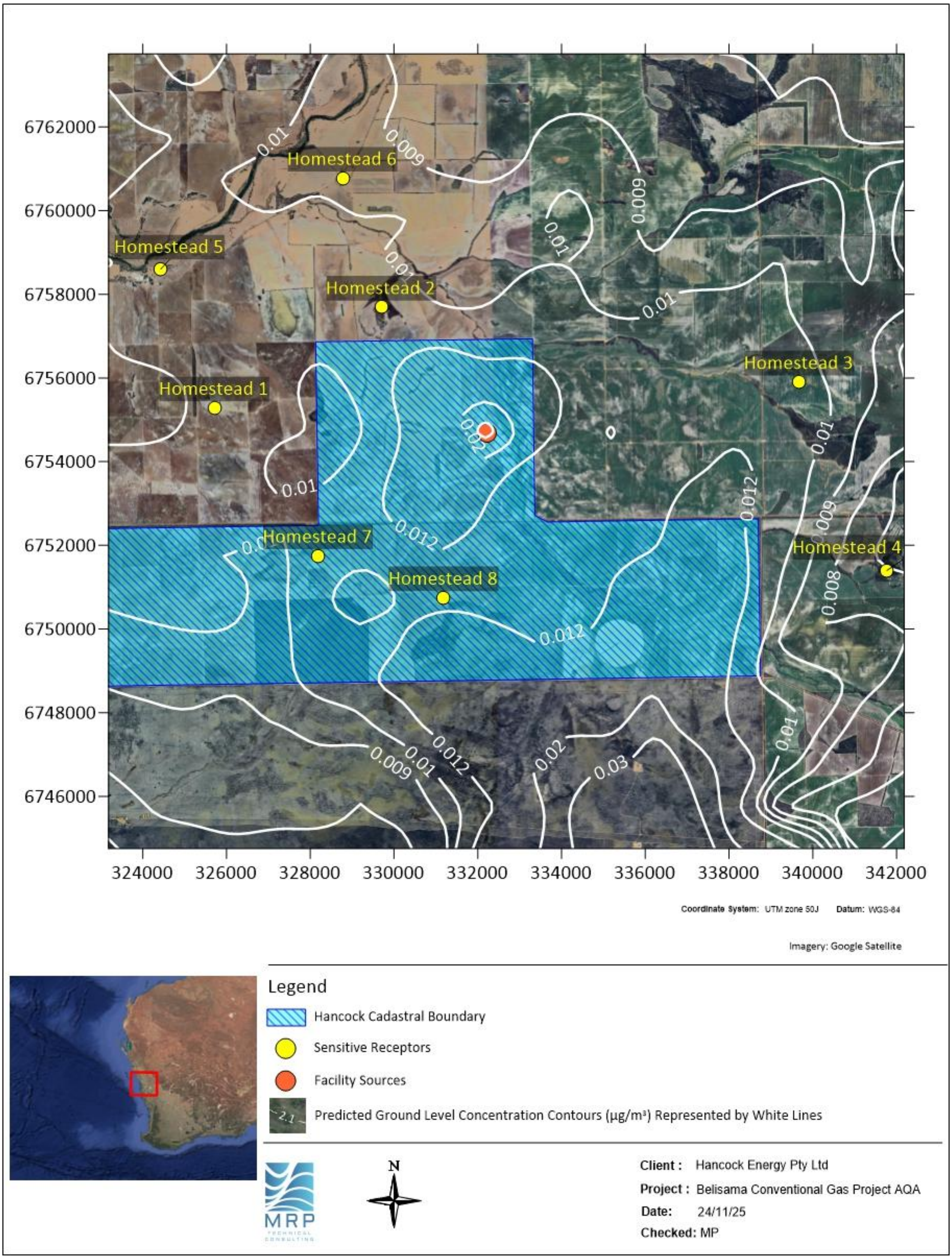

Figure 8-64: Predicted annual average GLCs of toluene for Scenario 3

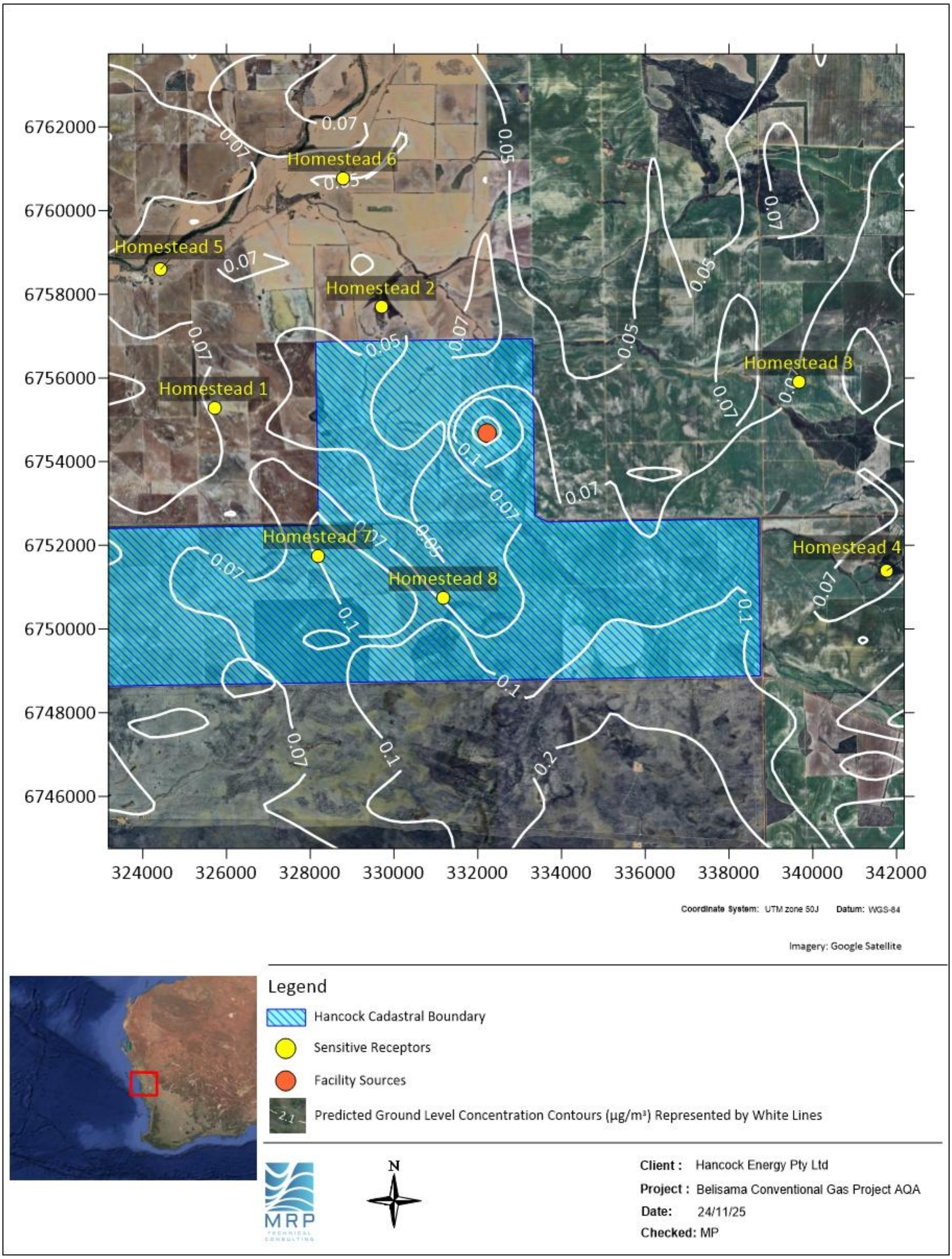

Figure 8-65: Maximum predicted 24-hour average GLCs of xylene for Scenario 3

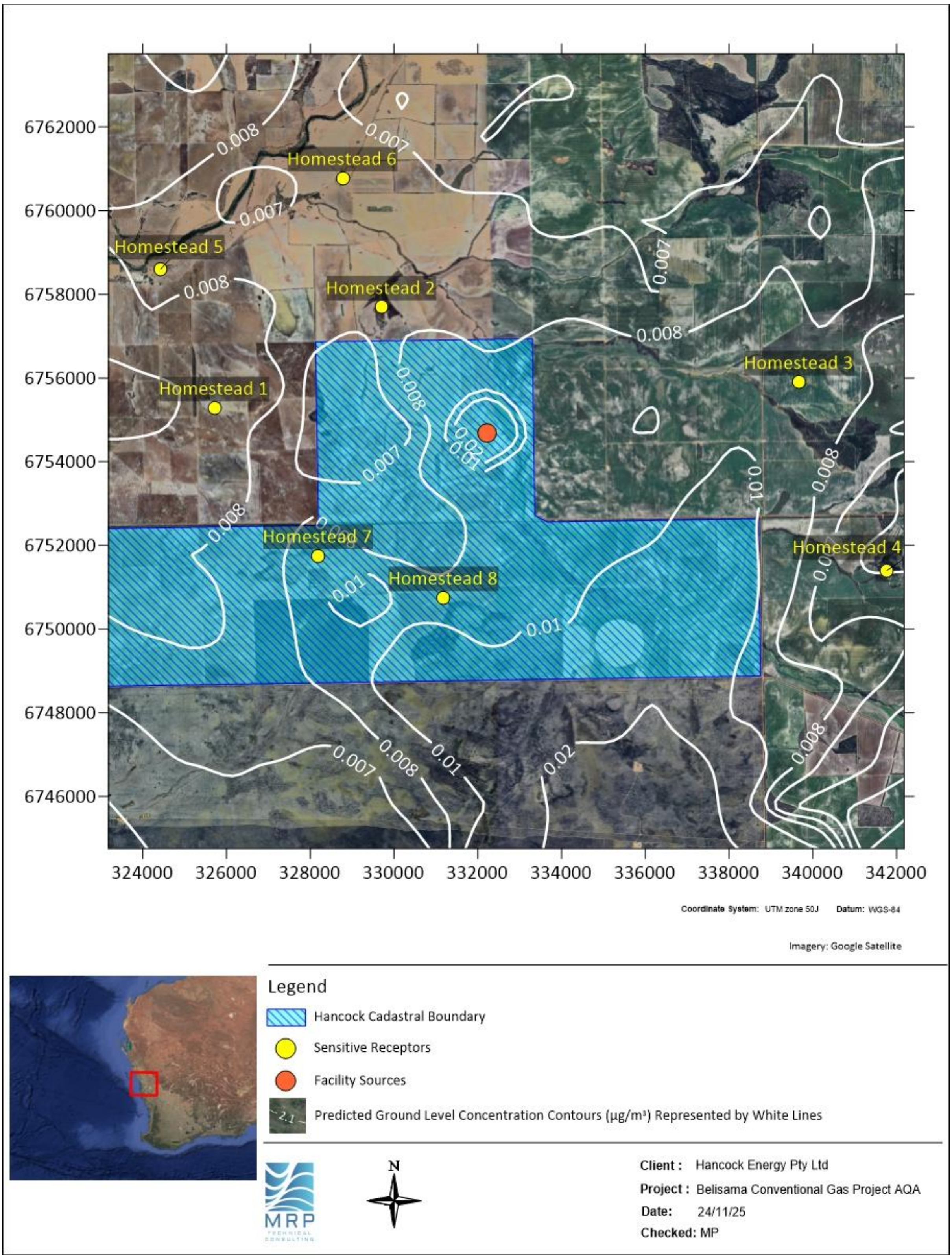

Figure 8-66: Predicted annual average GLCs of xylene for Scenario 3

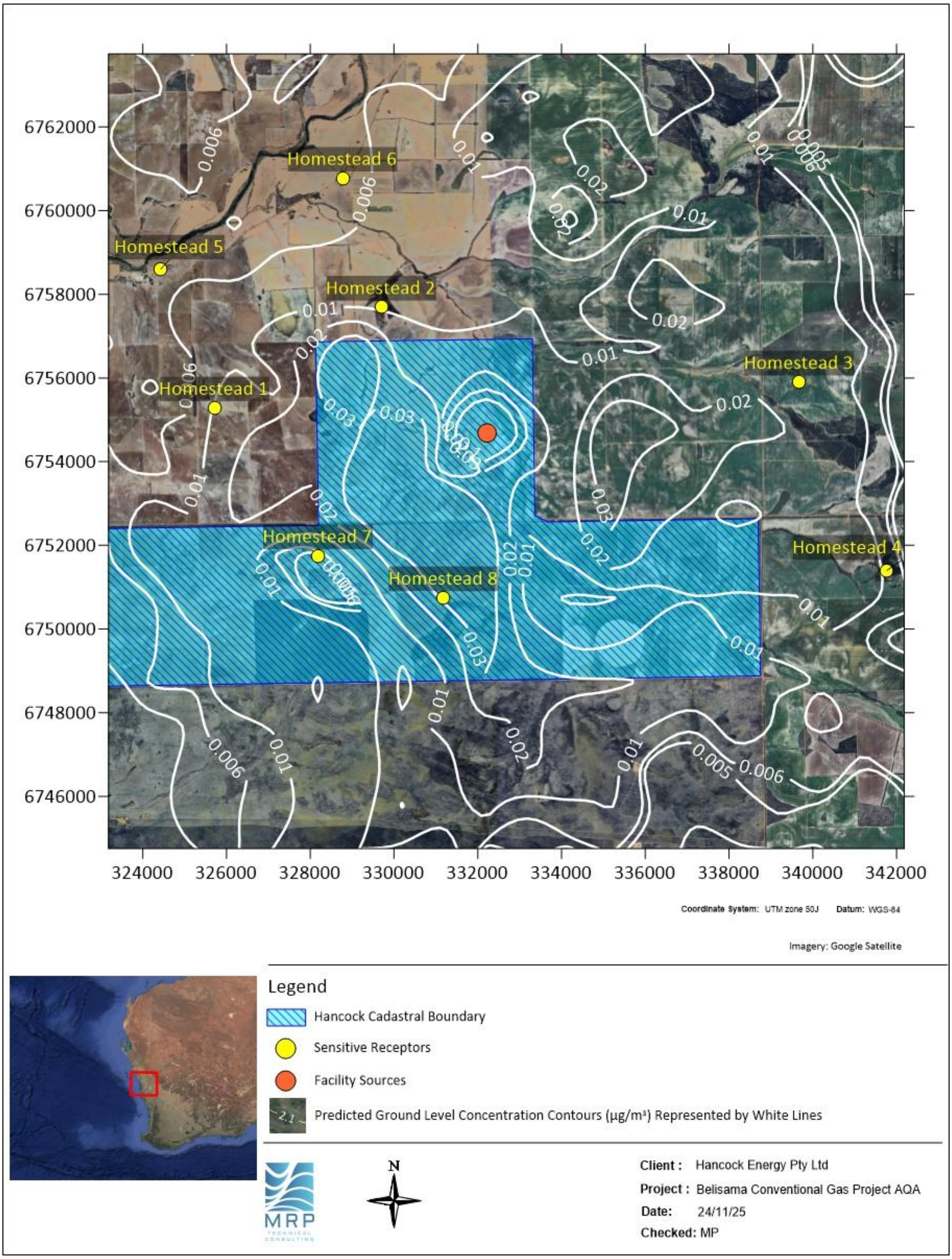

Figure 8-67: 99.9th percentile predicted 1-hour average GLCs of benzene for Scenario 4

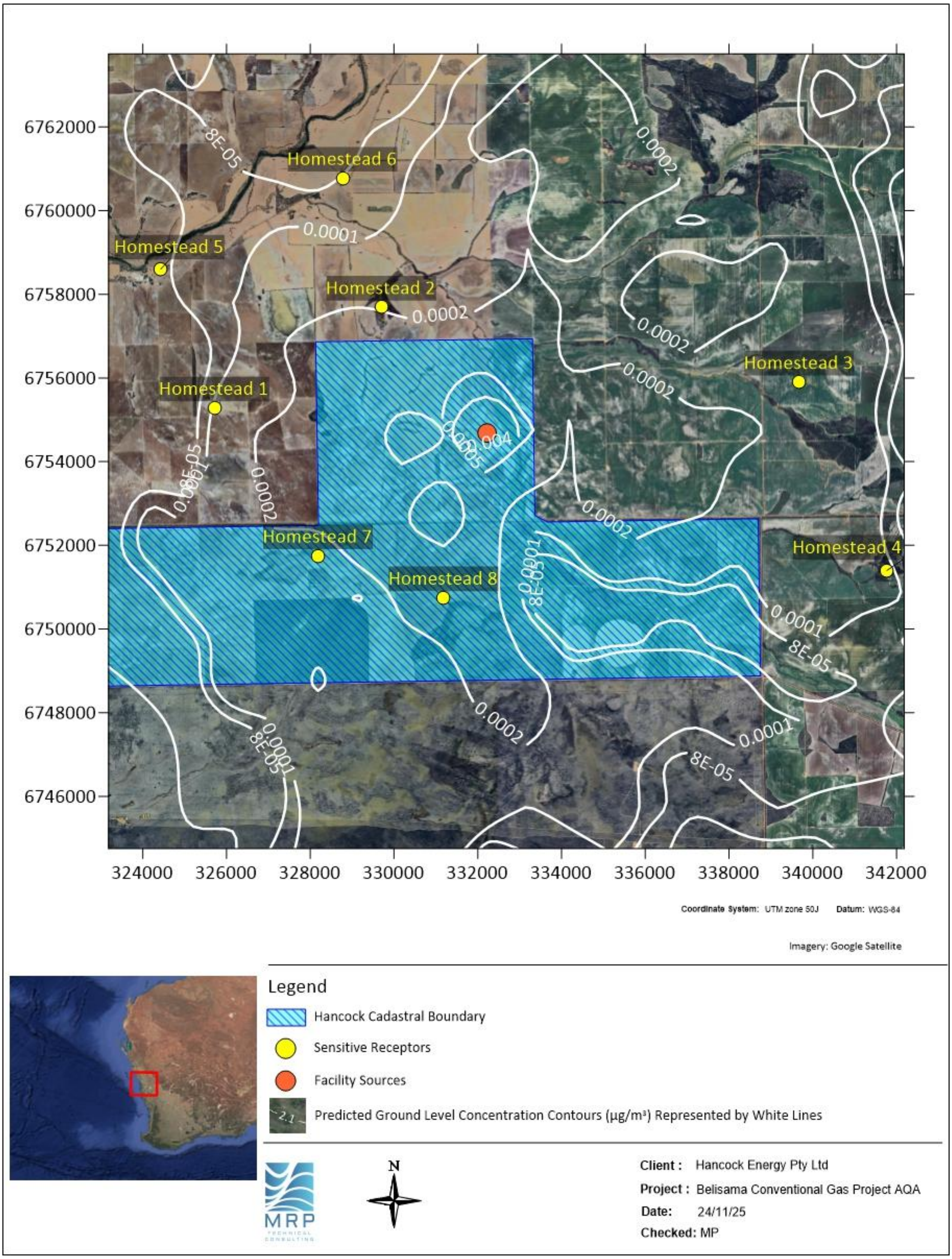

Figure 8-68: Predicted annual average GLCs of benzene for Scenario 4

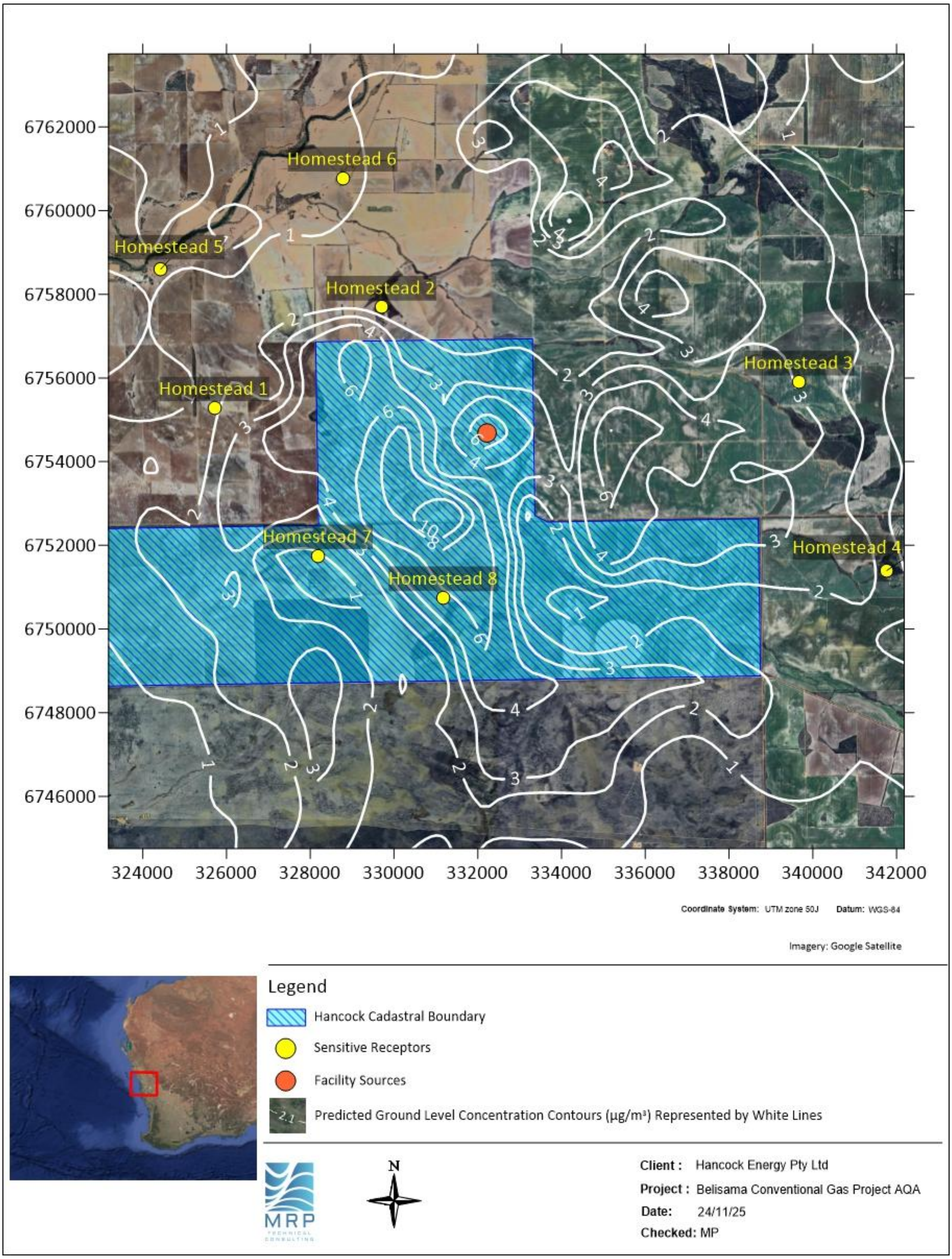

Figure 8-69: 99.9th percentile predicted 1-hour average GLCs of formaldehyde for Scenario 4

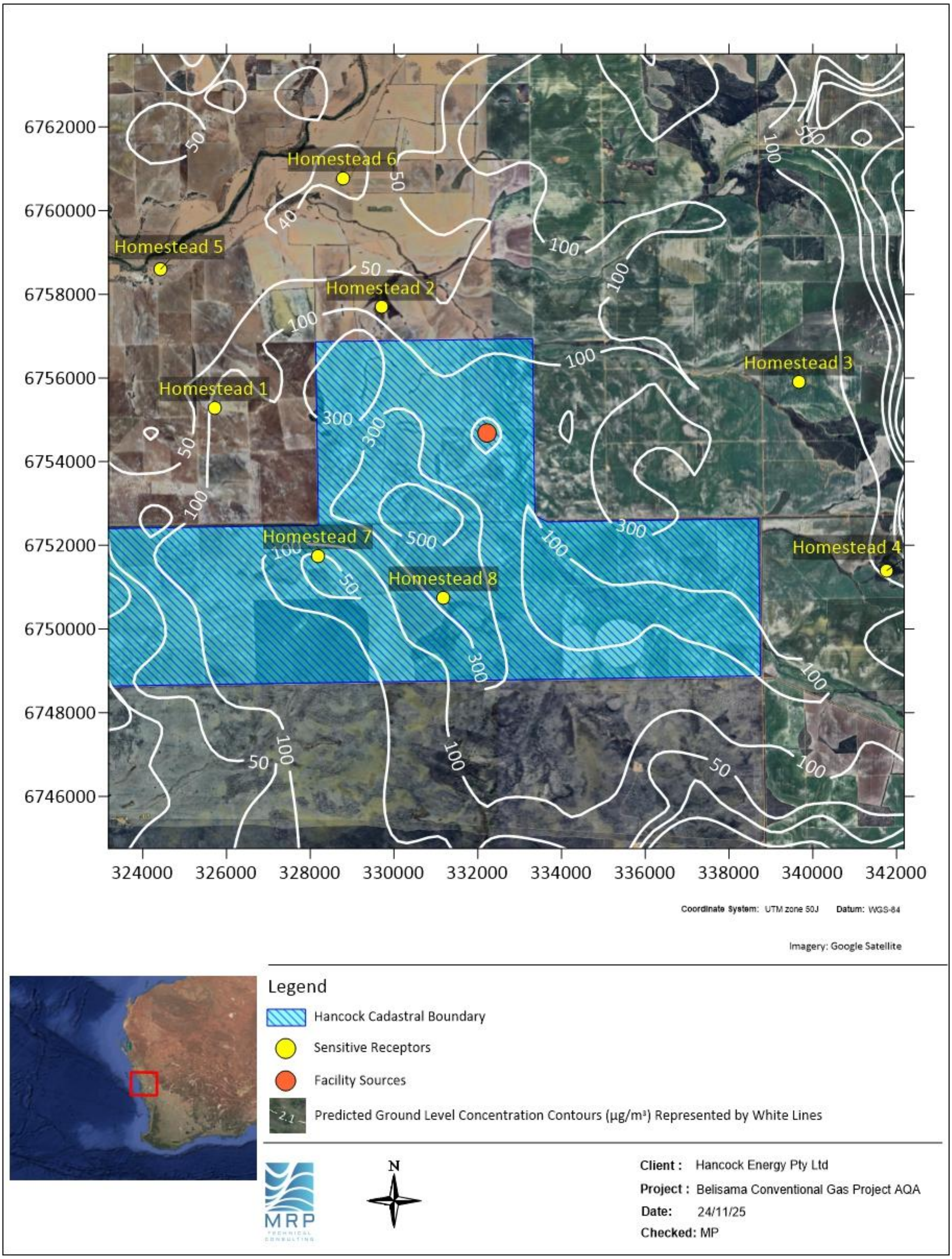

Figure 8-70: Maximum predicted 1-hour average GLCs of CO for Scenario 4

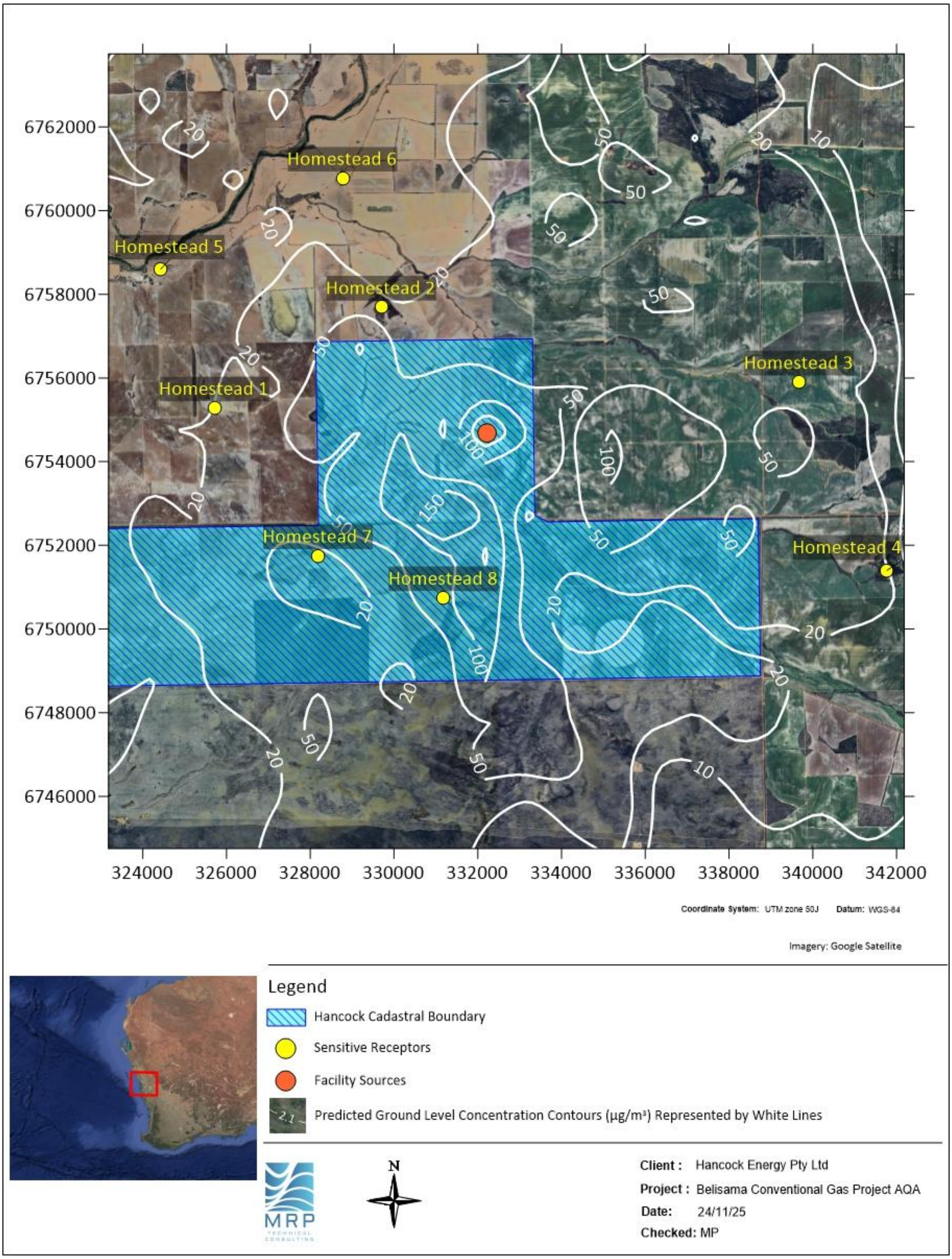

Figure 8-71: Maximum predicted 1-hour average GLCs of CO for Scenario 4

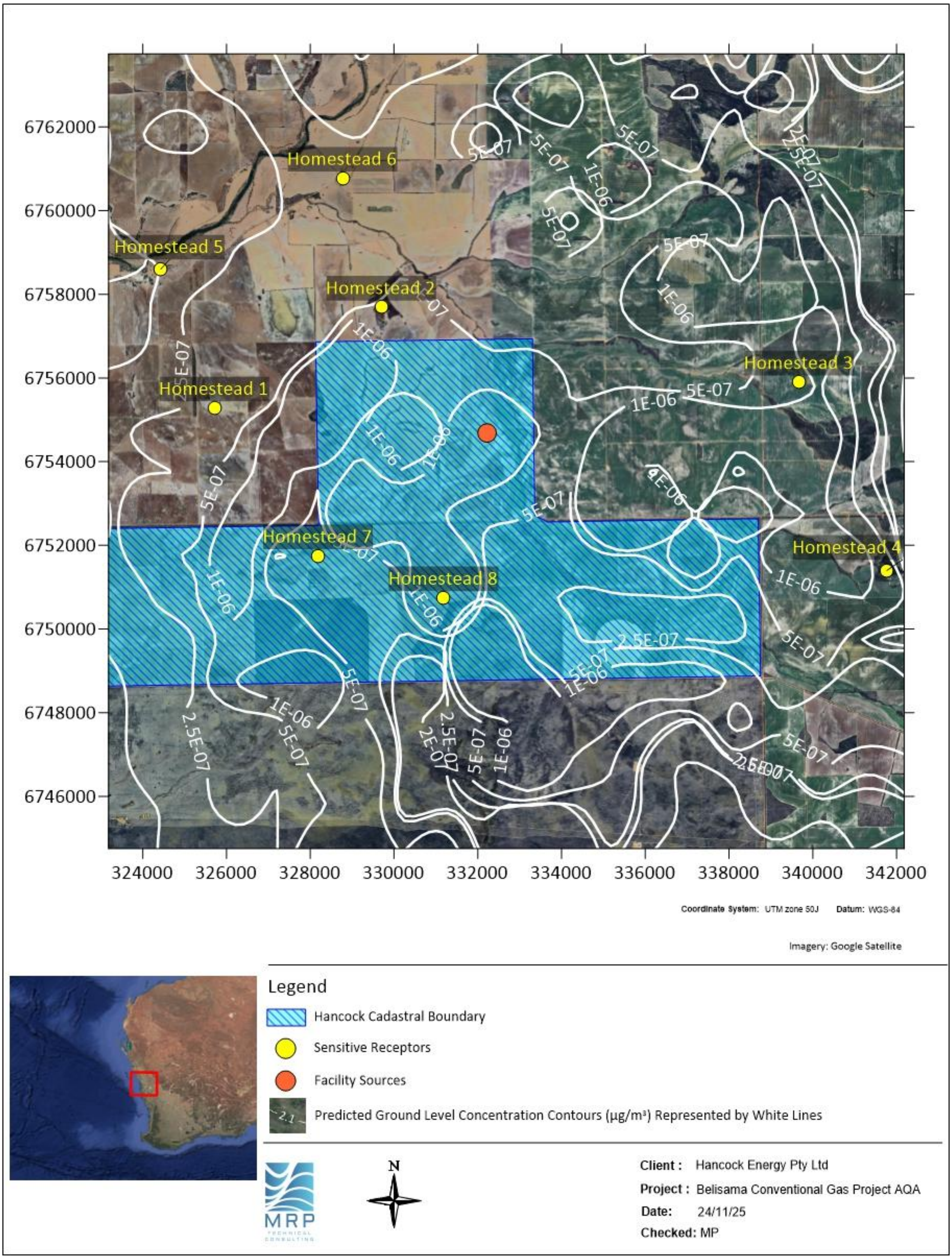

Figure 8-72: 99.9th percentile predicted 1-hour average GLCs of ethylbenzene for Scenario 4

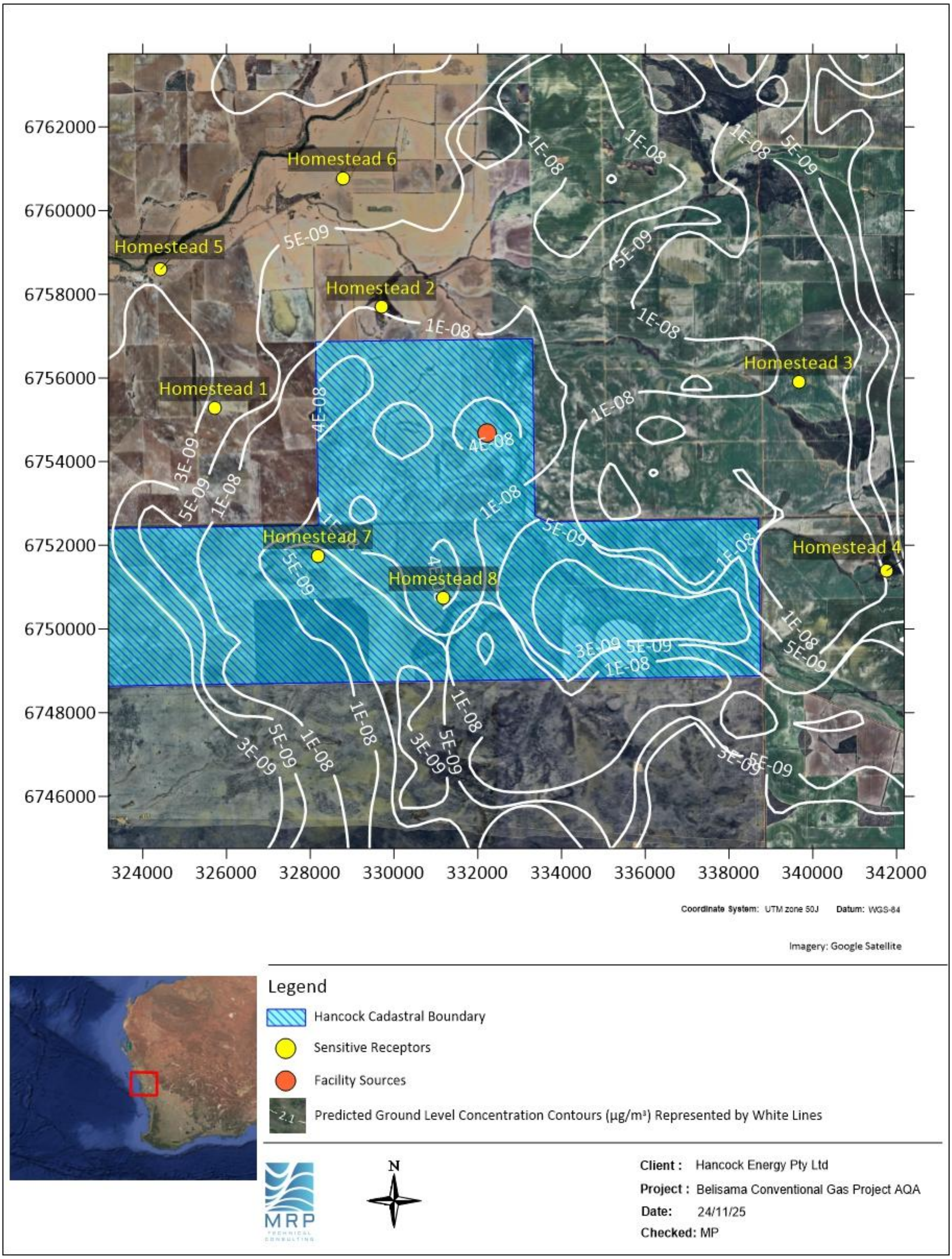

Figure 8-73: Predicted annual average GLCs of ethylbenzene for Scenario 4

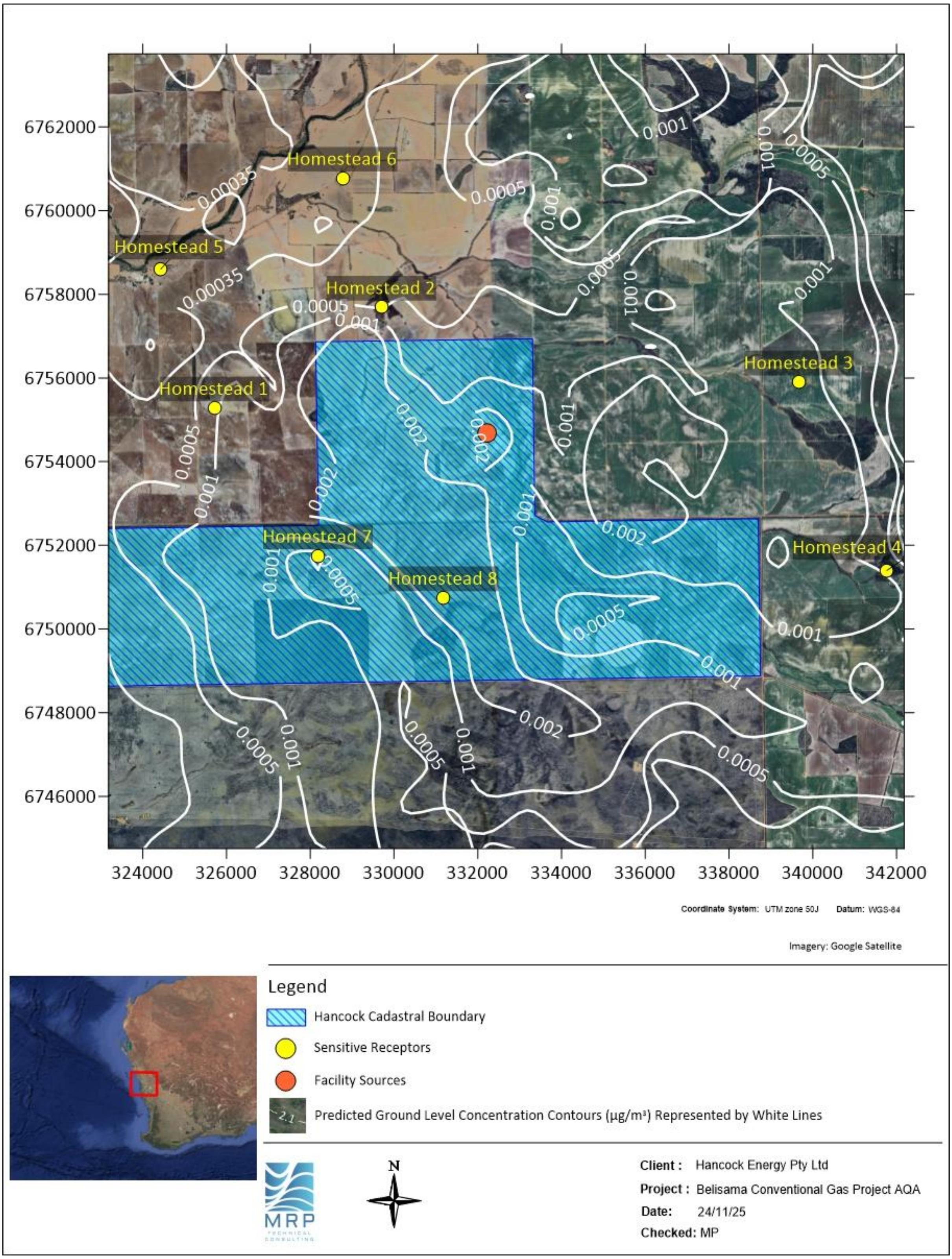

Figure 8-74: Maximum predicted 1-hour average GLCs of H_2S for Scenario 4

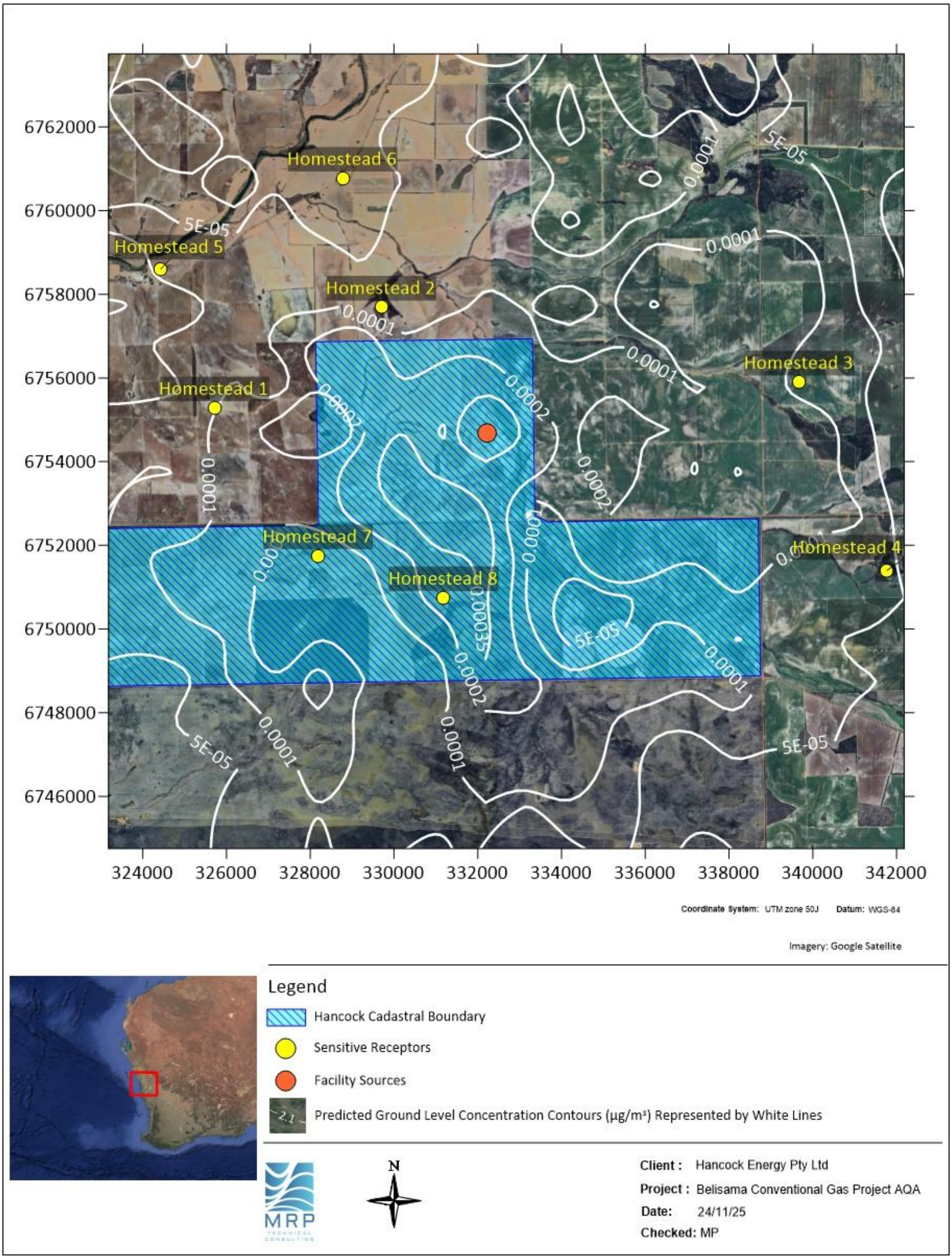

Figure 8-75: Maximum predicted 24-hour average GLCs of H_2S for Scenario 4

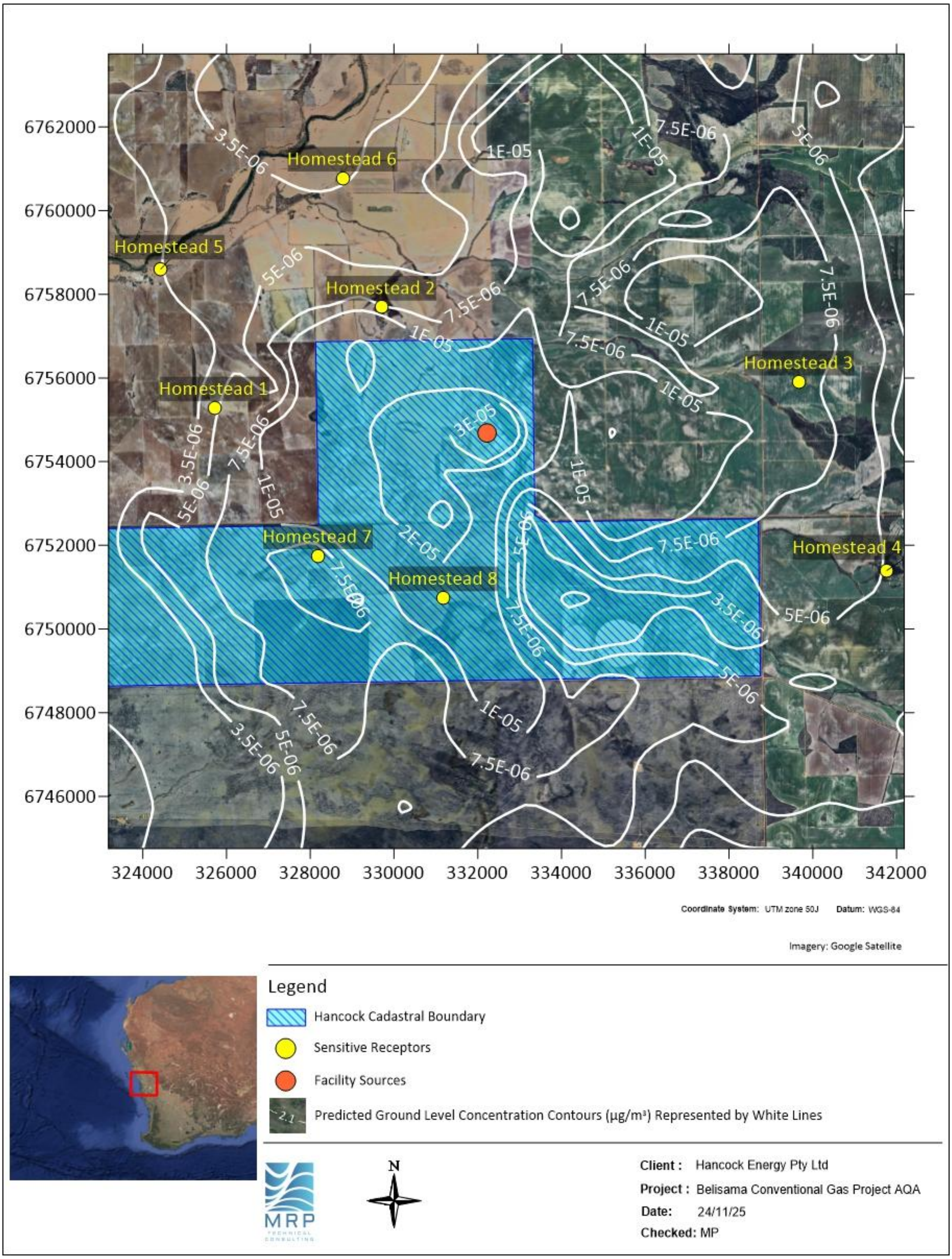

Figure 8-76: Predicted annual average GLCs of H_2S for Scenario 4

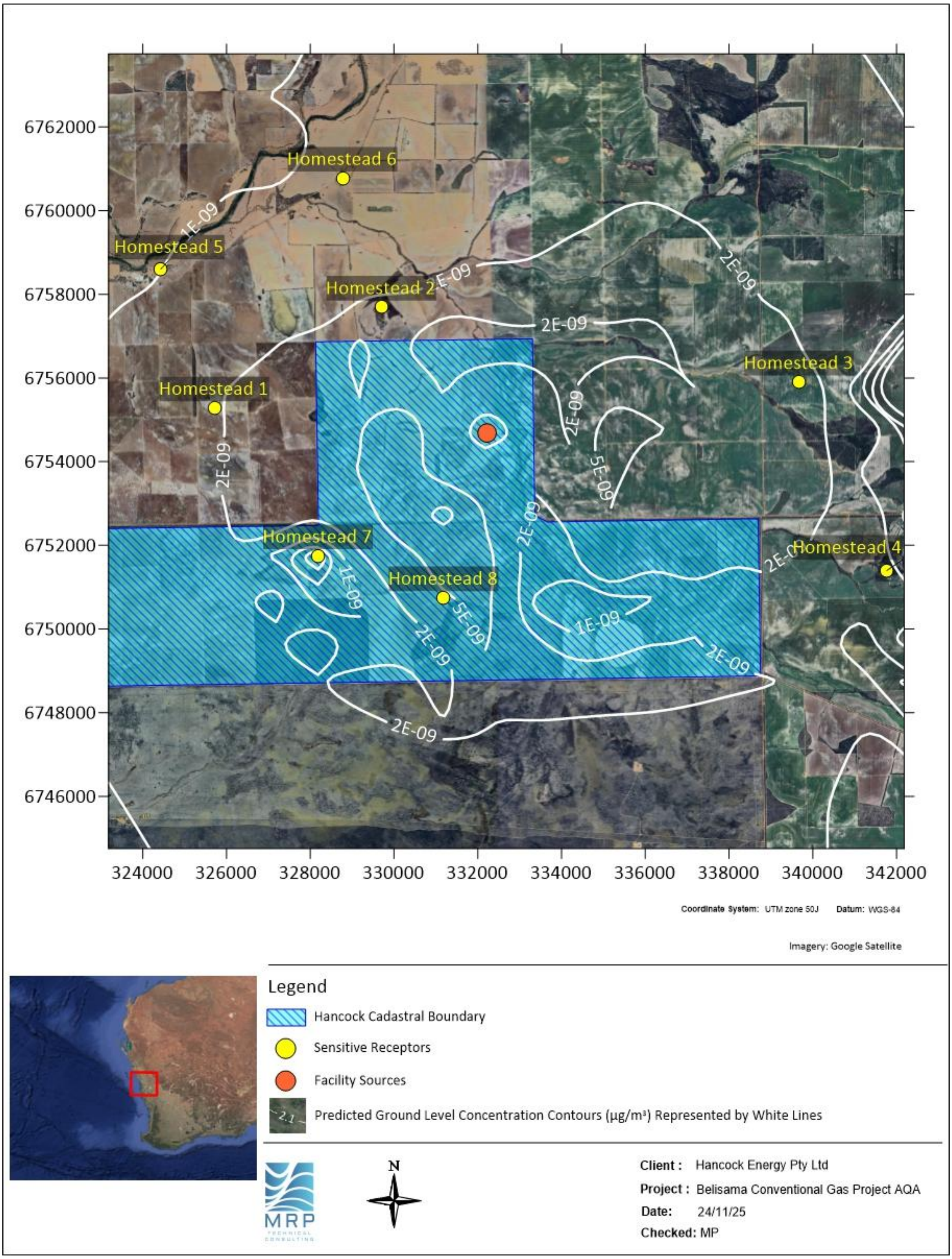

Figure 8-77: 99.9th percentile predicted 1-hour average GLCs of mercury for Scenario 4

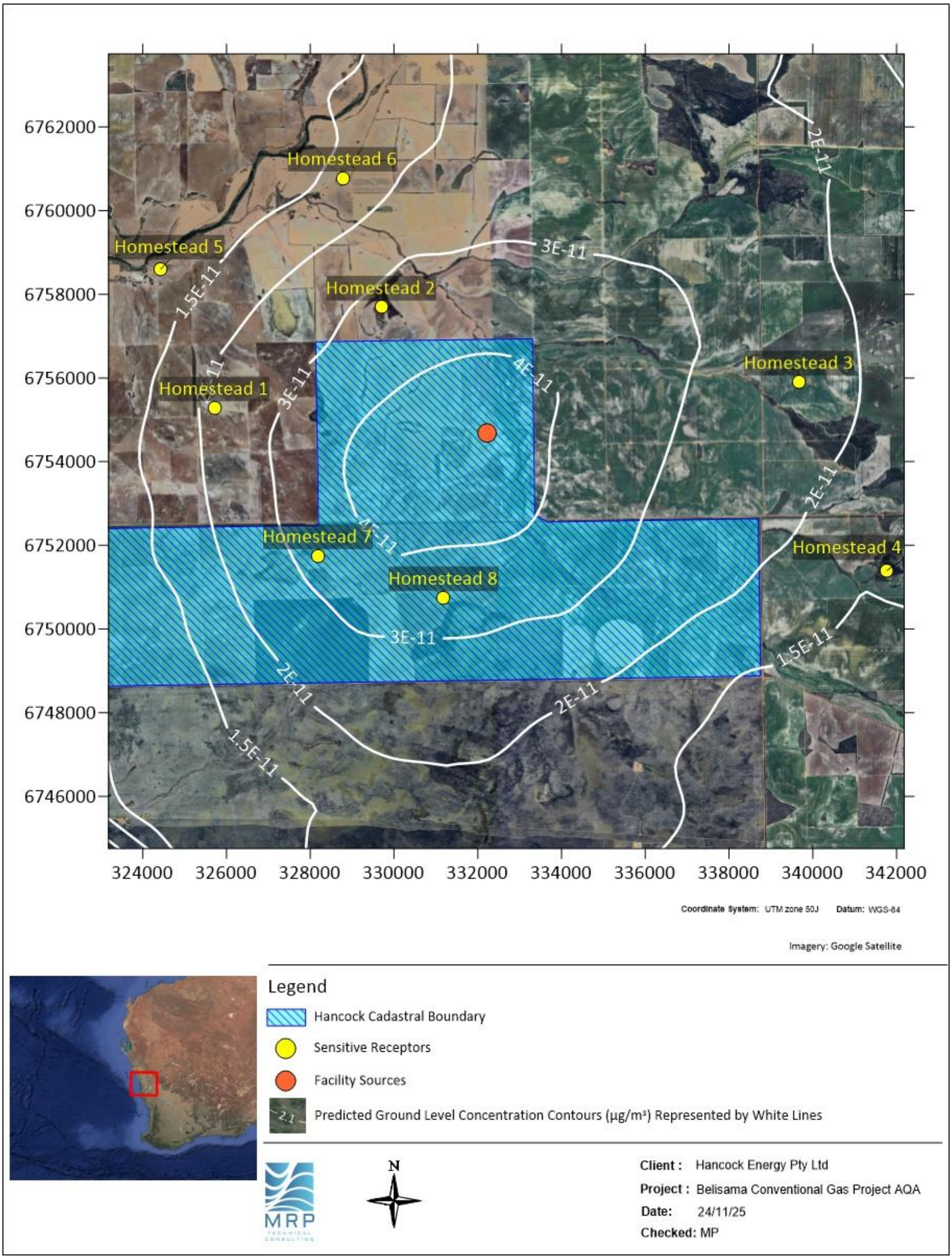

Figure 8-78: Predicted annual average GLCs of mercury for Scenario 4

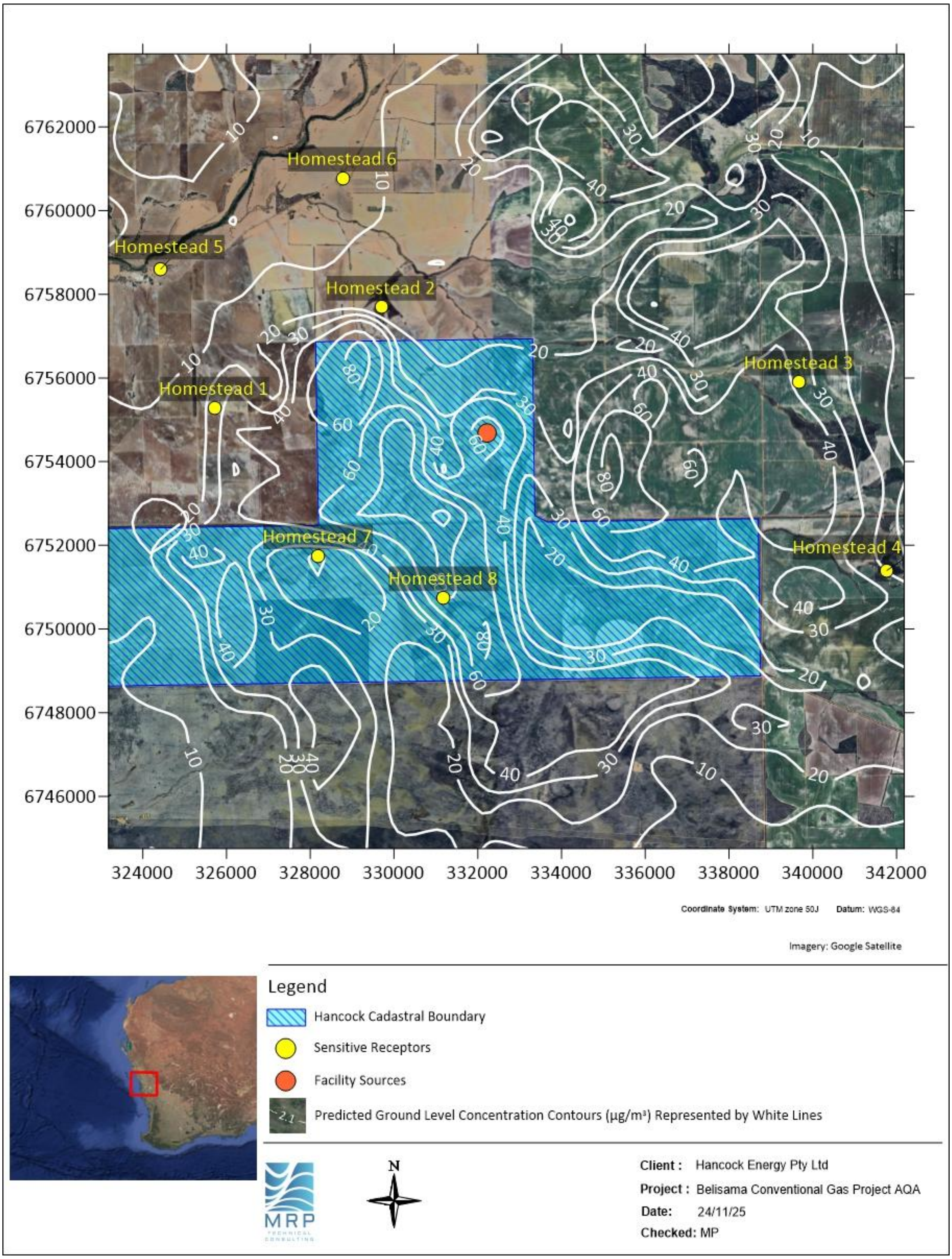

Figure 8-79: Maximum predicted 1-hour average GLCs of NO_2 for Scenario 4

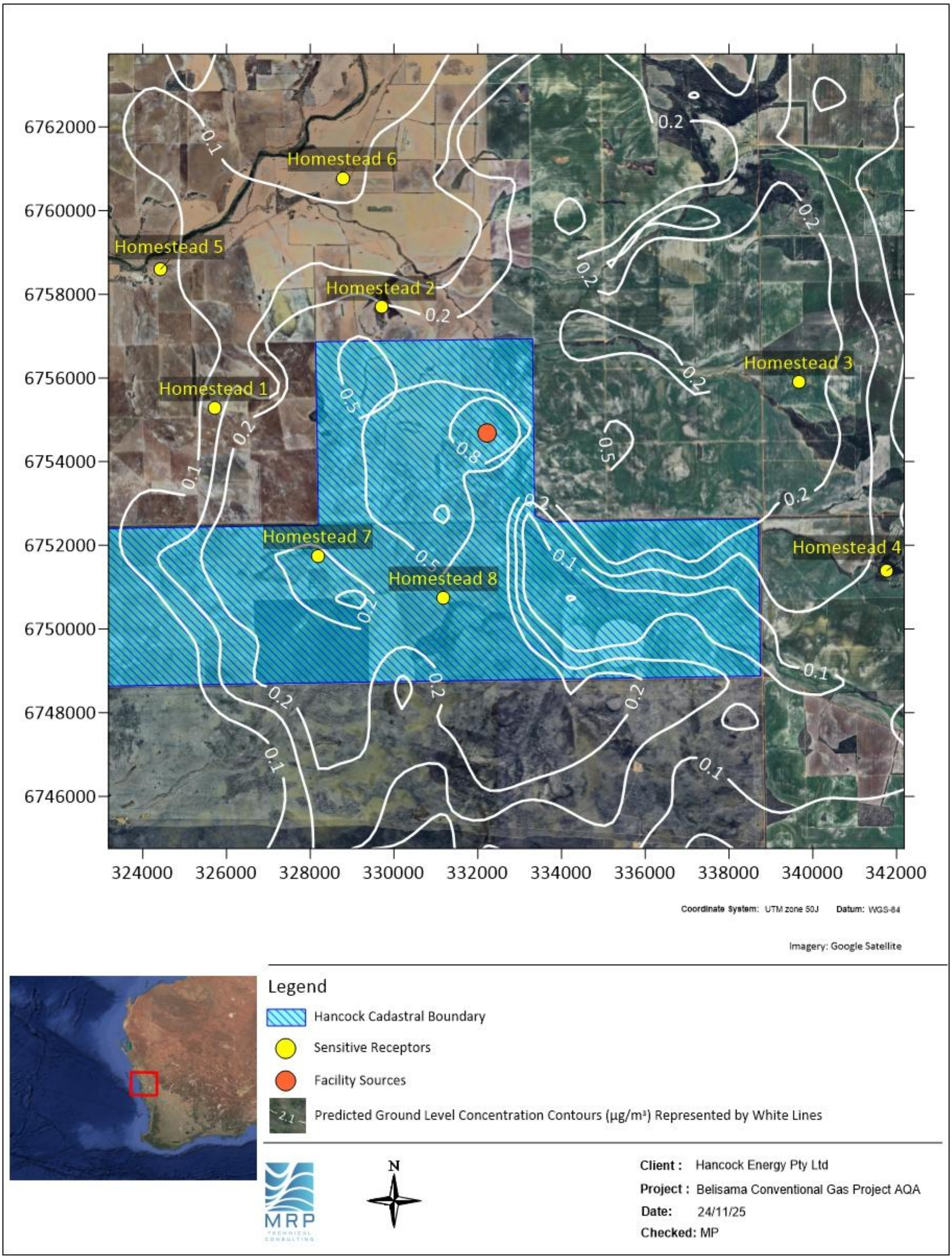

Figure 8-80: Predicted annual average GLCs of NO_2 for Scenario 4

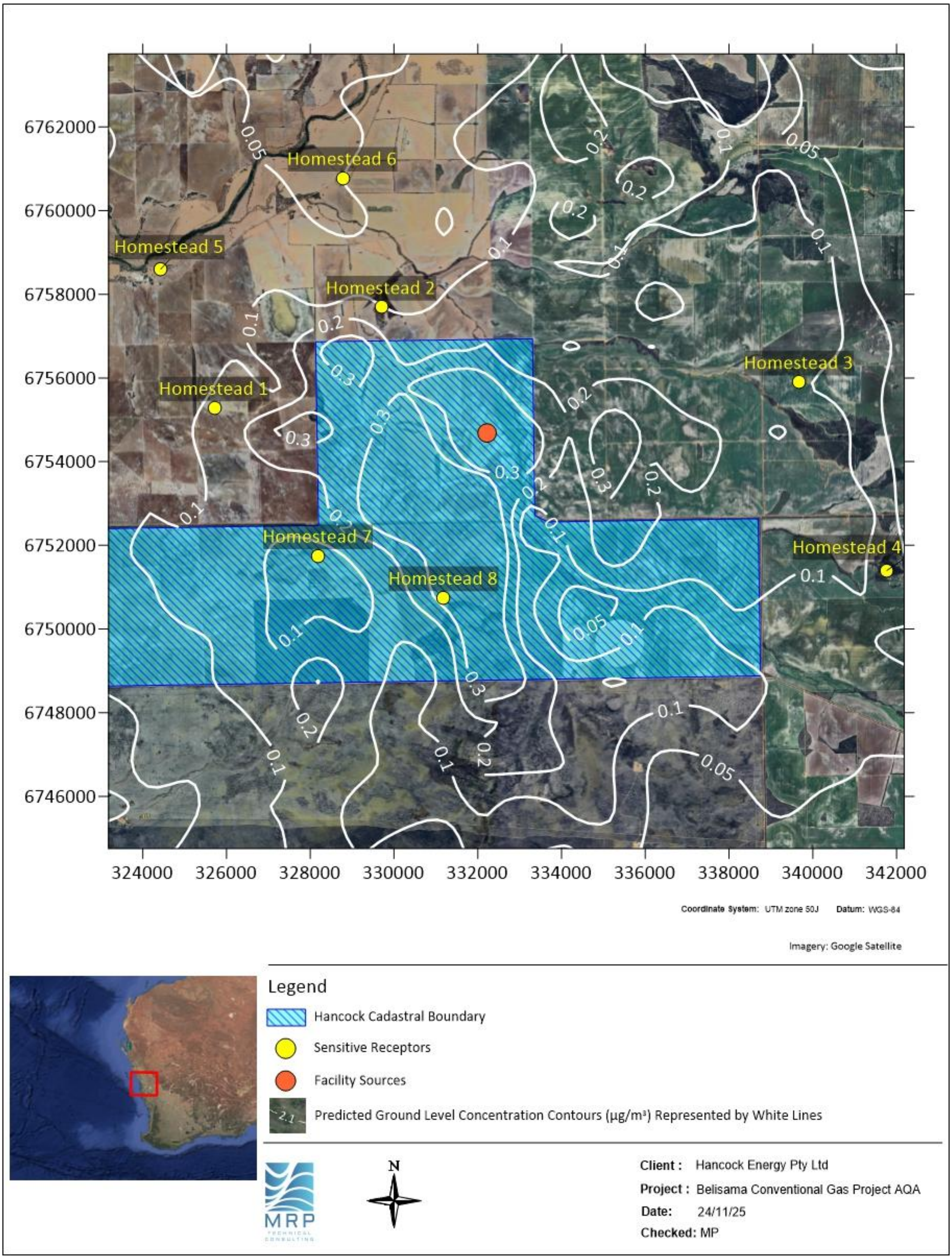

Figure 8-81: Maximum predicted 24-hour average GLCs of $PM_{2.5}$ for Scenario 4

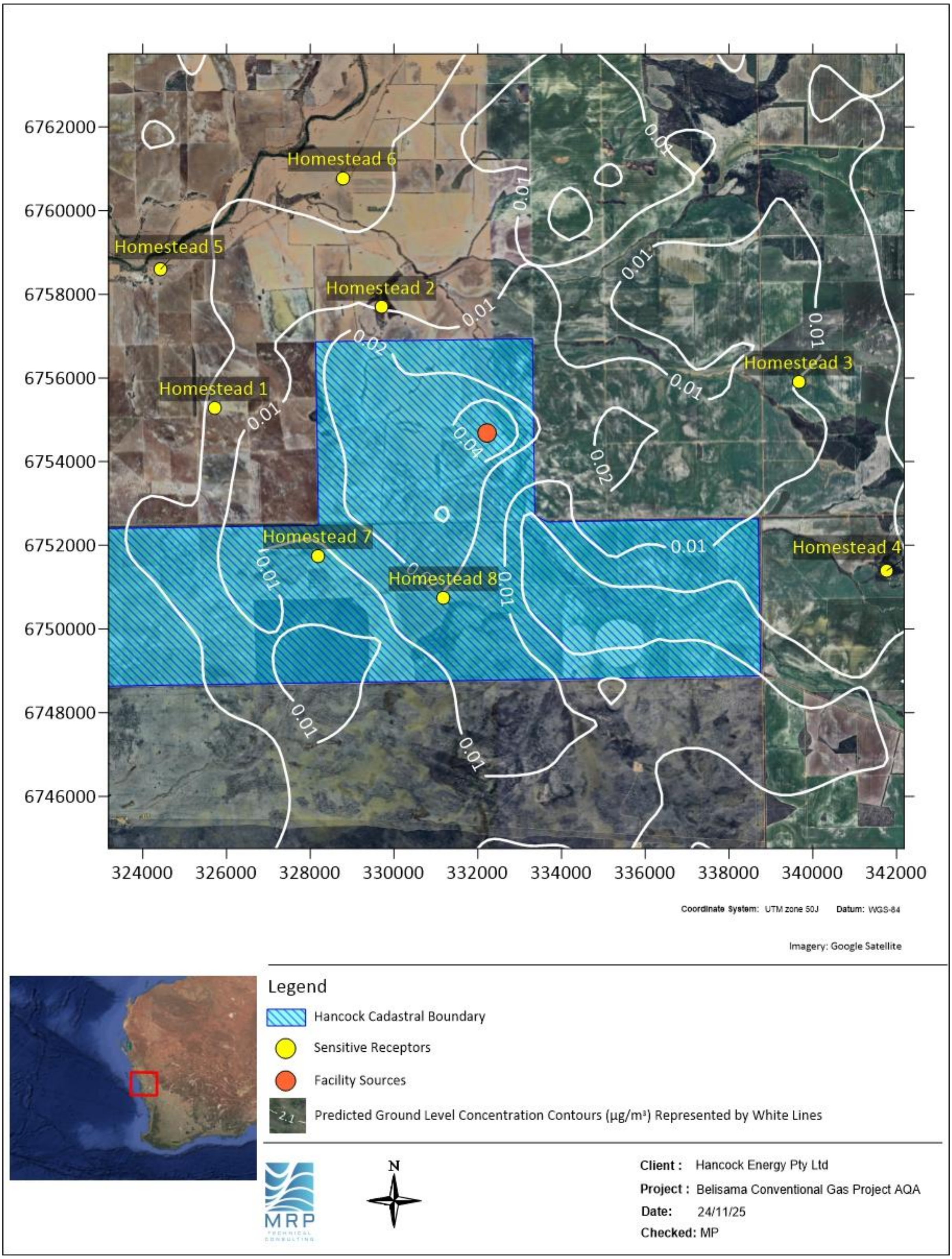

Figure 8-82: Predicted annual average GLCs of $PM_{2.5}$ for Scenario 4

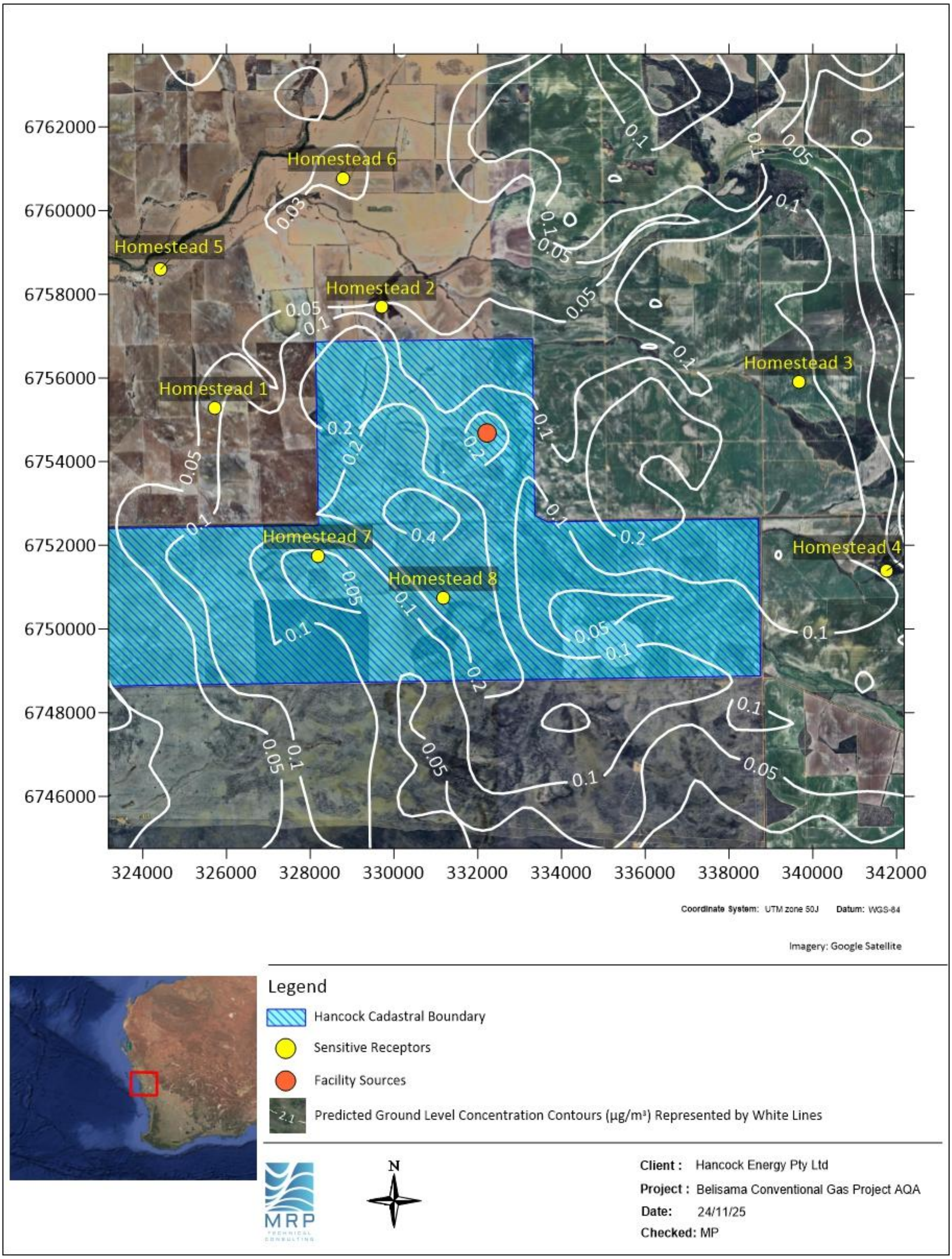

Figure 8-83: Maximum predicted 1-hour average GLCs of SO_2 for Scenario 4

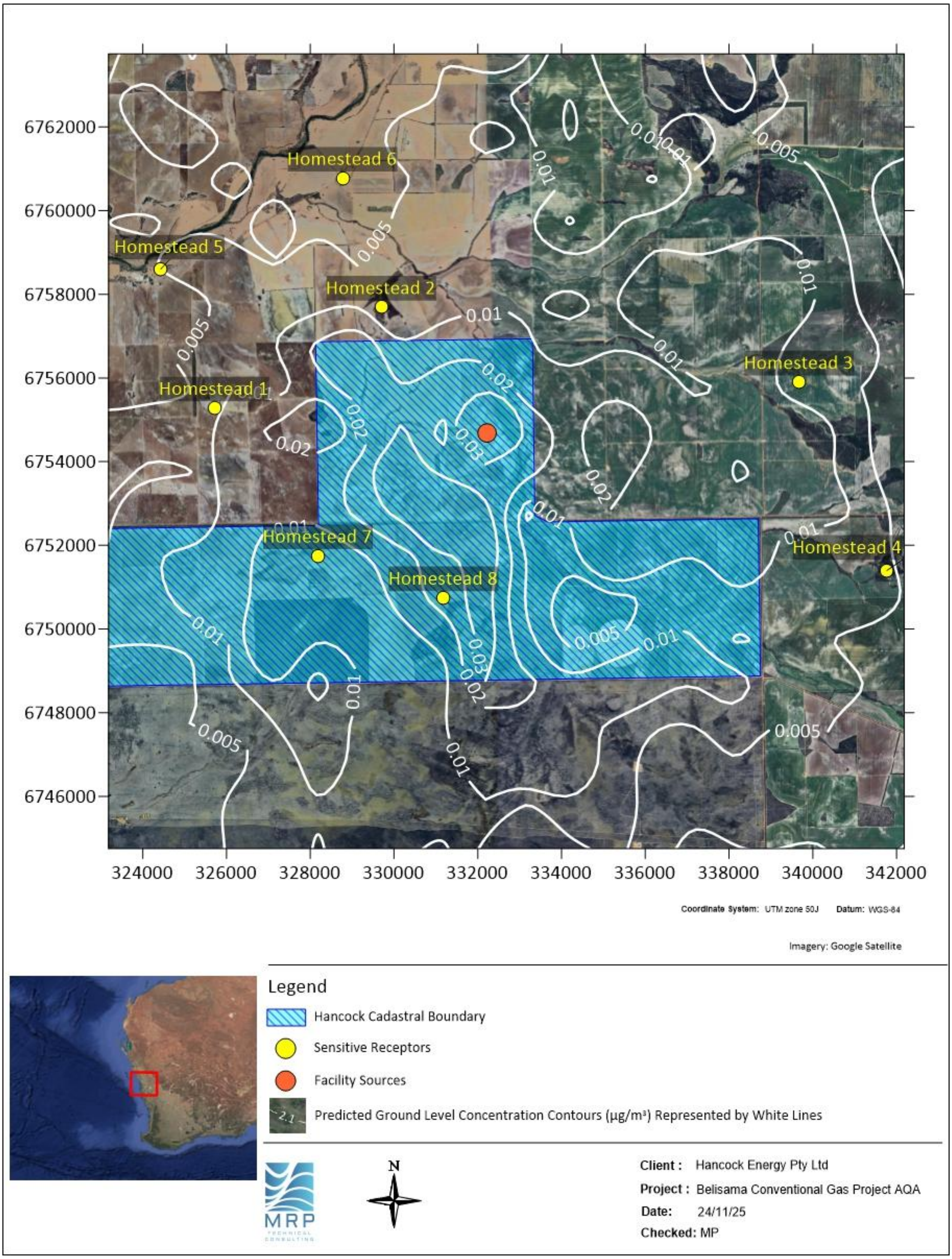

Figure 8-84: Maximum predicted 24-hour average GLCs of SO_2 for Scenario 4

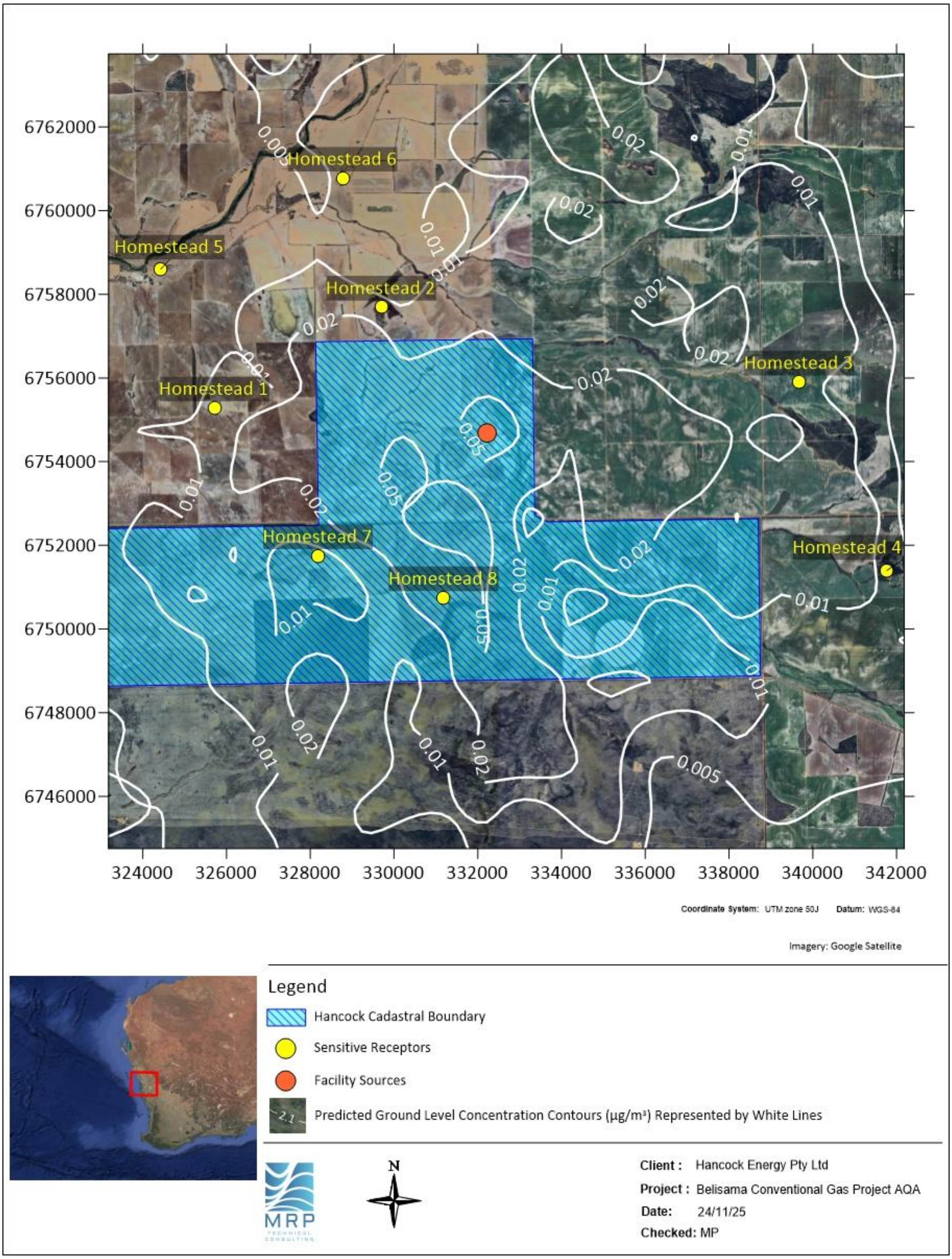

Figure 8-85: Maximum predicted 24-hour average GLCs of toluene for Scenario 4

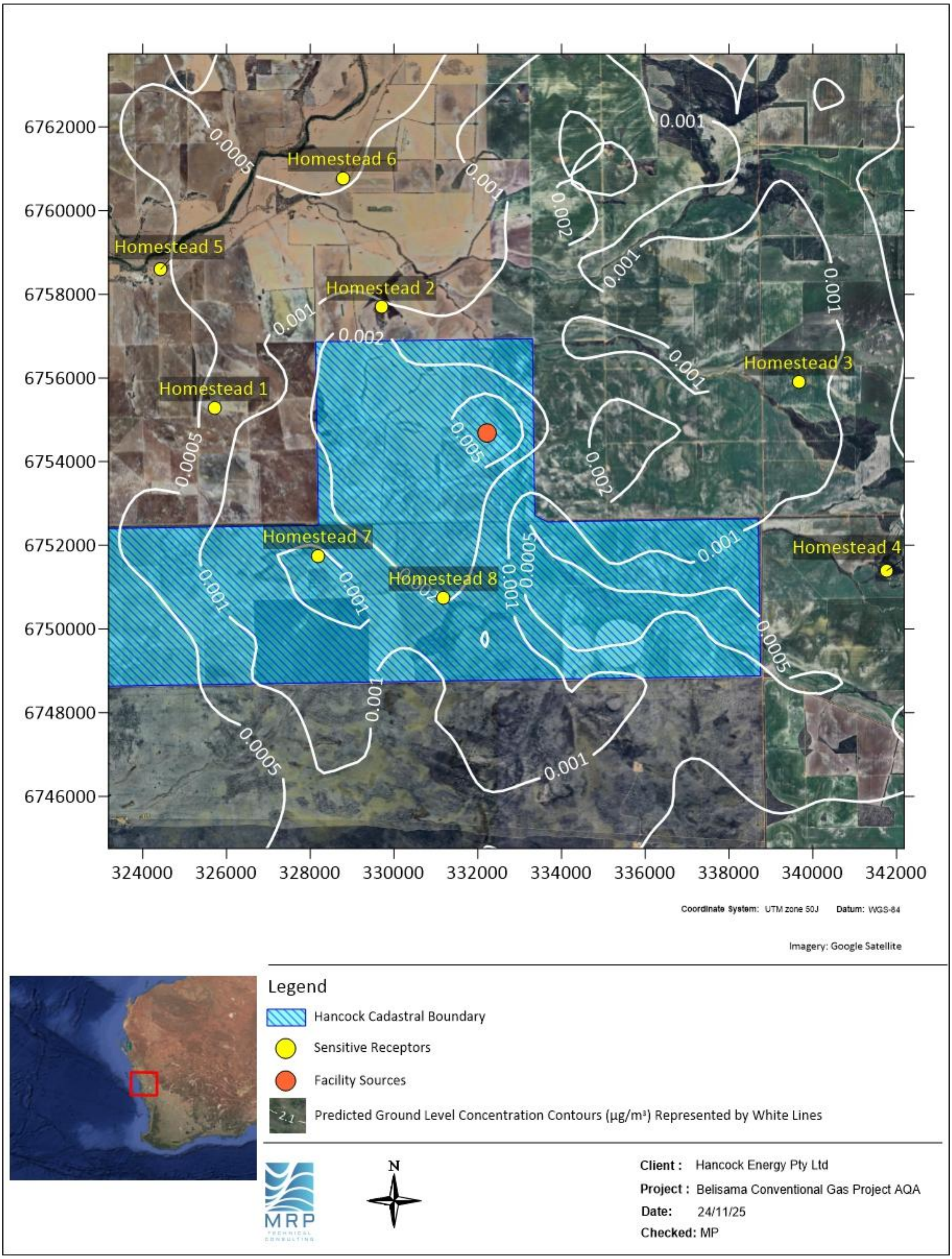

Figure 8-86: Predicted annual average GLCs of toluene for Scenario 4

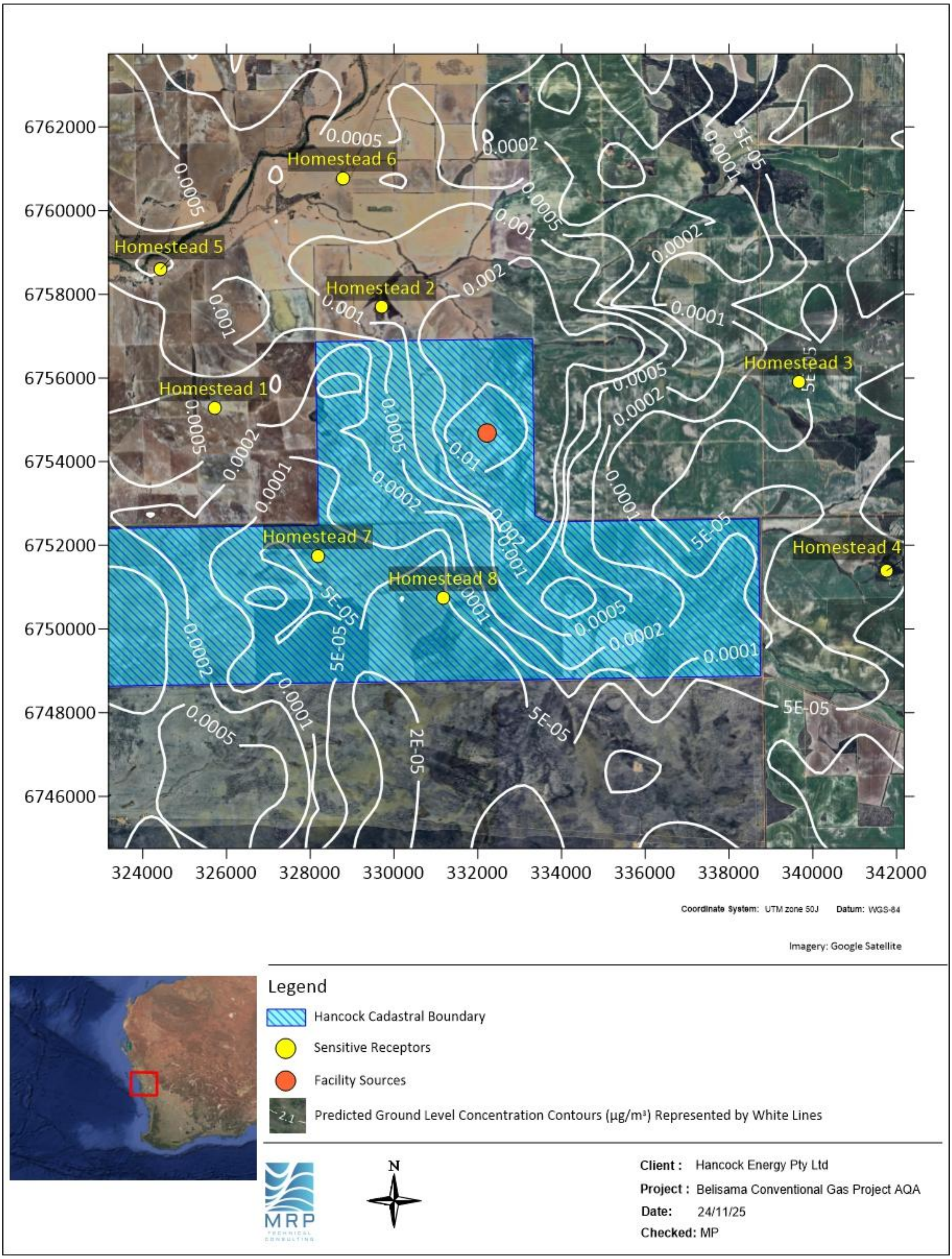

Figure 8-87: Maximum predicted 24-hour average GLCs of xylene for Scenario 4

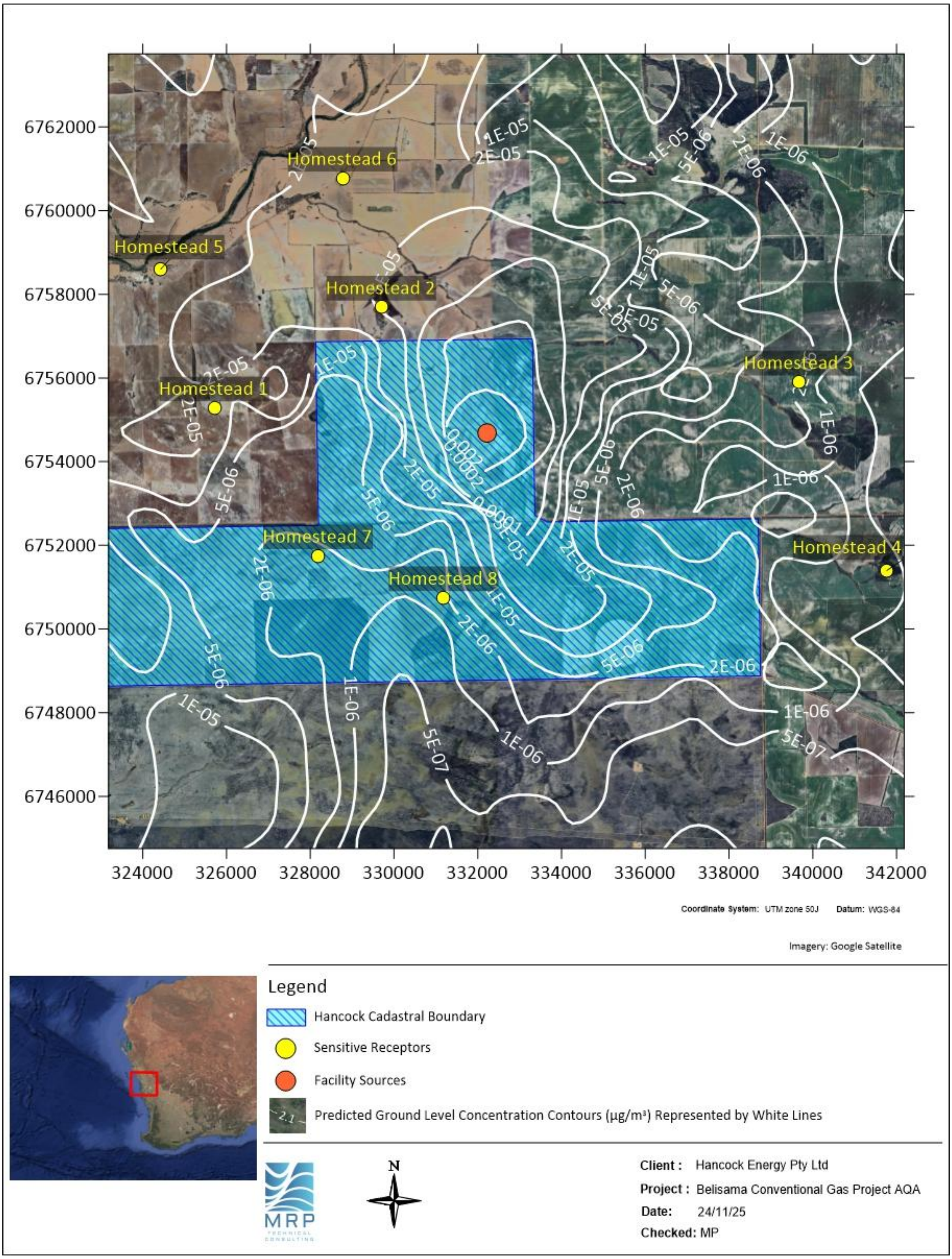

Figure 8-88: Predicted annual average GLCs of xylene for Scenario 4

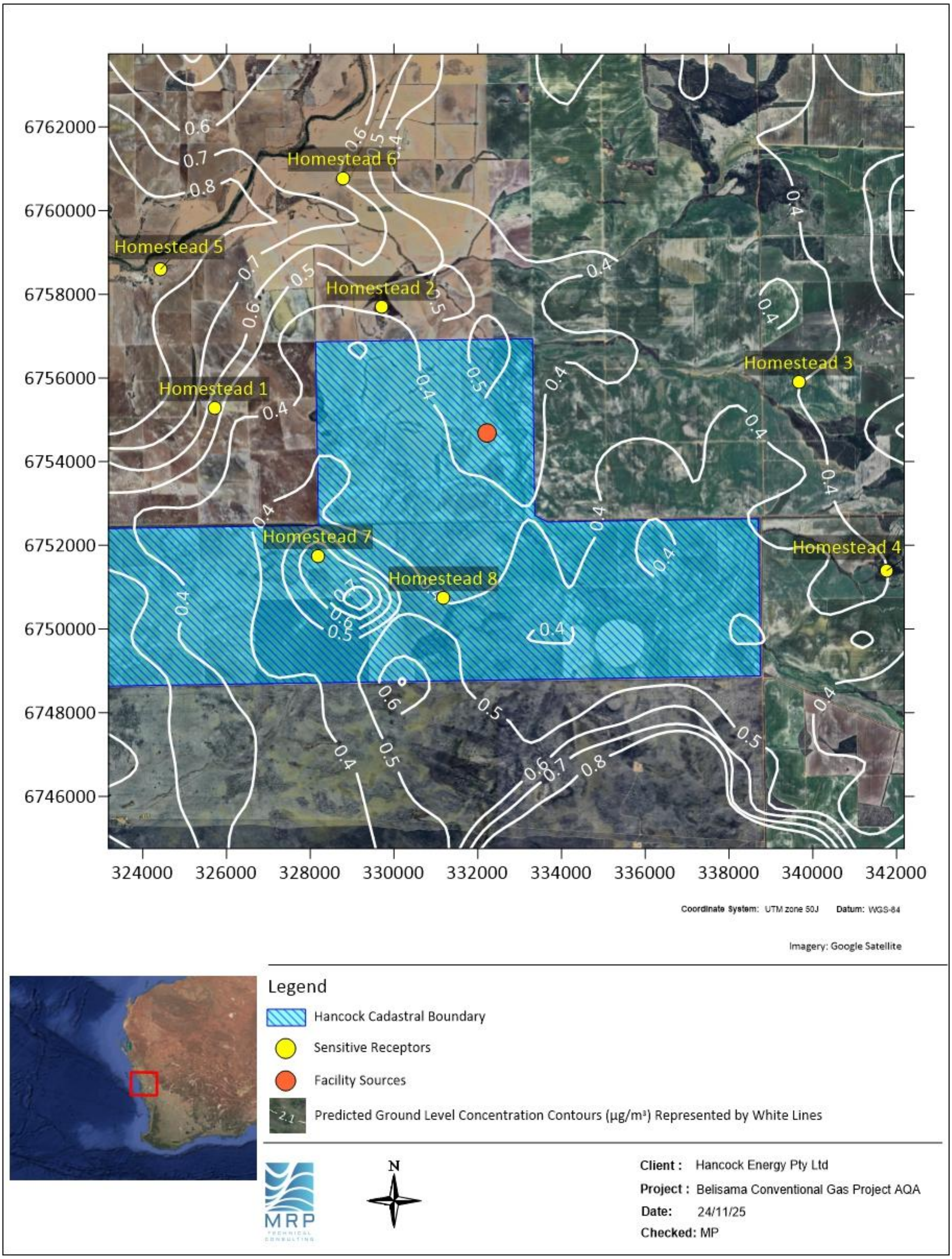

Figure 8-89: 99.9th percentile predicted 1-hour average GLCs of benzene for Scenario 5

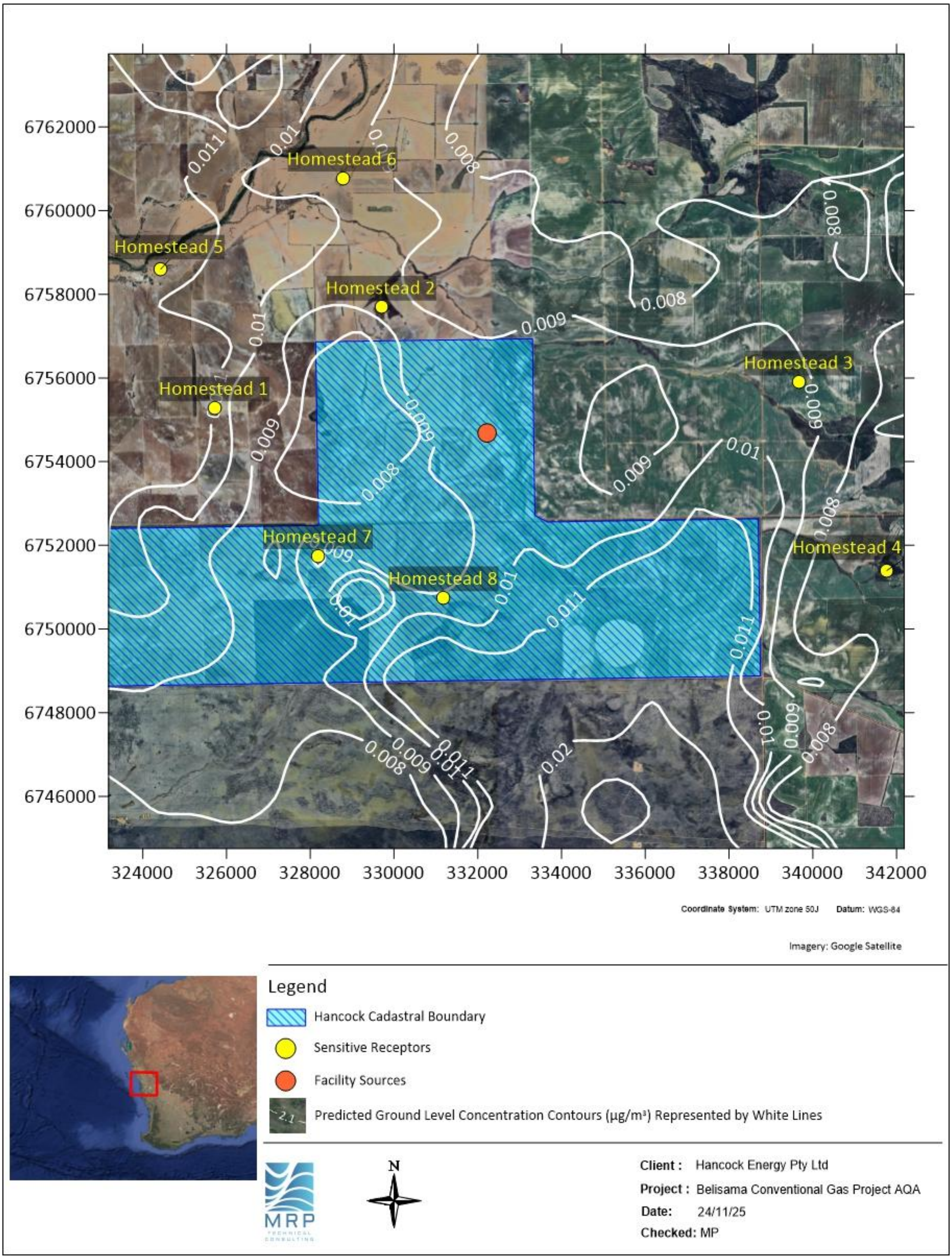

Figure 8-90: Predicted annual average GLCs of benzene for Scenario 5

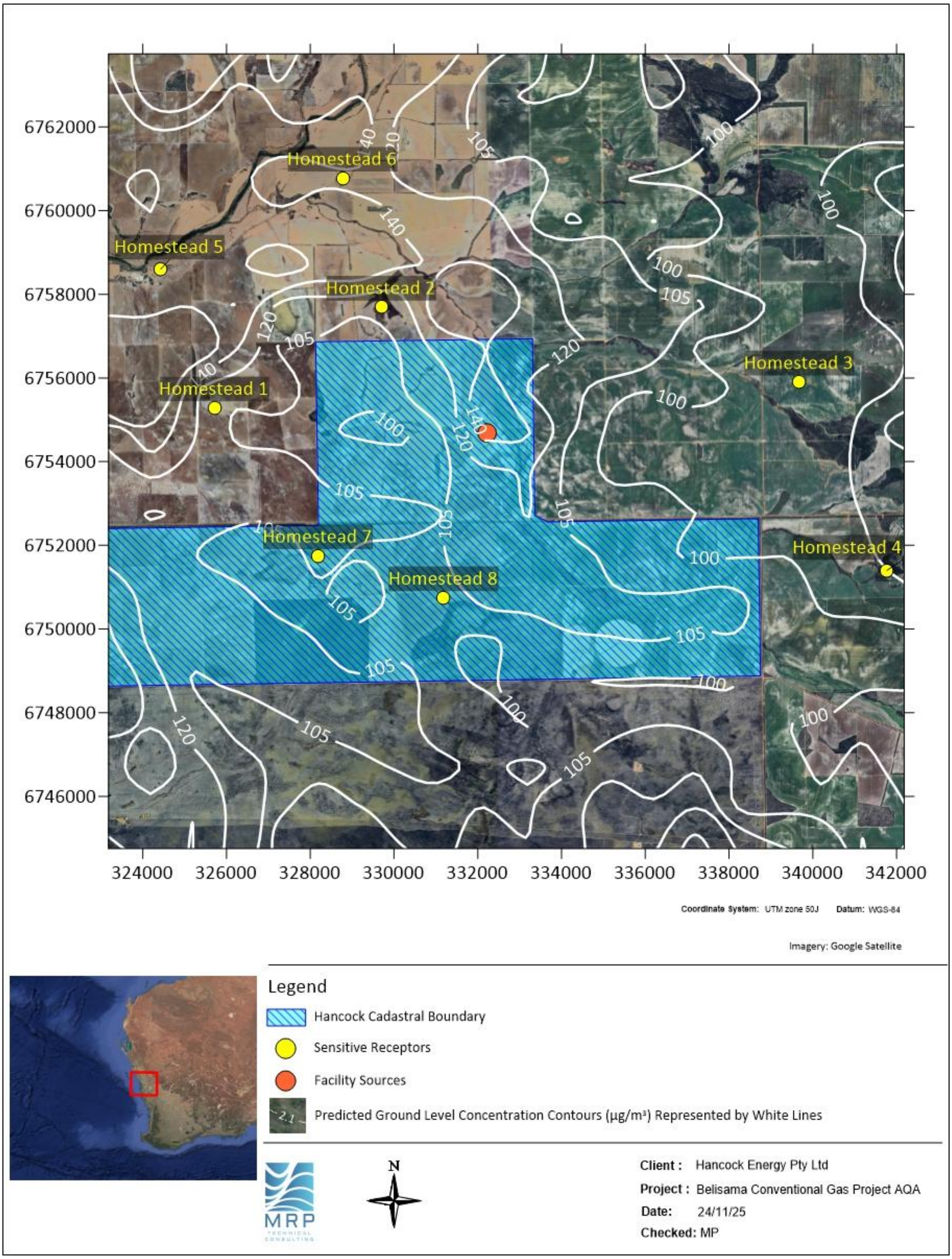

Figure 8-91: Maximum predicted 1-hour average GLCs of CO for Scenario 5

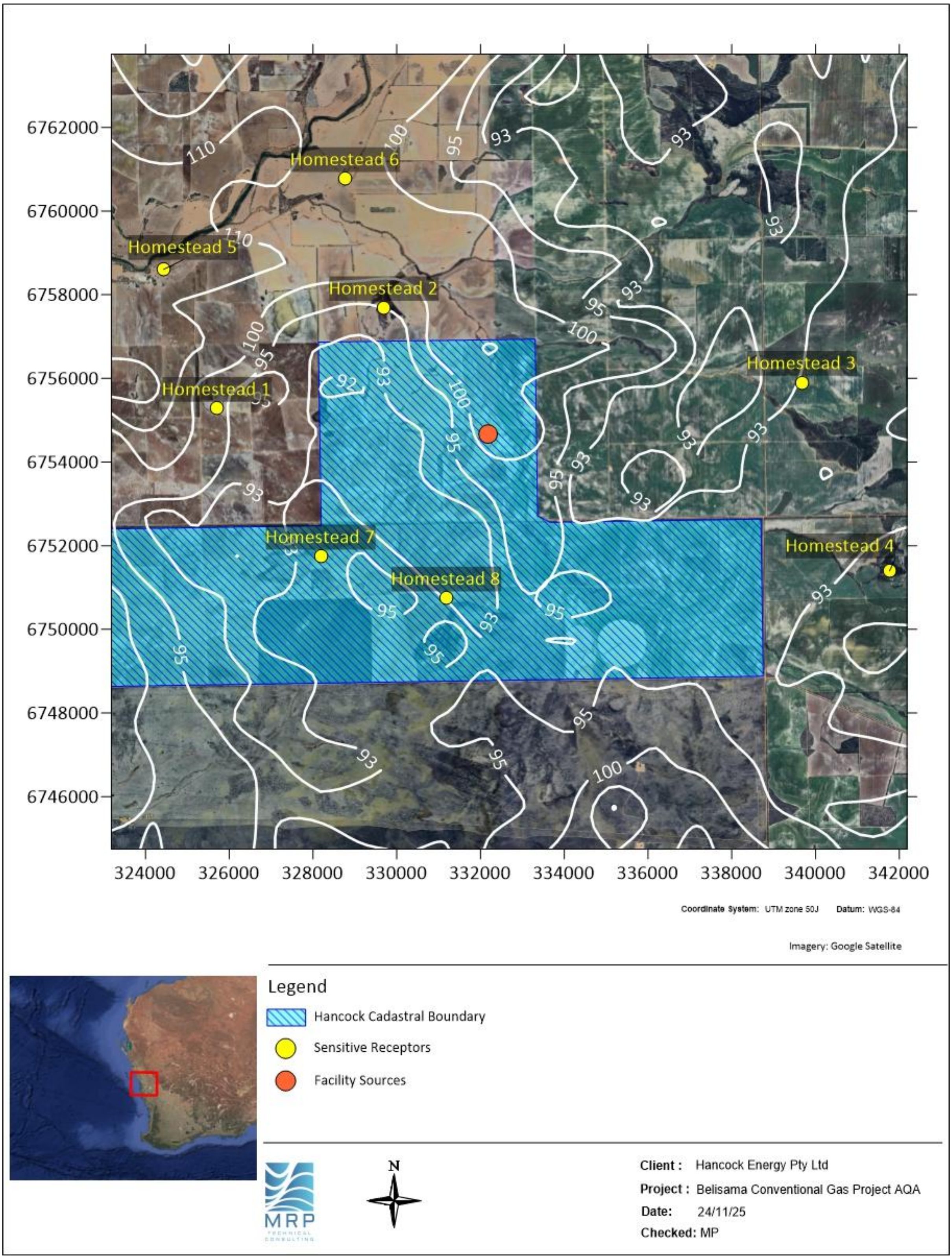

Figure 8-92: Maximum predicted 8-hour average GLCs of CO for Scenario 5

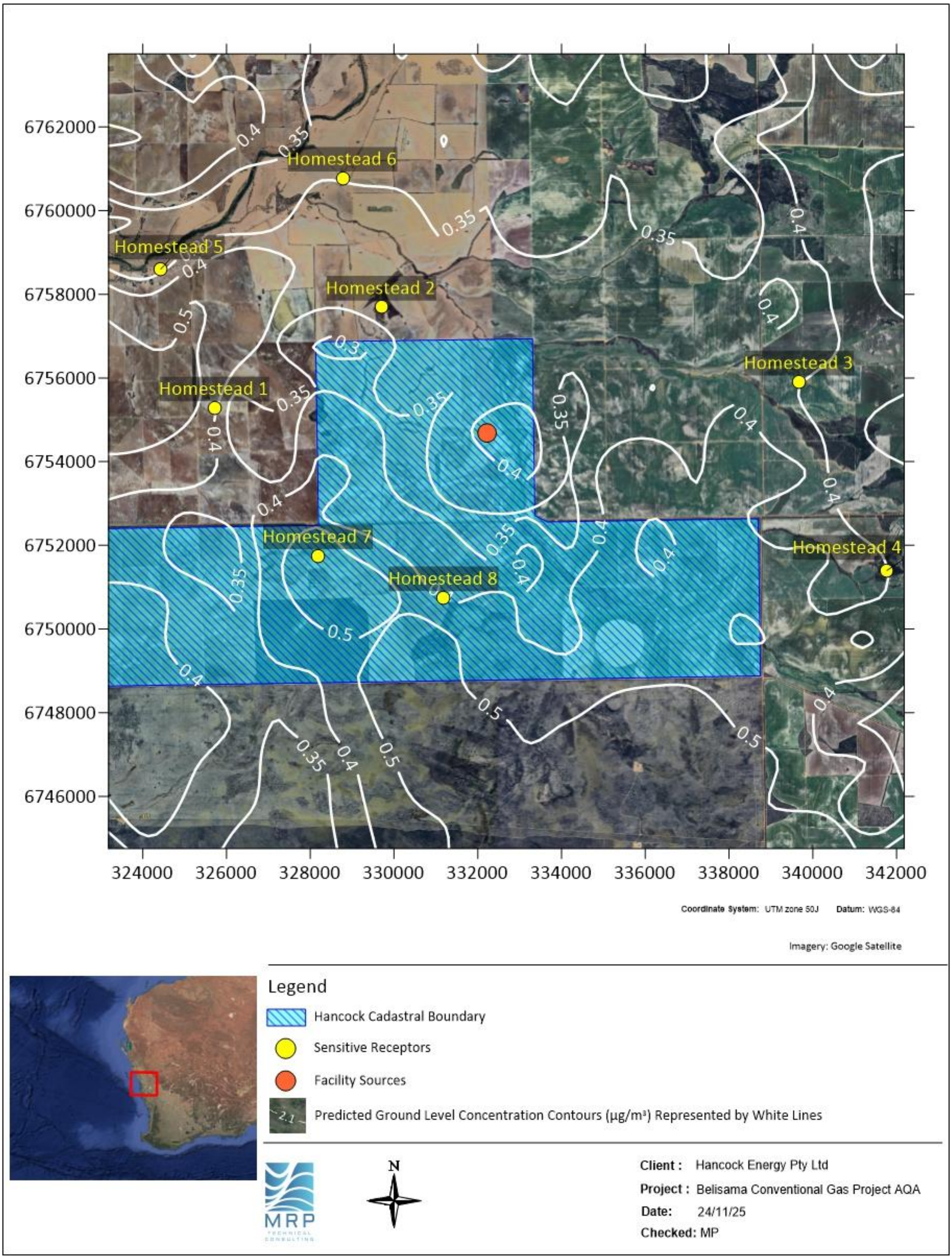

Figure 8-93: 99.9th percentile predicted 1-hour average GLCs of ethylbenzene for Scenario 5

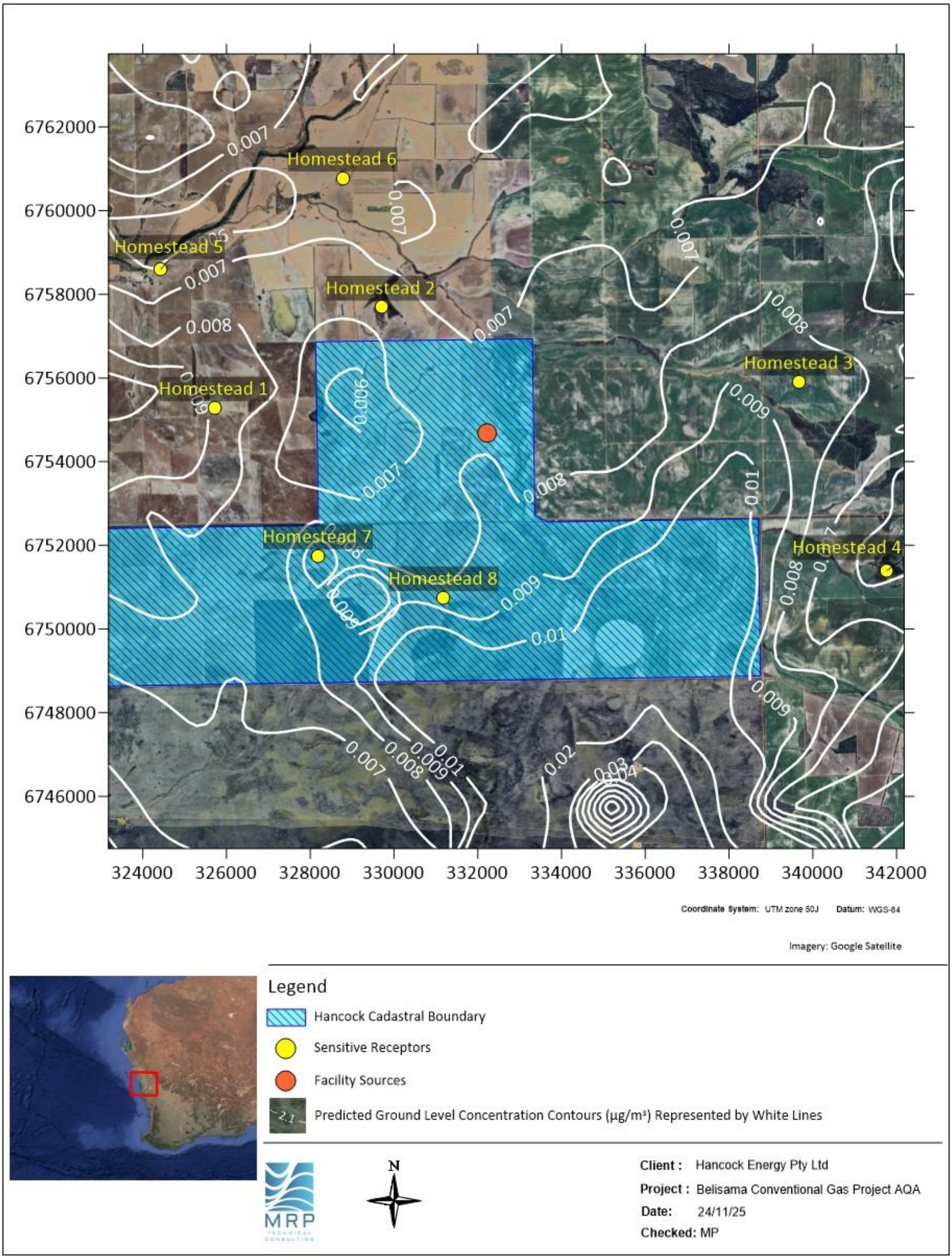

Figure 8-94: Predicted annual average GLCs of ethylbenzene for Scenario 5

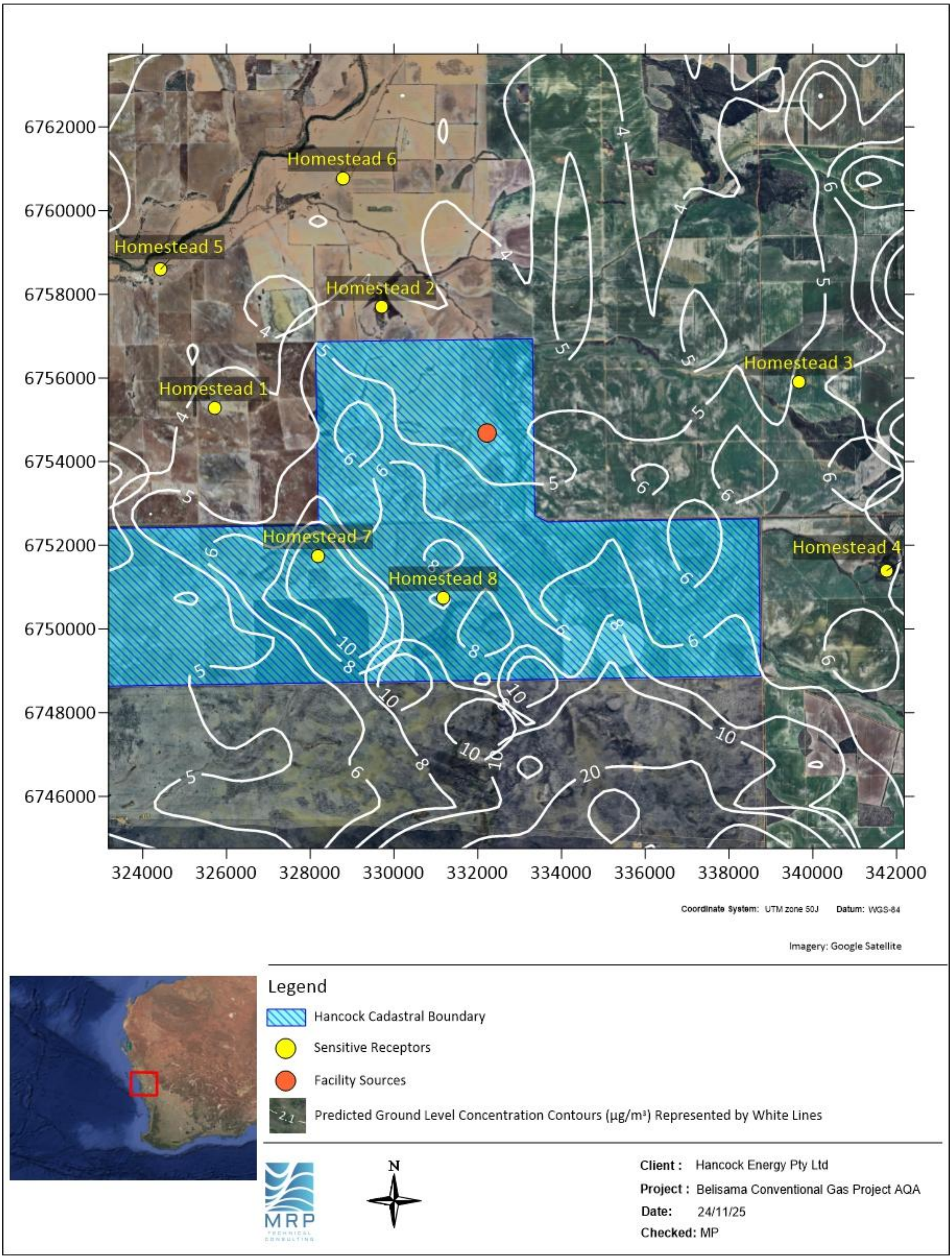

Figure 8-95: Maximum predicted 1-hour average GLCs of H_2S for Scenario 5

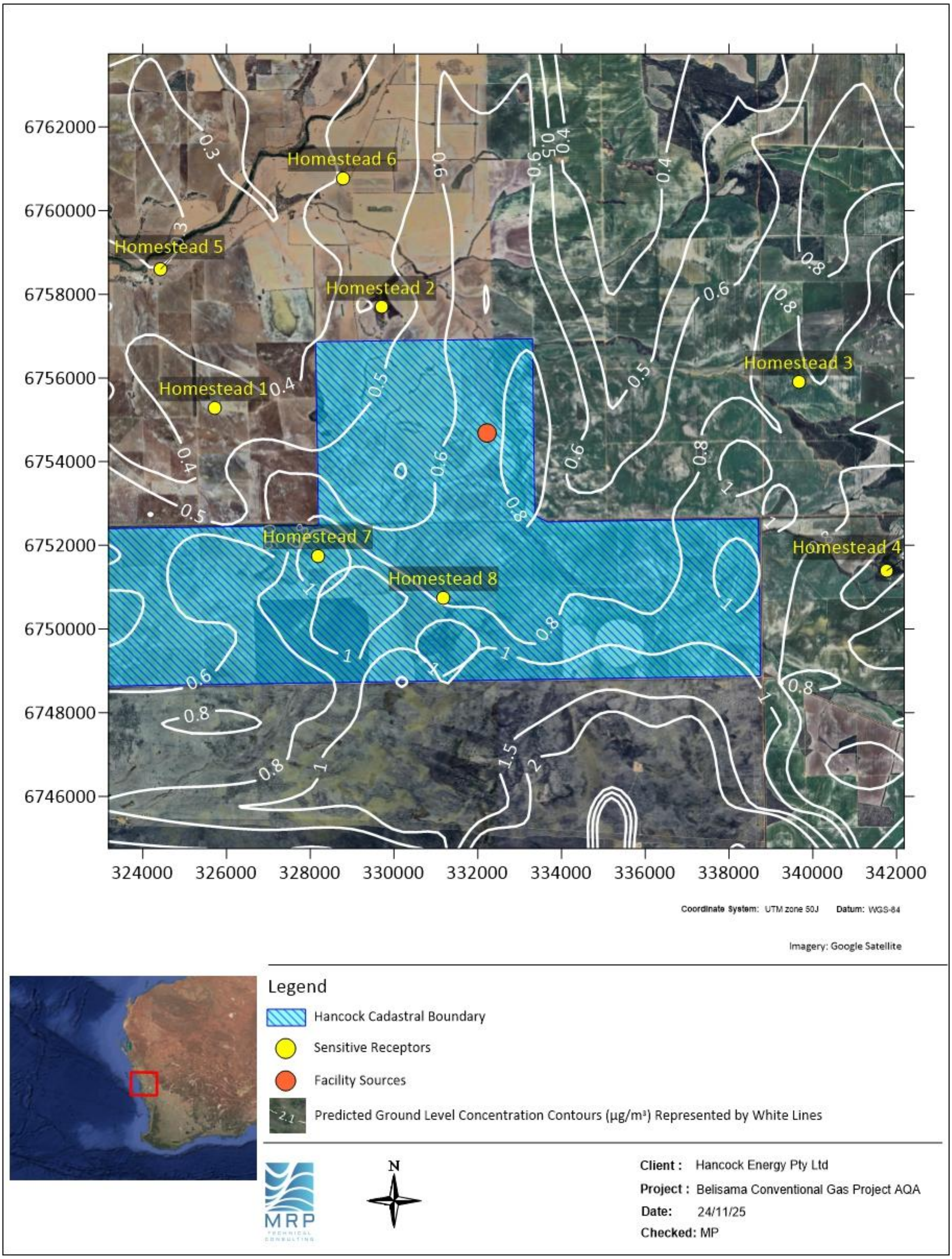

Figure 8-96: Maximum predicted 24-hour average GLCs of H_2S for Scenario 5

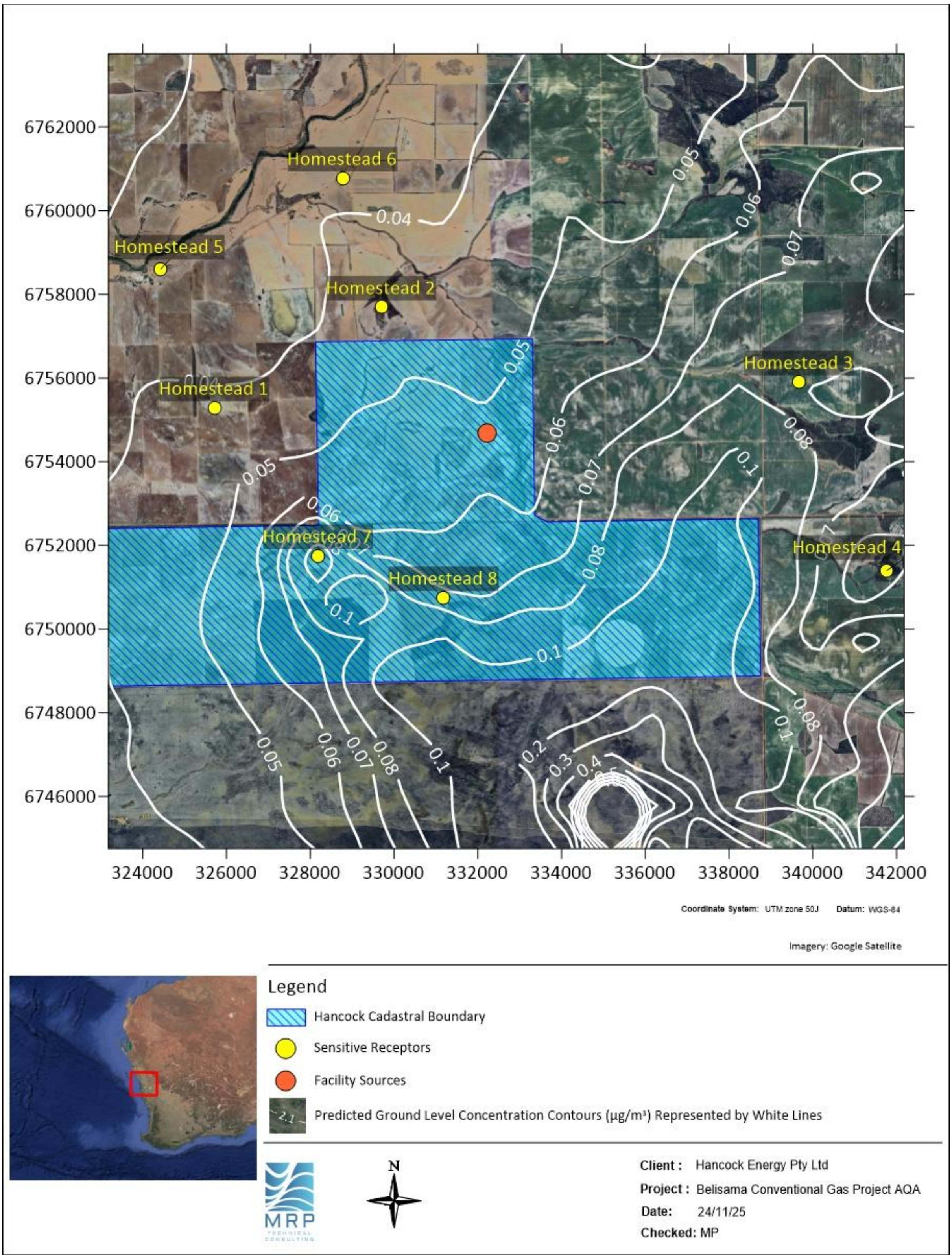

Figure 8-97: Predicted annual average GLCs of H_2S for Scenario 5

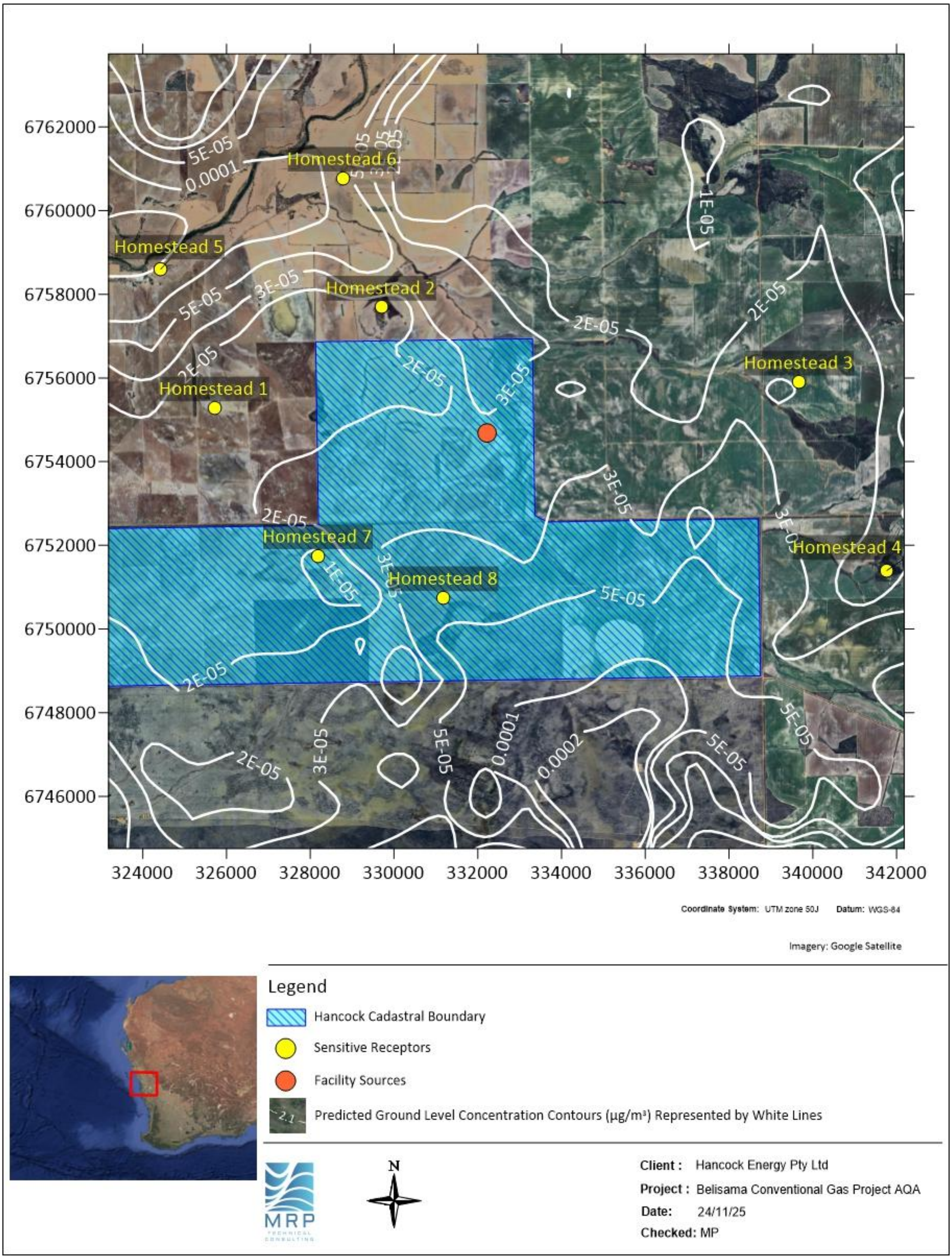

Figure 8-98: 99.9th percentile predicted 1-hour average GLCs of mercury for Scenario 5

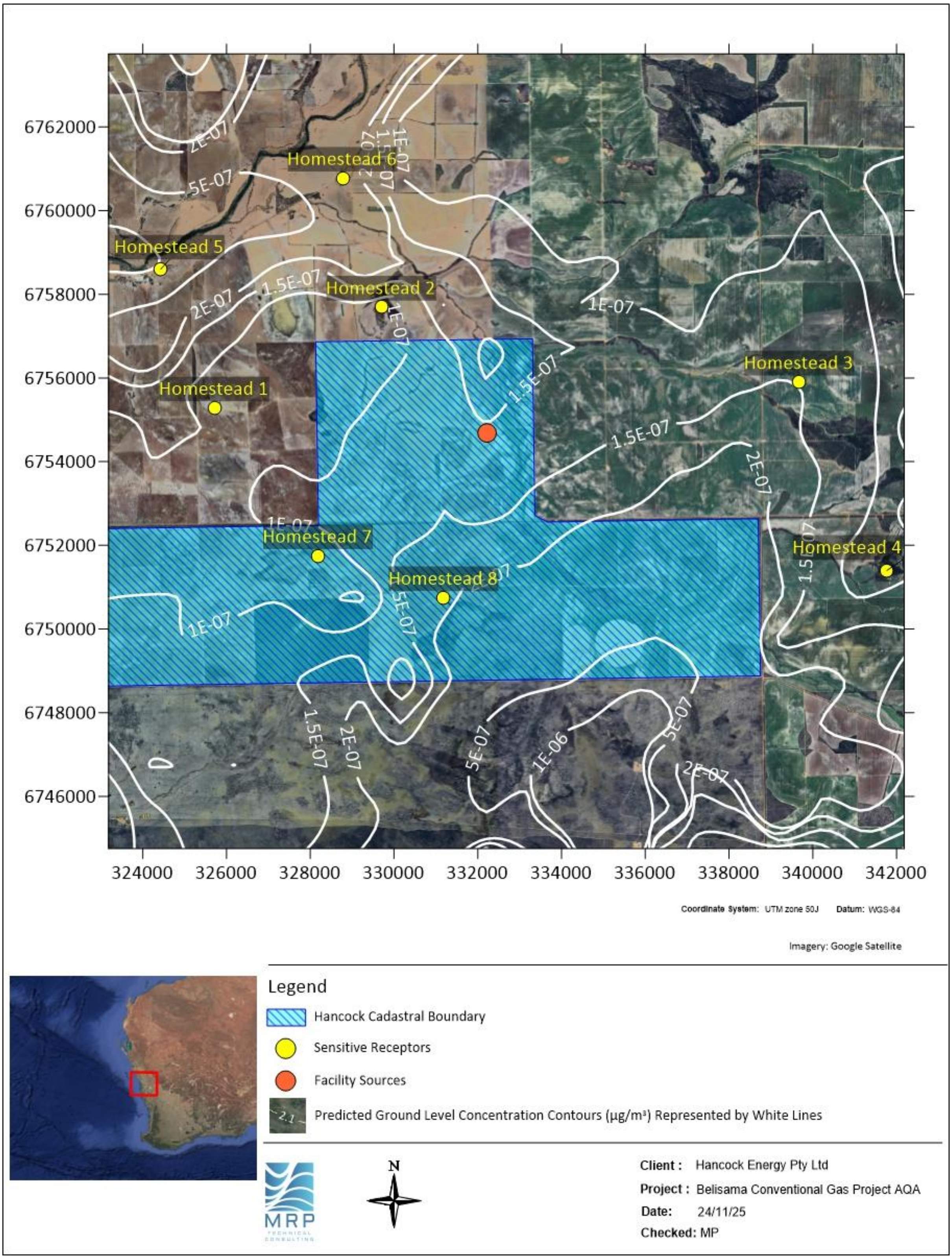

Figure 8-99: Predicted annual average GLCs of mercury for Scenario 5

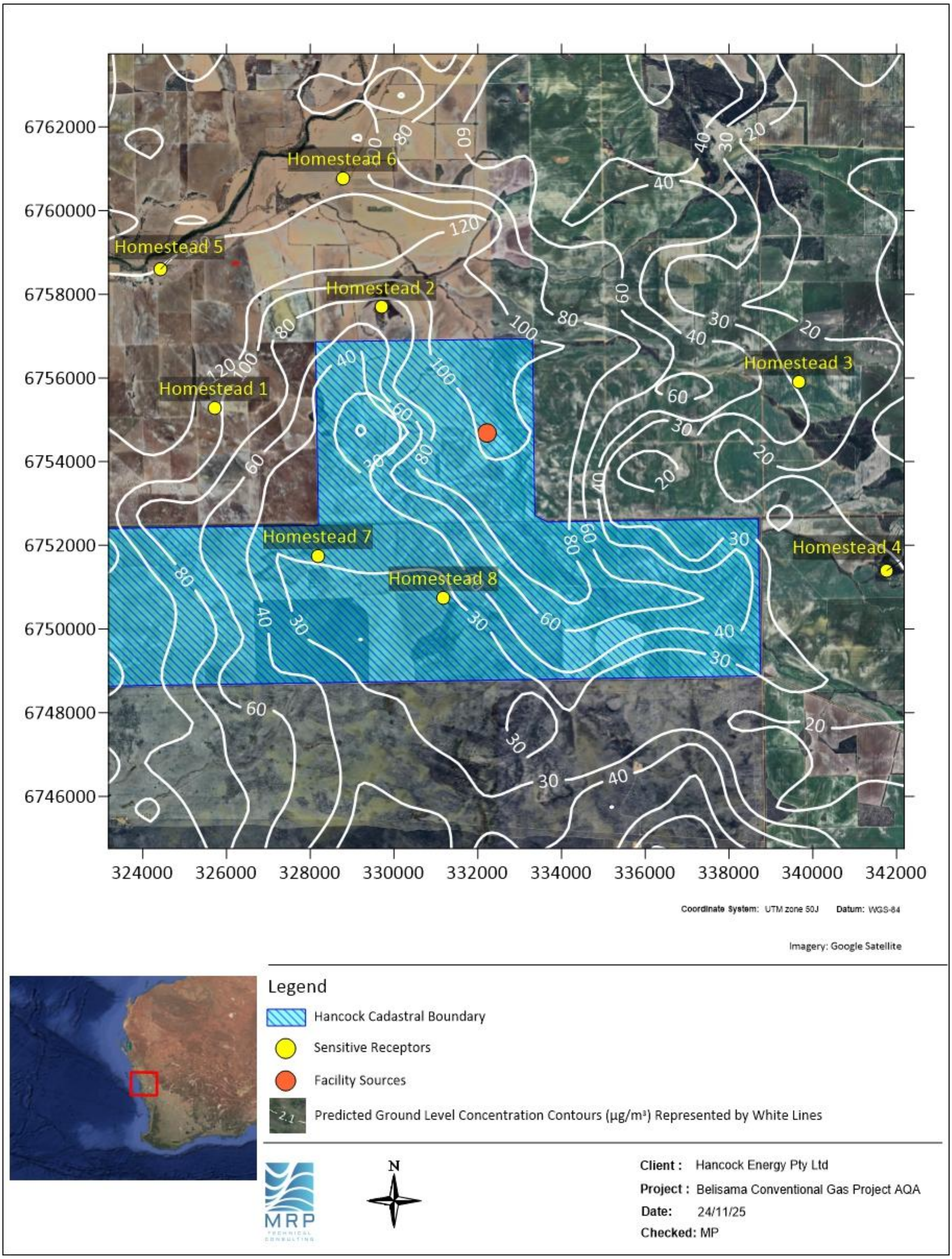

Figure 8-100: Maximum predicted 1-hour average GLCs of NO_2 for Scenario 5

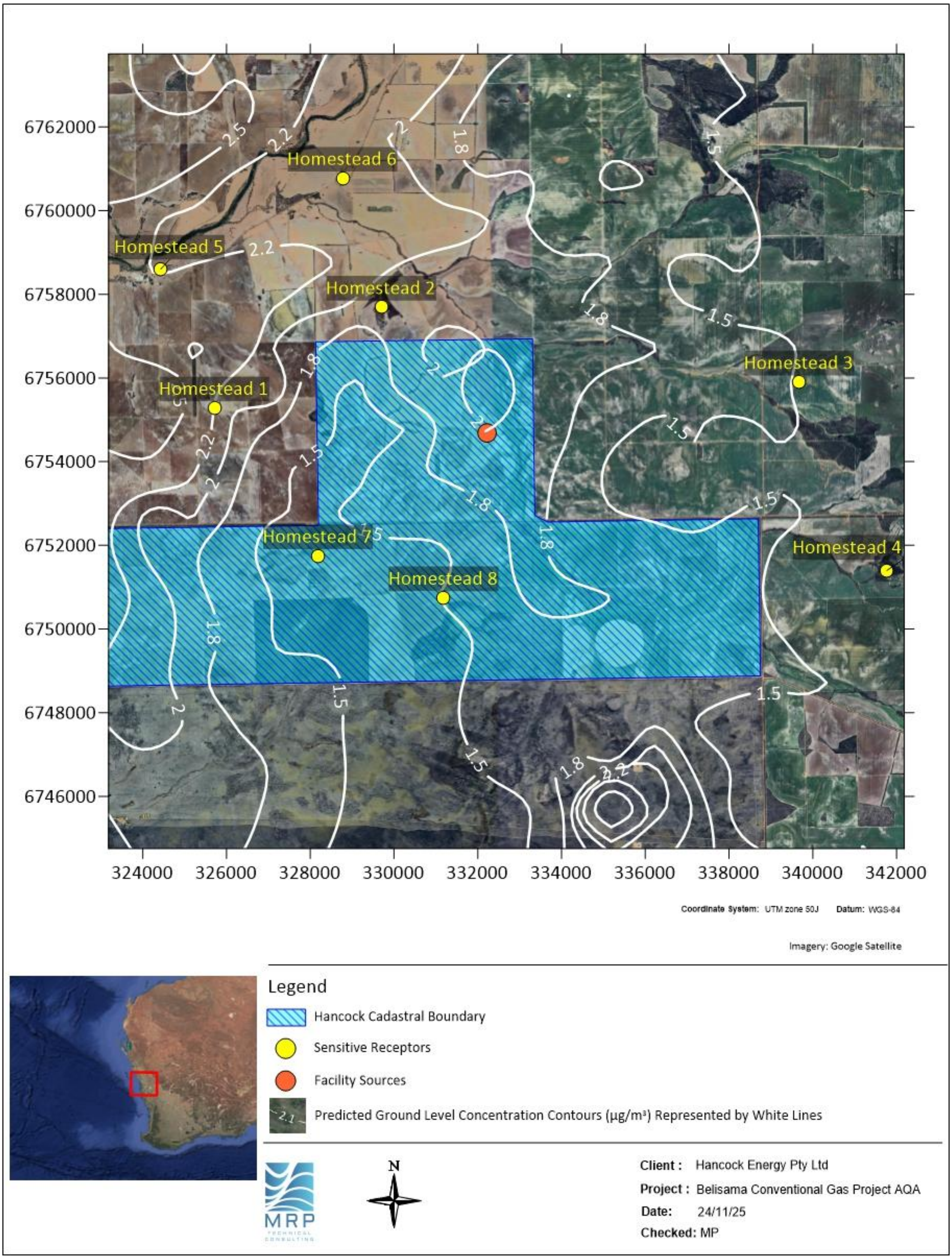

Figure 8-101: Predicted annual average GLCs of NO_2 for Scenario 5

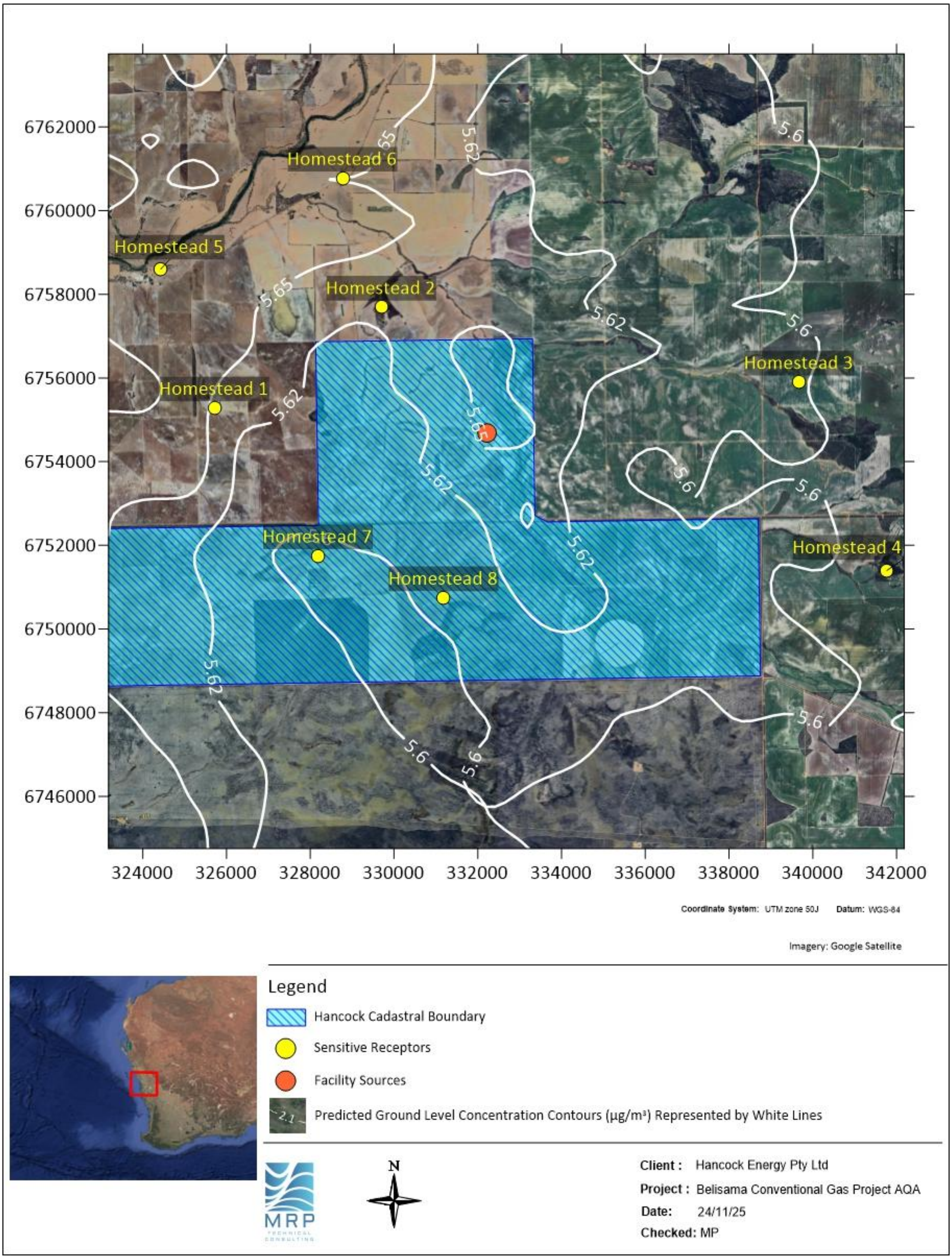

Figure 8-102: Maximum predicted 24-hour average GLCs of $PM_{2.5}$ for Scenario 5

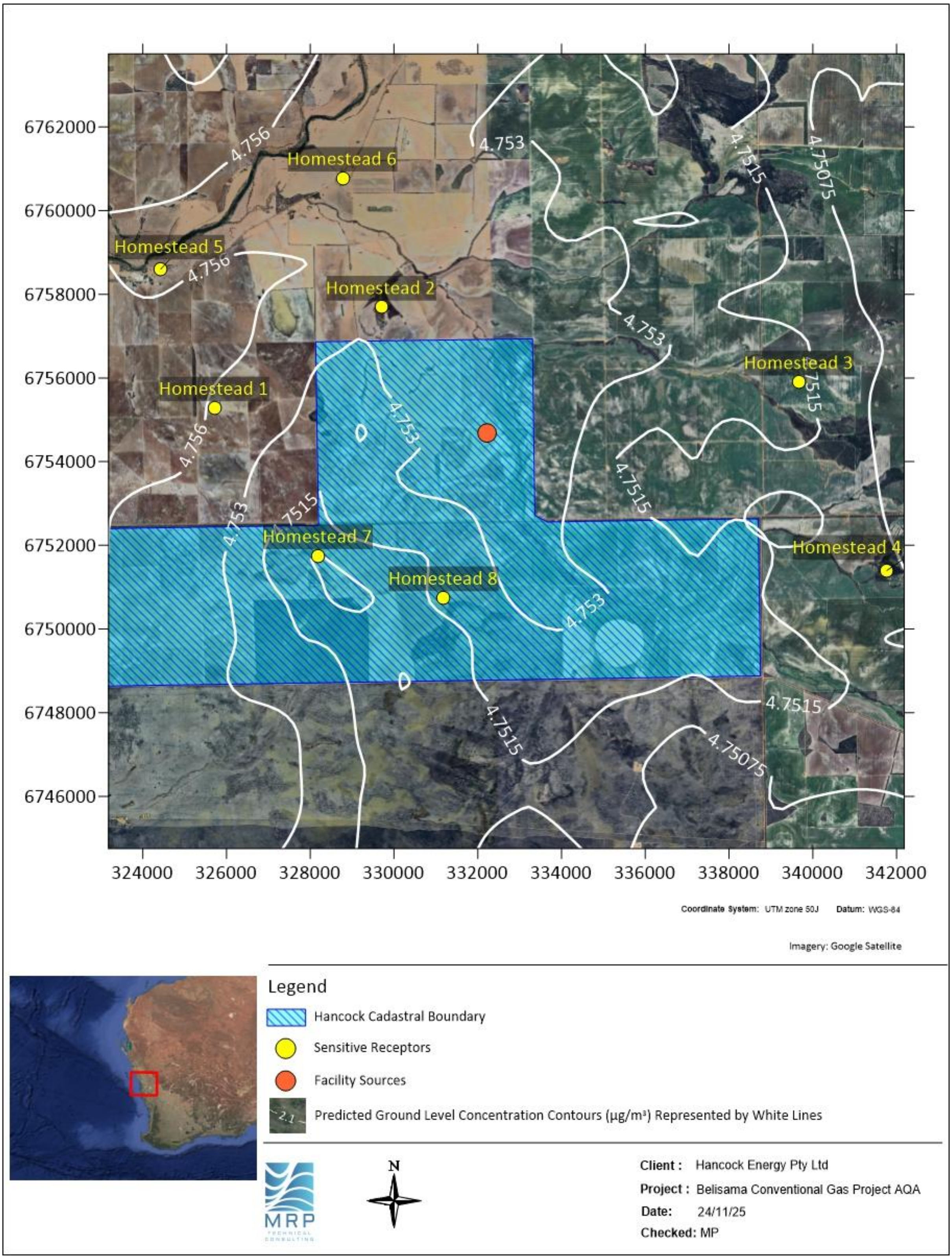

Figure 8-103: Predicted annual average GLCs of $PM_{2.5}$ for Scenario 5

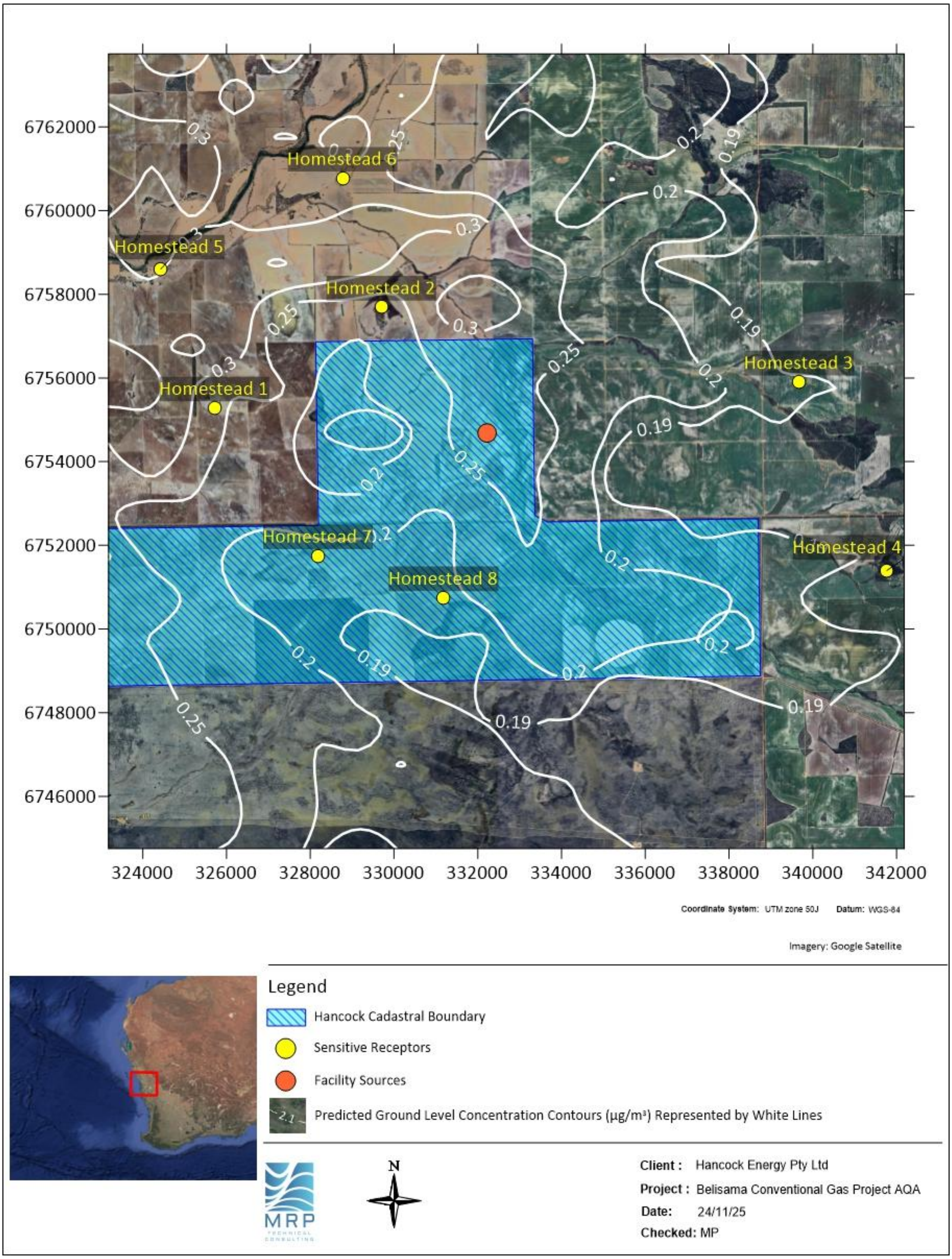

Figure 8-104: Maximum predicted 1-hour average GLCs of SO_2 for Scenario 5

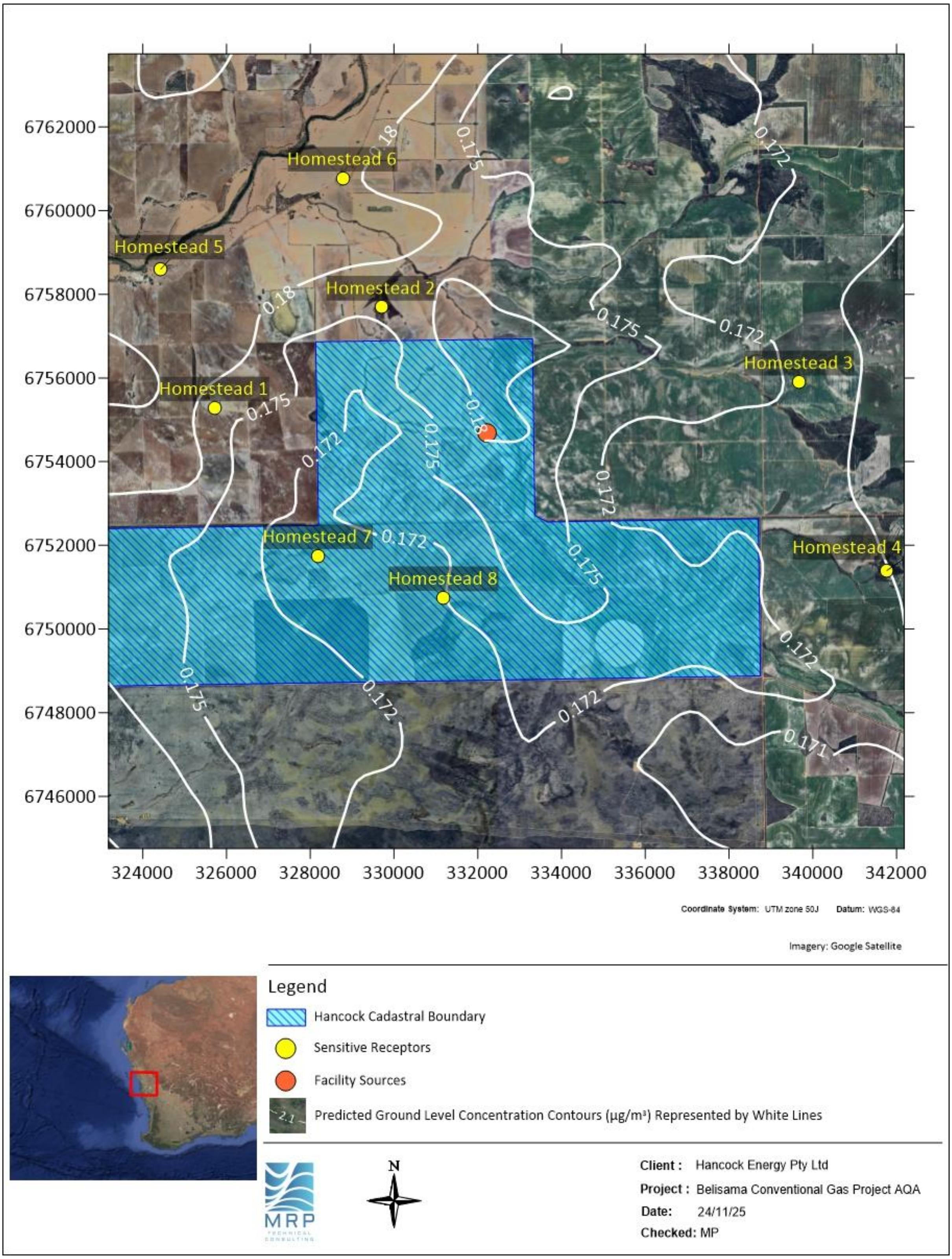

Figure 8-105: Maximum predicted 24-hour average GLCs of SO_2 for Scenario 5

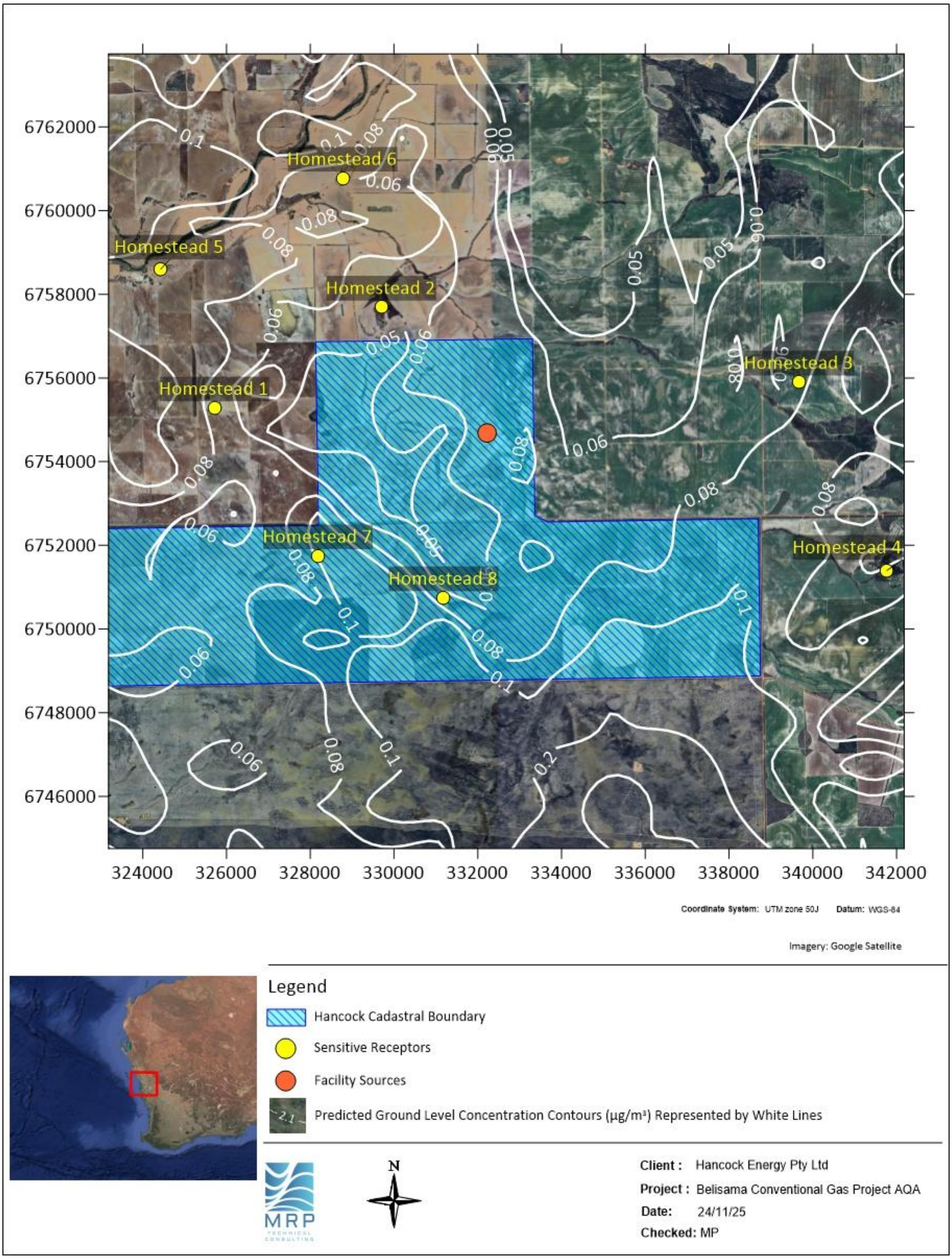

Figure 8-106: Maximum predicted 24-hour average GLCs of toluene for Scenario 5

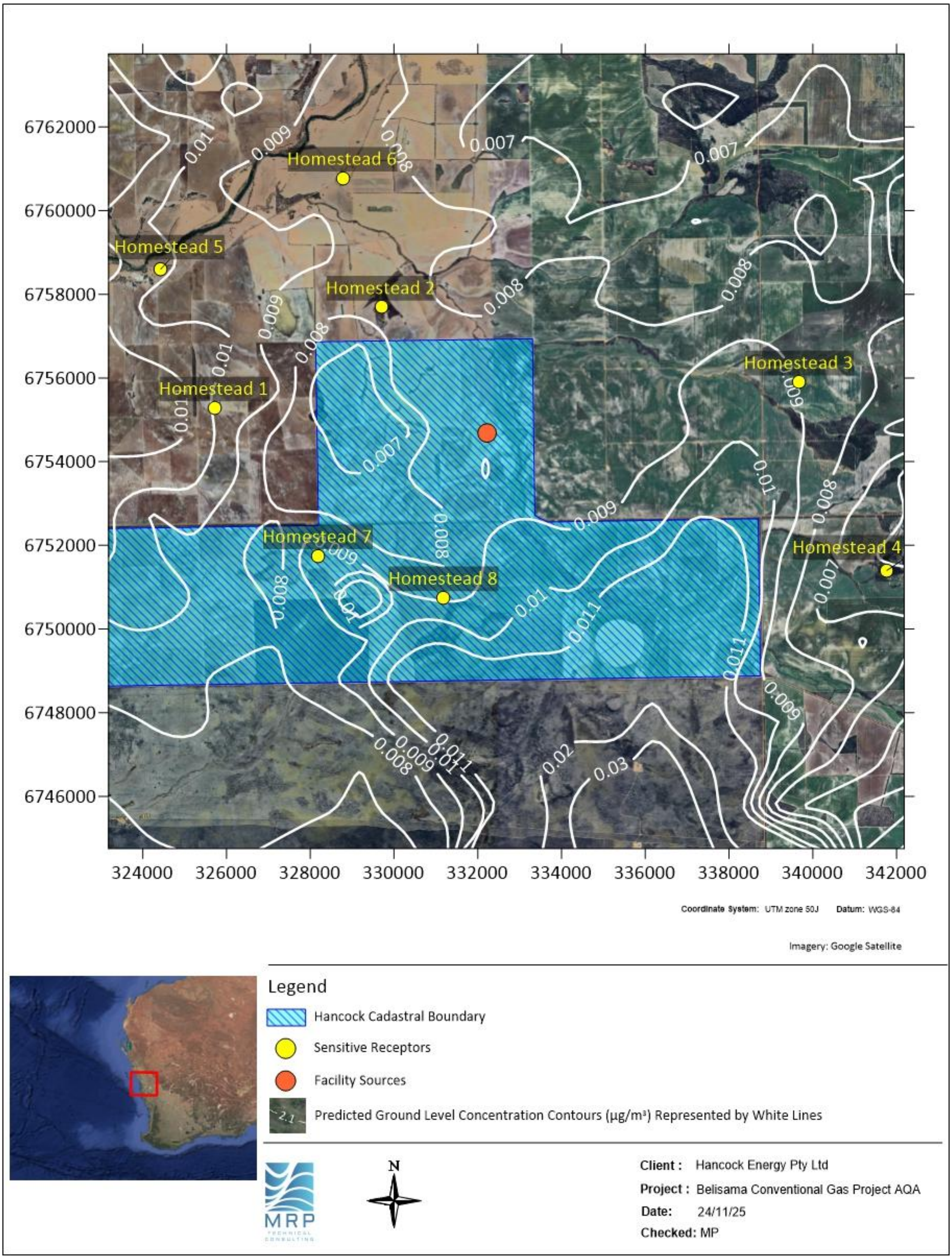

Figure 8-107: Predicted annual average GLCs of toluene for Scenario 5

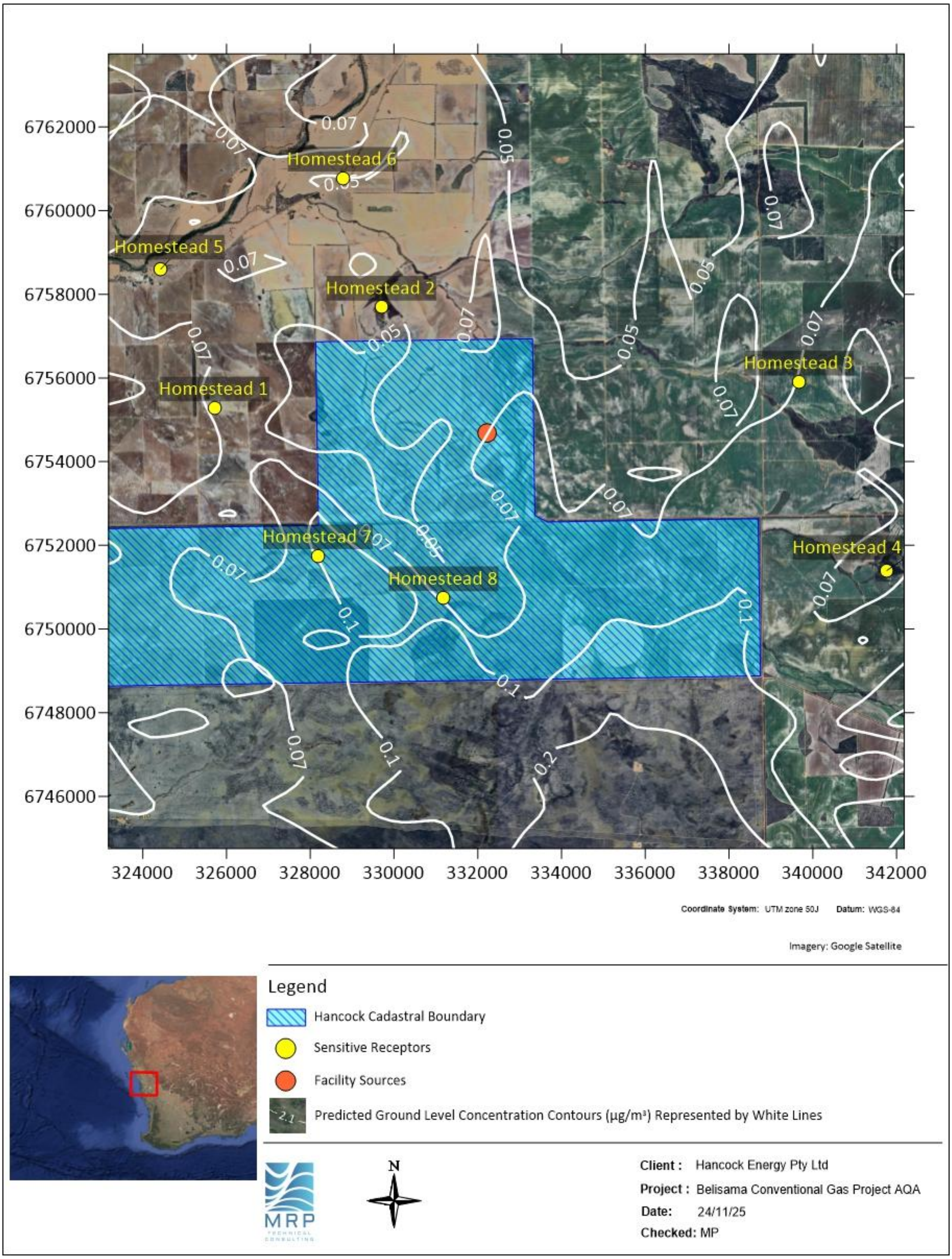

Figure 8-108: Maximum predicted 24-hour average GLCs of xylene for Scenario 5

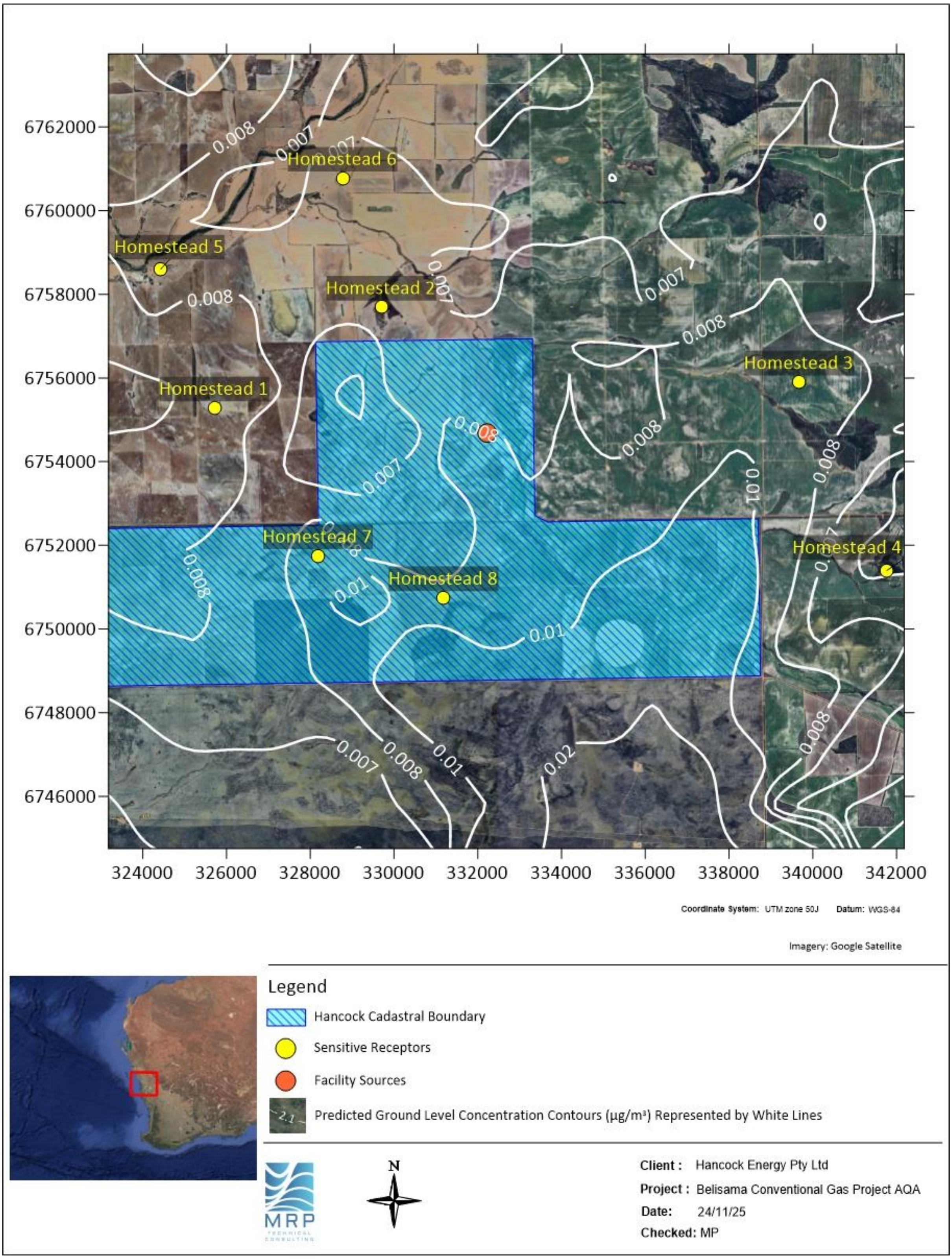

Figure 8-109: Predicted annual average GLCs of xylene for Scenario 5