Works Approval Application Form: Attachment Overview

Applicant: AGL Energy Limited

Prepared by: Ramboll Australia Pty Ltd

Form Reference	Attachment Description
Part 2, Section 2.8	Attachment 1A: Proof of Occupier Status
Part 2, Section 2.9	Attachment 1B: ASIC Company Extract
Part 3, Section 3.4	Attachment 2: Premises Map
Part 11, Section 11.1	Attachment 8: Supporting Information for Works Approval
Part 8, Section 8.12	Attachment 8A: AGL Offfences History
Part 13, Section 13.8	Attachment 10A: Details for cost of works

ATTACHMENT 1A
PROOF OF OCCUPIER STATUS

FORM APPROVAL
[B1791]

COPY

FORM L1

WESTERN AUSTRALIA
TRANSFER OF LAND ACT 1893 AS AMENDED.

LEASE

DESCRIPTION OF LAND (Note 1)

	EXTENT	VOLUME	FOLIO
Lot 13 on Deposited Plan 39572	Whole	2230	46

ENCUMBRANCES (Note 2)

NIL

ESTATE AND INTEREST

FEE SIMPLE

LESSOR (Note 3)

WESTERN AUSTRALIAN LAND AUTHORITY of Level 3, 40 The Esplanade, Perth.

LESSEE (Note 4)

WESTERN ENERGY PTY LTD (ACN 102 984 252) of Level 2, 33 Colin Street, West Perth.

TERM OF LEASE (Note 5)

A term of twenty (20) years.

Commencing from the 1ST day of MAY 2008

THE LESSOR HEREBY LEASES TO THE LESSEE the land above described subject to the encumbrances as shown hereon (Note 6)

As herein mentioned

for the above term for the clear yearly rental of (Note 7) As herein mentioned
payable (Note 8) As herein mentioned

subject to the covenants and powers implied under the Transfer of Land Act 1893 as amended (unless hereby negatived or modified) and also to the covenants and conditions contained herein.

CONTENTS

THIS LEASE is made the 17th day of June 2008

BETWEEN

WESTERN AUSTRALIAN LAND AUTHORITY
Level 3, 40 The Esplanade
Perth
Western Australia
("**Lessor**")

WESTERN ENERGY PTY LTD
(ACN 102 984 252)
Level 2, 33 Colin Street
West Perth
Western Australia
("**Lessee**")

PERTH ENERGY PTY LTD
(ACN 087 386 445)
Level 2, 33 Colin Street
West Perth
Western Australia
("**Guarantor**")

OPERATIVE PART:

The Lessor leases to the Lessee the Property for the Term subject to the terms of the Western Australian Land Authority Act 1992 and payment of the Rent to the Lessor and the observance and performance of the other covenants and agreements mentioned in this deed subject to the reservations mentioned herein.

LESSEE'S COVENANTS

The Lessee COVENANTS AND AGREES with the Lessor as follows:

1 PAY RENT

1.1 To pay to the Lessor the Rent clear of all deductions in advance by the instalments mentioned in the Schedule at the address of the Lessor mentioned in this Lease or to such other address or person or to the Lessor's credit at a bank or other financial institution as the Lessor may by notice from time to time to the Lessee require.

1.2 The Lessee shall pay and discharge all Outgoings as and when due calculated on a daily basis throughout the Term and any period of holding over together with all meter

installation costs telephone connection charges and rents. All such charges shall be paid to the Lessor within seven (7) days of invoice by the Lessor to the Lessee.

1.3 Where any Outgoings relate to the supply of electricity gas telephone or other services and such supply is separately metered to the Property the Lessee shall pay such Outgoings as and when due. Where any Outgoings include Outgoings with respect to other property, the Lessee shall pay a proportionate amount of such Outgoings calculated in the ratio that the area of the Property bears to the total area of the property to which such assessment of outgoings relate.

2 RESERVATION TO LESSOR

2.1 The Lessor reserves to itself and all persons authorised by the Lessor the right to enter the Property with or without vehicles and equipment at all reasonable times and after giving reasonable notice to the Lessee for the purpose of:

(a) access to and egress from other sites in the vicinity of the Property; and

(b) the right to install, maintain, use, repair, alter and replace pipes, ducts, conduits and wires leading through the Property;

(c) to pass and run gas, water, sewerage, heat, oil, electricity and other services through such pipes, ducts, conduits and wires and to enter upon the Property at any time or times for such purposes; and

(d) making, creating, granting or consent to the making, creating or granting of any road, right of way, water right or easement of any nature or kind whatsoever over the Property

PROVIDED THAT the operations of the Lessee are not as a consequence prejudiced or interfered with in any material manner.

2.2 The Lessee agrees not to interfere with or restrain such rights of access mentioned in **Clause 2.1** unless such access will materially prejudice or interfere with the operations of the Lessee.

2.3 In exercising its rights under **Clauses 2.1** and **2.2** the Lessor must:

(a) not cause any interference to the occupation or use of the Property by the Lessee; and

(b) make good any damage caused to the Property by the exercise of those rights.

3 MAINTAIN AND REPAIR PROPERTY

3.1 At all times during the Term at the Lessee's own expense maintain replace repair and keep the Property in good clean substantial and tenantable repair and condition to ensure compliance with all legislation including the Occupational Safety and Health Act 1984

fair wear and tear and (provided that the Lessor's indemnity under any insurance policy for the time being in force shall not have been vitiated or avoided by any act or neglect of the Lessee or its servants agents sub-Lessees licensees or invitees) damage by fire storm tempest or act of God excepted.

3.2 To keep the Property cleaned drained in a sanitary condition and clear of rubbish and debris and to store all garbage rubbish and refuse in a proper and hygienic manner within the Property and attend to the expeditious disposal thereof and observe any directions given from time to time by the Lessor relating thereto.

3.3 Not to burn any garbage refuse or rubbish except in incinerators approved by any Local or Public Authority for that purpose.

3.4 To keep all drains pipes water telephone gas electricity and sewerage connections on or appurtenant to or connecting with the Property in good and substantial repair and condition and cleaned drained and in a sanitary condition and clear of all rubbish and debris and not allow any person to place any material likely to block sewerage pipes in the toilets (if any).

3.5 At the determination of the Term to clear the Property of all rubbish and debris and to leave the Property in a clean and tidy condition to the satisfaction of the Lessor.

3.6 To treat and maintain all frontages to the Property so as to give an aesthetically pleasing appearance to a reasonable standard consistent with the Permitted Use and to keep all ground clean and tidy and free from rubbish and weed growth.

3.7 To repair all defects to the Property of which notice shall be given by the Lessor to the Lessee and for which the Lessee is liable under this Lease and in default to pay to the Lessor the costs and expenses incurred by the Lessor in repairing those defects.

3.8 Where any loss or damage is caused to the Property and any insurance effected in respect of that loss or damage has been rendered irrecoverable by some act or default of any person other than the Lessor the Lessee shall make good any loss or repair any damage and in default shall pay to the Lessor the costs and expenses incurred by the Lessor in making good any loss or repairing any damage.

4 INSURANCE

4.1 The Lessee shall at its cost effect and keep in force at all times during the Term in the respective names of the Lessee and the Lessor for their respective rights and interests the following policies of insurance with an insurer reasonably acceptable to the Lessor:

(a) a Public Liability Policy including cover against liability to any person for any reason arising in or about the Property for an amount of indemnity of not less than TWENTY MILLION DOLLARS ($20,000,000.00) (or any higher sum as determined by the parties (acting in good faith) in accordance with industry accepted standards from time to time and failing agreement, by an expert appointed by the President for the time being of the Law Society of Western Australia;

(b) Workers Compensation Insurance in accordance with the Workers Compensation Legislation of Western Australia.

4.2 The Lessee shall if required by the Lessor within thirty (30) days from the date of the Lessor's request produce to the Lessor a current certificate of renewal in respect of any policy of insurance required pursuant to **Clause 4.1.**

4.3 If the Lessee does or permits to be done any act matter or thing which has the effect of invalidating or avoiding any policy of insurance taken out by or effected hereunder for the benefit of the Lessor then the Lessee shall pay to the Lessor on demand the full amount of any damage or loss which the Lessor may suffer or incur as a result thereof.

4.4 To comply with all the terms warranties and conditions of the insurance policies effected in relation to the Property or for public liability or any other insurance or the requirements of the insurer relating to the policy and the Property in respect of insurance taken out by the Lessee or in respect of which the Lessor has advised the Lessee of the terms and not do or fail to do any act matter or thing that may cause the premium to be increased or cause the insurance to be prejudiced or liable to be cancelled or avoided or whereby any claim on the policy may be reduced or payment withheld either in whole or in part.

4.5 In the event of any damage or loss to the Property or injury to any person in relation to which the Lessor is liable and subject always to the provisions of the relevant policy of insurance the Lessor alone shall have full power to receive payment of insurance monies and to settle compromise or enforce any claim against any insurance company or for all moneys payable under any insurance or compensation.

4.6 To pay any additional premium (whether incurred by the Lessor or the Lessee) incurred as a result of the nature of the business carried on by the Lessee on the Property or as a result of the Lessee's occupation of the Property.

4.7 The Lessee's obligations pursuant to **Clauses 4.3** and **4.4** are subject always to the Lessor having provided the Lessee with an up to date copy of the Lessor's policy of insurance.

5 PAY COSTS

5.1 To pay to the Lessor all the Lessor's reasonable costs fees and expenses which may be payable expended incurred or sustained by the Lessor in respect of or incidental to:

(a) the instructions for and the preparation execution and of this deed and any surrender of the lease granted by this deed;

(b) any exercise or enforcement of the Lessor's Remedies where the Lessee is in default;

(c) any breach of or failure of the Lessee to observe and perform the Lessee's Covenants;

(d) compliance by the Lessor with the provisions of Section 81 of the Property Law Act 1969 notwithstanding that the Lessee may have applied to the Court (whether successfully or not) for relief pursuant to Section 81 (2) of the Property Law Act 1969;

(e) the withdrawal of any caveat claiming an interest in the Property and lodged over the Property pursuant to this deed where the Lease is terminated as a consequence of a default by the Lessee.

5.2 The Lessee must pay all stamp duty on this Lease excluding any fines and penalties incurred as a result of an act or omission of the Lessor.

6 PAY INTEREST

To pay interest to the Lessor at the rate per annum from time to time being the rate charged by BankWest on overdraft facility not exceeding ONE HUNDRED THOUSAND DOLLARS ($100,000.00) on the daily balance of all outstanding Rent outgoings costs and expenses due by the Lessee but unpaid for seven (7) days after payment is due to the Lessor and calculated from the due date of payment of the moneys in respect of which interest is chargeable.

7 ENTRY ON PREMISES

7.1 Without limiting the operation of **Clause 2** to permit the Lessor or its servants or agents to enter the Property with or without tools machines and materials at all reasonable times subject to giving reasonable notice to the Lessee except in the case of an emergency when no notice need be given to:

(a) inspect the Property and ascertain whether the Lessee is observing and complying with the Lessee's Covenants;

(b) do all such acts matters and things as in the opinion of the Lessor may be necessary desirable or convenient in order to rectify any breach of the Lessee's Covenants or to enforce the Lessor's Remedies (without the Lessor being under any obligation so to do and without prejudice to the Lessor's Remedies).

7.2 Subject to **Clause 7.4**, the Lessee shall facilitate the Lessor exercising the Lessor's Remedies and will not claim any compensation or abatement of Rent for any inconvenience caused by the Lessor provided that the Lessor shall exercise its rights so as to minimise as far as is reasonably practicable damage and inconvenience to the Lessee and provided the alterations or additions to the Property are of substantial benefit to the Lessee.

7.3 In exercising any powers under this clause the Lessor shall observe the reasonable security practices adopted by the Lessee.

7.4 In exercising its rights under **Clause 7.1** the Lessor must:

(a) not cause any undue interference to the occupation or use of the Property by the Lessee; and

(b) make good any damage caused to the Property by the exercise of those rights.

8 NOT TO ALTER OR DAMAGE PROPERTY

8.1 Not to make or allow to be made any external or internal addition or alteration to the Property except in accordance with drawings and specifications and in materials previously approved by all Local or Public Authorities and subject to the Lessee giving to the Lessor not less than fourteen (14) days prior written notice of any application to any Local or Public Authority to effect the addition or alteration.

8.2 Not to damage dismantle or destroy the Property or allow the Property to be damaged dismantled or destroyed.

9 DELIVER NOTICES

9.1 To forthwith deliver to the Lessor copies of all notices orders or summonses relating to or which could relate to the Property received by the Lessee from any person or any Local or Public Authority.

9.2 To pay to the Lessor all monies by way of compensation relating to the Property received from any local public or other authority other than in respect of the:

(a) Lessee's Improvements;

(b) Lessee's interest in this Lease; or

(c) Permitted Uses; or

(d) Lessee's use of the Property.

9.3 To give to the Lessor prompt notice in writing of any accident to or defect or want of repair to any part of the Property and of any circumstances likely to be or cause any danger risk or hazard to the Property or any person thereon of which the Lessee is or ought to be aware.

10 INDEMNITY

Notwithstanding the existence of any policy or policies of insurance in the name of the Lessor or of the Lessor and any other person including the Lessee the Lessee hereby indemnifies and agrees to keep indemnified the Lessor from and against:

(a) all loss or damage to the Property or any adjoining or nearby property caused by the negligence of the Lessee or any employee agent licensee customer or invitee of the Lessee.

(b) all damage sums of money costs charges expenses actions claims and demands which may be sustained or suffered or recovered or made against the Lessor by the Lessee or by any other person for any injury the Lessee or such other person may sustain when using or entering or near the Property or any appliance connected with the Property;

(c) the use or occupation of the Property by the Lessee or its servants, agents or contractors;

(d) any work carried out by or on behalf of the Lessee or its servants, agents or contractors under this Lease;

(e) the Lessee's activities, operations, business or other use of any land under this Lease;

(f) Pollution of the Property or any land adjoining or near the Property and of the air generally above the Property by any act or omission of the Lessee whatsoever, including but not limited to the escape from the Property of petroleum or any other inherently dangerous or inflammable liquid or matter;

(g) any breach of the Lessee's Covenants;

(h) the exercise or attempted exercise of the Lessor's Remedies,

PROVIDED THAT the Lessee shall not be responsible for any loss or damage caused or contributed to by the act, neglect or default of the Lessor or its servants, agents or of those the Lessor permits to enter upon or use the Property (other than the Lessee) or any person claiming under or in trust for the Lessor, and PROVIDED FURTHER that the Lessor shall take reasonable steps to mitigate and avoid any such losses or damage.

11 COMPLY WITH ACTS

11.1 The Lessee shall comply with and observe all present and future laws statutes legislation regulations and by-laws and the requirements and orders of all Local or Public Authorities affecting the Property or relating to the Permitted Use including notices requiring the carrying out of any repairs alterations or works. Without limitation to the generality of the foregoing the Lessee shall do all things necessary to comply with and observe all requirements contained in or imposed by the Occupational Safety and Health Act 1984, the Water Corporation and the Department of Environmental Protection.

11.2 The Lessee must, at its cost, comply with and assume all requirements, orders and requisitions imposed by any Land or Public Authority in respect of operations carried out by the Lessee on the Land. In the event that the Lessee fails to comply with and observe any such requirements, orders and requisitions, then:

(a) the Lessor must give the Lessee notice of such default and a period of twenty-one (21) days to cure such default. In the event the Lessee does not cure such default within the period set out in this **Clause 11.2(a)**, the provisions of **Clause 11.2(b)** will apply;

(b) subject to **Clause 11.2(a)**, the Lessor shall be entitled (but not bound) to comply with and observe such requirements, orders and requisitions, in which case the Lessee shall indemnify and keep indemnified the Lessor from all costs, charges, expenses, actions, claims and demands suffered or incurred by the Lessor in connection with such requirements, orders and requisitions.

12 NOT TO INCREASE RISKS OF DAMAGE

12.1 Not to do or allow to be done any act or thing, except any act or thing done by the Lessee in connection with the Permitted Uses that may cause any insurance premium to be increased or that may cause any insurance taken out under this Lease and of which the Lessee has been provided details to be prejudiced or become liable to be cancelled or avoided or voidable or whereby any claim on the insurance policy may be or become liable to be reduced whether such insurance is in respect of the Property or any adjoining property.

12.2 To keep all heat power and light appliances and installations guarded or otherwise maintained in a safe manner so as not to increase any risk of fire or other damage to the Property.

12.3 Promptly to report in writing to the Lessor any occurrence or omission which may give rise to damage to or destruction of the Property.

13 NOT TO CARRY ON OFFENSIVE ACTIVITIES

13.1 Not to carry on or permit to be carried on at the Property any noxious noisome or offensive activity trade or calling nor anything which may be a nuisance annoyance or objectionable or cause damage or loss to the Lessor or the owners or occupiers of any adjoining property or any other person or to use the Property for any illegal or immoral purposes PROVIDED THAT the normal and proper use of the Property for the Permitted Uses shall not be deemed to be a breach of this clause.

13.2 Notwithstanding that the Lessee may hold a licence or authority from a Local or Public Authority the Lessee shall not cause or contribute to any Contamination or Pollution on or from the Property which will give rise to any common law liability.

14 USE OF PROPERTY

14.1 To use the Property solely for the Permitted Uses and shall not permit or suffer the same to be used for any other purpose without the prior written consent of the Lessor (not to be unreasonably withheld).

14.2 To keep in force all licences and permits required by law for the carrying on of any business conducted by the Lessee in or upon the Property.

14.3 To carry on the Permitted Uses upon the Property in accordance with good and proper business practices and in accordance with the requirements of all Local and Public Authorities including all environmental approvals and requirements.

15 LESSEE'S RESPONSIBILITY FOR SAFETY

15.1 Subject to the covenants and obligations on the part of the Lessor, the Lessee agrees to be subject to the same responsibilities to which it would be subject in respect of persons and property if during the Term it was the occupier of the Property.

15.2 The Lessee agrees that for the purposes of the Occupational Safety and Health Act 1984 of Western Australia, the Lessee has sole control of the Property.

15.3 The Lessee releases and indemnifies and agrees to keep indemnified the Lessor from and against all actions, claims, demands, losses, damages, costs and expenses for or in respect of the Lessee's occupation of the Property which the Lessor is or may be or become liable by reason of the Occupational Safety and Health Act 1984 of Western Australia in respect of the Property or its use.

15.4 The Lessee must take all necessary precautions and appropriate action to avoid and prevent the uncontrolled escape of petroleum or any other inherently dangerous or inflammable liquid or matter from the Property or from the Plant or other equipment of the Lessee in or upon the Property. In the event of escape of petroleum or other liquid or matter (whether with or without fault or negligence on the part of the Lessee or its employees, agents or contractors) the Lessee must, at its own cost and expense, (except where the escape of petroleum or other liquid and matter was caused or contributed to by the Lessor in which case it shall be at the Lessor's expense or the Lessor shall contribute the proportion to which it contributed to such escape) take immediate action to stop the escape of petroleum or other liquid or matter and rectify and repair any injury or damage whatsoever caused and clean up and reinstate the Property to its former condition prior to the escape.

15.5 The Lessee must take all reasonable precautions against causing an outbreak of fire on the Property and must comply with all laws and all lawful requirements, notices or orders of any Local or Public Authority relating to the construction of fire breaks on the Property.

15.6 The Lessee must install and maintain fire fighting and control equipment on the Property to the reasonable satisfaction of the Lessor.

15.7 The Lessee agrees to implement all reasonable measures to ensure that its Plant and all operations upon the Property will, at all times, be safe and not cause physical injury to any persons or damage to any property.

16 FENCING

The Lessee must prior to commencement of construction of any Development and to the reasonable satisfaction of the Lessor, erect and maintain a fence around the area of the Land on which the Lessee's Plant is to be erected or located and any other portion of the Land which, in the Lessor's reasonable opinion, it is necessary to fence in order to prevent injury or damage to persons or livestock.

17 SURVEY OF LAND

The Lessor shall pay all costs of and incidental to the establishment and location by survey of the boundaries of the Land for the purposes of creating a separate lot for the Land but the Lessee shall pay all costs associated with any repegging or resurvey required as a result of the requirements of the Lessee or if survey pegs or benchmarks are disturbed by the Lessee.

18 COST OF LESSEE'S OBLIGATIONS

Unless this Lease provides otherwise, anything which must be done by the Lessee under this Lease, whether or not at the request of the Lessor, must be done at the cost of the Lessee.

19 REGISTRATION OF LEASE

Within 30 (thirty) days after this Lease is executed by the Lessor and the Lessee, the Lessee must lodge this Lease with DOLA for registration and the Lessor must product the duplicate certificate of title.

20 SIGNS

Not to display on or affix to the Property any business or advertising sign or notice without first obtaining the consent of all applicable Local or Public Authorities.

21 NOT TO ASSIGN THE PROPERTY

21.1 Other than as permitted in **Clause 21.2** the Lessee must not assign sub-let licence mortgage charge encumber or part with possession of the Property or this lease or any estate or interest in the Property or mortgage, charge or otherwise encumber any Plant and Equipment without first obtaining the written consent of the Lessor provided that the Lessor will not unreasonably withhold its approval to a mortgage, charge or encumbrance where the mortgagee, chargee or encumbrancee agrees to be bound by the terms of this Lease in the exercise of any powers and agrees to enter into a deed of covenant to record such agreement in a form reasonably required by the Lessor.

21.2 The Lessee shall be entitled to assign the benefit of this Lease sub-lease or grant a licence in respect of part of the Land to a related body corporate (as defined in Section 50 of the Corporations Act) subject to the Lessee remaining principally liable under this Lease and the assignee sub-lessee or licensee entering into a deed of covenant or assignment with the Lessor to be bound by the terms of this Lease in a form reasonably required by the Lessor.

21.3 If the Lessee shall be a corporation (other than a corporation listed on the Australian Stock Exchange) any change in the beneficial ownership of any substantial shareholding in the corporation or any related corporation which shall have the effect of changing control of the corporation shall be deemed to be an assignment of the Property and the benefit of this lease for the purposes of this clause and if the Lessee is a Trust any change in the beneficial interests of the Trust so as to change control of the Trust shall be deemed to be an assignment of the Property and the benefit of this lease for the purposes of this clause.

21.4 If the Lessor consents to the assignment of this lease under this clause that consent will be subject to:

(a) the Lessee at the Lessee's expense withdrawing any subject to claim caveat lodged by the Lessee against the Land;

(b) the Lessee procures the execution by such sub-lessee assignee or transferee of a sub-lease assignment or transfer of this deed to which the Lessor is a party in such form as the Lessor or its Solicitors shall reasonably approve (which shall be prepared by the Solicitors for the Lessor at the cost and expense in all respects of the Lessee) and which shall contain a covenant by the sub-lessee assignee or transferee with the Lessor that the sub-lessee assignee or transferee will at all times during the continuance of the term duly pay the Rent at the times and in the manner mentioned in this deed and perform and observe all the Lessee's Covenants;

(c) all Rent and other moneys then due or payable under this deed shall have been paid and there shall not then be any existing unremedied breach of the Lessee's Covenants of which the Lessee has been given notice by the Lessor;

(d) the Lessee paying to the Lessor all proper costs charges and expenses incurred by the Lessor of and incidental to any enquiries which may be made by or on behalf of the Lessor as to the responsibility solvency fitness and suitability of any proposed sub-Lessee assignee or transferee.

(e) if the proposed assignee is a corporation, the Lessor may as a condition of the Lessor's consent to the assignment require that the covenants by the assignee contained in the deed of covenant will be guaranteed by the directors and principal shareholders of the corporation or other appropriate security unless the Lessee can demonstrate that the assignee has sufficient financial resources to enable it to properly carry out all of the Lessee's Covenants.

21.5 The covenants and agreements on the part of any such sub-lessee assignee or transferee shall be deemed to be supplementary to this deed and shall not in any way relieve or be deemed to relieve the Lessee from its liability under this deed.

21.6 The Lessee shall not without the prior consent in writing of the Lessor (such consent not to be unreasonably withheld) hold the Lessee's interest in this Lease on trust for any party other than pursuant to the trust (if any) described herein nor declare a trust of the Lessee's interest pursuant to this Lease nor in the event of approval of a trust by the Lessor pursuant to the terms hereof vary amend alter or revoke the terms contained in any trust deed or add to or vary the beneficiaries thereunder nor distribute or join in the distribution of any or all of the capital of such trust or in any other way vest such trust and any such holding or declaration variation amendment alteration or revocation addition or variation distribution or vesting shall be deemed to be an assignment to which the provisions of this clause apply.

22 CAVEATS

Not to lodge any absolute Caveat to protect the interest of the Lessee under this lease.

23 LESSOR MAY ACT BY AGENT

All acts and things which the Lessor is required or empowered to do under this deed may be done by the Lessor or the solicitor agent contractor or employee of the Lessor.

24 COVENANTS BY LESSOR

The Lessor covenants with the Lessee (to the intent to bind the registered proprietor for the time being of the Property) that subject to the Lessee duly paying the Rent and observing and performing the Lessee's Covenants the Lessee may (except as provided in this deed) peaceably hold and enjoy the Property during the Term without any interruption or disturbance by the Lessor or any person claiming under or in trust for the Lessor.

MUTUAL AGREEMENTS

The Lessor and the Lessee mutually AGREE AND DECLARE as follows:

25 OWNERSHIP OF IMPROVEMENTS

25.1 If the Lessee erects constructs installs attaches affixes establishes provides or brings any Improvements upon the Property for use or incorporation in or in connection with any Permitted Use, then all such Improvements shall remain the property of the Lessee absolutely.

25.2 No Existing Facilities shall be removed from the Property at any time by the Lessee.

26 DEFAULT

26.1 If the Lessee commits any Default and fails to remedy the default within twenty one (21) days after notice from the Lessor requiring the default to be remedied(and in the case of non payment of Rent whether or not formal demand shall have been made for payment), the Lessor shall be entitled to do all such acts, matters and things as may be necessary or expedient to remedy the default. The Lessor shall be entitled to:

(a) enter the Land with necessary materials and labour and execute repairs or works to the Property; and

(b) expend reasonable moneys on behalf of the Lessee.

26.2 The Lessee shall pay to the Lessor on demand all reasonable costs and expenses and interest thereon as hereinafter provided incurred by the Lessor pursuant to the exercise of its powers under this clause.

26.3 The Lessor may exercise its powers under this clause.

26.4 The Lessee shall indemnify the Lessor against all costs expenses claims demands losses and liabilities arising from any default of the Lessee including all reasonable legal costs.

26.5 Acceptance of Rent by the Lessor after default by the Lessee shall be without prejudice to the exercise by the Lessor of the powers conferred upon the Lessor under this Lease and shall not operate as an election by the Lessor either to exercise or not to exercise any of the Lessor's rights powers or privileges.

26.6 No consent or waiver expressed or implied by the Lessor to any default of the Lessee shall be construed as a consent or waiver to or of any other default.

27 EXCLUSIONS OF PROPERTY LAW ACT

Sections 80 and 82 of the Property Law Act 1969 are excluded from this Lease.

28 TERMINATION AND RIGHT OF RE-ENTRY

If:

(a) the Rent shall be unpaid after it is due for a period of twenty one (21) days (whether or not legal or formal demand shall have been made for payment); or

(b) there shall be a breach of the Lessee's Covenants and the Lessee fails to remedy the breach within a period of twenty one (21) days after service of a notice calling upon the Lessee to do so; or

(c) the Lessee being a company shall enter into liquidation whether voluntary or involuntary (except for the purpose of amalgamation or reconstruction approved by the Lessor such approval not to be unreasonably withheld) or a receiver or manager of the Lessee or an Administrator is appointed; or

(d) if the Lessee enters into an arrangement or composition for the benefit of the Lessee's creditors or not being a company assigns the Lessee's estate or enters into a deed of arrangement for the benefit of the Lessee's creditors (provided always that any deed of assignment or deed of arrangement made under the Bankruptcy Act 1966 and any act or actions by or against the Lessee or the Lessee's property which is or may be deemed to be an act of bankruptcy under the Bankruptcy Act 1966 will be excluded from the operation of this clause);

(e) any person other than the Lessee or an approved sub-lessee assignee licensee or transferee shall be in occupation or possession of the Property or in receipt of the rents and profits of the Property; or

(f) the interest of the Lessee in this Lease shall be taken in execution; or

(g) in the event that the Plant has, in any period of five (5) years during the Term, ceased to be in bona fide operation for a consecutive period of two (2) years except where the cessation is caused by an Uncontrollable Event or a default of the Lessor;

(h) the Lessor has given notice to the Lessee in accordance with Section 81 of the Property Law Act or otherwise (provided that the Lessor need only give such notice if required to do so under the Property Law Act or otherwise) and the Lessee fails within a reasonable time after the service of the notice on him to remedy the breach if it is capable of remedy and to make reasonable compensation in money to the satisfaction of the Lessor for the breach;

THEN the Lessor or any person authorised by the Lessor may subject to the provisions of the Property Law Act terminate this Lease and enter and repossess the Property but without prejudice to the Lessor's Remedies and without relieving the Lessee from liability for Rent accrued up to such determination or for any breach of the Lessee's Covenants antecedent to such determination.

29 RIGHTS AND DUTIES ON TERMINATION

29.1 The provisions of this clause will apply in respect of any termination of this lease by expiry cessation or by reason of default.

29.2 At the expiration cessation or sooner determination of the Lease, the Lessee shall at the Lessee's own expense:

(a) remove from the Land the Plant and Equipment;

(b) remove from the Land all other Improvements;

(c) in the case of structural Improvements remove such items to a minimum of two (2) metres depth overall provided that where substantial infrastructure exists such as machinery pits, tunnels and sub-surface structures, such structures shall be removed entirely and the Land compacted in accordance with generally accepted prevailing engineering standards;

(d) deliver up possession of the Property to the Lessor in a clean, tidy state free from rubbish and debris consistent with the Lessee's Covenants; and

(e) ensure that all Contamination whether on or below the surface of the Land other than Pre-existing Contamination is removed or otherwise contained as reasonably required by the Lessor.

29.3 The Lessee shall provide to the Lessor a full set of as constructed plans and specifications in respect of all Improvements effected to the Land and shall provide an update of any such plans or specifications whenever any further works are undertaken.

29.4 Subject to the written approval of the Lessor, the Lessee may leave any surface or sub-surface structures in place on the Land upon the termination of this Lease.

29.5 The Land shall be returned to the Lessor upon the termination of this Lease in a condition consistent with the natural surface level of the Land at the Commencement Date and with all areas of excavation compacted in accordance with generally accepted prevailing engineering standards.

29.6 The Lessee's obligations under this clause shall survive the expiration or other termination of this Lease.

29.7 Upon termination of this Lease the Lessor shall be entitled to re-enter the Property. For the purposes of re-entry the Lessor or the Lessor's appointed agent or servant will have power to open by any means any door gate or fastening for the purpose of resuming possession of the Property.

29.8 The Lessee shall within a period of not less than twelve (12) months before the expiration of the Term by effluxion of time prepare a programme and a timetable for vacating the Property and providing vacant possession to the Lessor and for the removal of all Plant and Equipment and Improvements in or about the Property owned by the Lessee in order to ensure that vacant possession of the Property in good order and repair shall be available to the Lessor not later than the date of termination of the Term.

29.9 The Lessee shall provide to the Lessor a detailed report not less than once every month between the period being twelve (12) months prior to the expiration of the Term and the date of expiration of the Term (and more frequently if requested by the Lessor) indicating all steps taken by the Lessee to meet the proposed programme and timetable and generally to enable the Lessor to monitor whether or not the proposed timetable and programme can be met by the Lessee.

30 DEVELOPMENT

30.1 During the Term the Lessee shall carry out any Development on the Land on the following basis:

(a) Development may only be carried out pursuant to plans and specifications previously approved in writing by all Local or Public Authorities;

(b) Development may be carried out for the purposes connected with the Permitted Uses and not for any other purposes;

(c) the Lessee shall ensure that all Development shall be carried out:

(i) with all proper care, skill and diligence;

(ii) in accordance with good industry practice;

(iii) in compliance with all applicable laws and regulations and the requirements of all relevant Local or Public Authorities;

(iv) in a proper and workmanlike manner;

(v) using Materials which are in good condition and suitable to the purpose for which they are intended.

30.2 Construction and Operation

(a) The Lessee must effect Commencement of Construction on the Land of the Plant not later than the Works Commencement Date.

(b) The Lessee must complete Practical Completion of the Plant and all other major project components associated with the Plant and referred to in all environmental approvals not later than the Works Completion Date.

(c) The Lessee must commence operation of the Plant not later than the Plant Operation Date and must, subject to **Clauses 30.3** and **37**, continue operation until the end of the Term.

(d) The Lessee must construct and operate the Plant in a good and workmanlike manner and in accordance with all environmental approvals.

30.3 Cessation of Operations

(a) In the event that the Plant is, by whatever cause or event, destroyed or so extensively damaged as to be effectively destroyed, the Lessee must, within a period (Notice Period) of six months after such destruction or damage provide to the Lessor in writing a statement containing a schedule for re-building the Plant ("Rebuilding Schedule") and nominating a date ("Reinstatement Date") by which such rebuilding will be completed and operation of the Plant resumed. The Lessor must within one month of receiving that statement, give the Lessee notice in writing stating whether that date is acceptable to the Lessor. If that

date is acceptable to the Lessor, the Lessee must rebuild the Plant in accordance with the Rebuilding Schedule and resume bona fide operation of the Plant not later than the Restatement Date. If that date is not acceptable to the Lessor, the Lessor's notice must state a reasonable date ("Stated Date") by which the Lessee must complete such rebuilding and resume bona fide operation of the Plant. If the Lessee disputes the reasonableness of the Stated Date the Lessee may, within one month after receiving the Lessor's notice, refer the matter to arbitration under **Clause 31** and the arbitrator may confirm the Stated Date or alter the same ("Altered Date"). The Lessee must complete such rebuilding and then resume bona fide operation of the Plant not later than the Stated Date or the Altered Date as the case requires.

(b) Other than if caused by an Uncontrollable Event or other than where due to the default of the Lessor, in the event that the Plant ceases to be in bona fide operation for a period of twelve (12) months then the Lessee must, within a period (Notification Period) of one month after the end of that twelve (12) month period, provide to the Lessor in writing a statement setting out firstly, the reasons for the cessation and secondly, the date ("Recommencement Date") on which bona fide operation of the Plant will be resumed. The Lessor must, within one month of receiving that statement, give the Lessee notice in writing stating whether that date is acceptable to the Lessor. If that date is acceptable to the Lessor, the Lessee must resume bona fide operation of the Plant not later than the Recommencement Date. If that date is not acceptable to the Lessor, the Lessor's notice must specify a reasonable date ("Specified Date") by which the Lessee must resume bona fide operation of the Plant. If the Lessee disputes the reasonableness of the Specified Date the Lessee may, within one month after receiving the Lessor's said notice, refer the matter to arbitration under **Clause 31** and the arbitrator may confirm the Specified Date or vary the same ("Varied Date"). The Lessee must then resume bona fide operation of the Plant not later than the Specified Date or the Varied Date as the case requires.

30.4 The Lessor may, at the request of the Lessee but at the sole discretion of the Lessor, extend any of the periods of time or any of the dates referred to in **Clauses 30.2, 30.3** and **30.4.**

31 ARBITRATION

Any dispute arising in respect of the operation of **Clause 30.3** shall be referred to the award of a single arbitrator if the parties can agree upon one and otherwise to two arbitrators one to be appointed by each party and in either case in accordance with the provisions of the Commercial Arbitration Act 1985. Each Party shall be entitled to be represented at such arbitration by a legal practitioner.

32 HOLDING OVER

If the Lessee with the consent of the Lessor shall remain in possession of the Land after the expiration of the Term then the Lessee shall so remain as a monthly tenant of the

Lessor at the Rent payable immediately prior to its expiration and otherwise subject to the Lessee's Covenants and that tenancy shall determine at the expiration of one (1) months notice given by either party to the other at any time.

33 NO WARRANTY BY LESSOR

33.1 The Lessee acknowledges and declares that in entering into this Lease the Lessee has inspected the Property and that it has not relied on any promise representation warranty or undertaking given by or on behalf of the Lessor in respect to the suitability of the Property for any business to be carried on therein and all warranties (if any) implied by law are hereby so far as legally possible expressly negatived. The terms, covenants, conditions and provisions contained in this Lease expressly or by statutory implication cover and comprise the whole of the agreement between the parties hereto and it is expressly agreed and declared that no further or other terms covenants or provisions whether in respect of the Property or otherwise will be deemed to be implied herein or to arise between the parties hereto by way of collateral or other agreement.

33.2 To the extent that any one or more of the provisions herein contained is prohibited by any applicable law including the Trade Practices Act 1974 such provisions and each of them will to such extent be ineffective without invalidating or modifying the remaining provisions hereof which will continue in full force and effect as if the provisions so prohibited had not been included herein as from the date hereof.

Without limiting **Clause 33.1** the Lessee acknowledges that it takes this Lease on the basis of the condition of the Property as at the Commencement Date and shall not make any claim whatsoever against the Lessor in relation to the condition of the Property as at the Commencement Date.

33.3 Without affecting the generality of **Clause 33.1**, the Lessor does not represent or warrant that the zoning of the Property will allow the Property to be used for the Permitted Use, whether with the approval or permission of the relevant planning authority or otherwise. It is the Lessee's responsibility to make its own enquiries about zoning, and the Lessee warrants that, before executing this Lease, the Lessee has done so to the Lessee's own satisfaction.

34 RELEASE

34.1 For the purposes of this clause, the term Lessor includes the Crown and the agents, servants, employees and contractors of the Lessor and the Crown.

34.2 The Lessee agrees to occupy, use and keep the Property at the risk of the Lessee.

34.3 The obligations of the Lessee under this clause continue after the expiration or earlier determination of this Lease in respect of any act, deed, matter or thing occurring before the expiration or earlier determination of this Lease.

35 DAMAGE BY FLOODING

Without limiting any other clause in this Lease, compensation will not be payable by the Lessor to the Lessee for damage to any property or the improvements whatsoever caused by flooding of the Property unless and to the extent that flooding was caused or contributed to by the Lessor.

36 PROVISION OF SERVICES

Neither the Lessor, the Crown nor any Local or Public Authority having jurisdiction over the Property shall be responsible to the Lessee for the provision of or required to provide any services to the Property.

37 UNCONTROLLABLE EVENTS

Neither Party will be liable to the other for any failure or delay in the fulfilment of any of its obligations under this Lease that is caused by circumstances beyond the power and control of that Party including the following when beyond that power and control namely act of God, force majeure, earthquakes, floods, storms, tempest, washaways, fire (unless caused by the actual fault or privity of the Party responsible for such performance), act of war, act of public enemies, riots, civil commotions, strikes, lockouts, acts or omissions of the Commonwealth or State Governments, shortages of labour or essential materials, reasonable failure to secure contractors, delays of contractors and factors due to overall world economic conditions or factors due to action taken by or on behalf of any government or Governmental Agency (other than, the government of the State or any Governmental Agency of the State). The Party whose performance of obligations is affected by any of the said causes ("Affected Party") shall promptly give notice to the other Party of the event or events. The Affected Party shall use reasonable endeavours to minimise the effect of and to overcome or remove such causes as soon as practicable after the occurrence, and must at such reasonable times or intervals as the other Party may require, furnish to the other party particulars of such endeavours and of progress made and expected to be made in overcoming or removing the said causes.

38 EXCLUSION OF PREVIOUS AGREEMENTS

The covenants and agreements contained or implied in this Lease shall comprise the entire agreement between the parties and the parties agree that no other covenants warranties or agreements in respect to the Property or otherwise shall apply to this transaction by reason of any promise oral statement representation warranty covenant or undertaking given or made by the Lessor or its agents employees on or prior to this deed becoming enforceable by any party.

39 EXERCISE OF REMEDIES

39.1 The Lessor may exercise the Lessor's Remedies in respect of any Default notwithstanding any previous neglect waiver or laches by the Lessor in respect of the Lessee's Covenants or the exercise of the Lessor's Remedies.

39.2 No waiver by the Lessor of any breach of the Lessee's Covenants shall be construed as a general waiver and such waiver shall relate only to the particular breach or non-observance in respect of which it is made.

39.3 The acceptance by the Lessor of any Rent or other moneys payable under this deed shall not alone constitute a waiver by the Lessor.

39.4 Any notice relating to any breach or non-observance of any covenant or agreement contained in or implied by this deed to be observed and performed by the Lessee which may be given by the Lessor to the Lessee shall be prima facie evidence of such breach or non-observance unless the Lessee has within seven (7) days or within such other time as may be prescribed by the notice given full details of any contrary contention.

40 STATUTORY POWERS

The powers rights and discretions given to or conferred upon the Lessor under any statute shall (except to the extent inconsistent with the terms and provisions of this deed) be in addition to the Lessor's Remedies.

41 NOTICE DEMAND OR CONSENT

Any notice or other communication request demand consent or approval to or by a Party:

(a) must be in writing addressed as shown below:

(i) Lessor:

Address: Level 3, 40 The Esplanade
Perth WA 6000

Facsimile: (08) 9481 0861

(ii) Lessee:

Address: Level 2, 33 Colin Street
West Perth W A 6005

Facsimile: (08) 9481 1697

or to any other address facsimile number or person most recently specified in writing by a party to the sender;

(b) must be signed by the sender or its solicitors or agents or if a company by an officer of the company or under the common seal of the company or signed by its solicitors or agents;

(c) is deemed to be given by the sender and received by the addressee:

(i) if given by delivery in person, when delivered to the addressee;

(ii) if sent by security post and if posted from an address within Australia to an address within Australia, on the third (3rd) business day from and including the date of positing but if posted by security post from outside Australia or posted to an address outside Australia then on the sixth (6th) business day from and including the date of posting; or

(iii) if sent by facsimile transmission, on production of a transmission report by the facsimile machine by which the facsimile message was transmitted which indicates that the facsimile message was transmitted in its entirety to the facsimile number of the recipient;

but if the delivery receipt or transmission is or is deemed to be by sub-clause (b) or (c) on a day which is not a business day it is deemed to be given on the next succeeding business day; and

(d) can be relied upon by the addressee and the addressee is not liable to any other person for any consequence of that reliance if the addressee reasonably believes it to be genuine correct and authorised by the sender;

(e) for the purposes of this agreement a business day shall mean a day upon which trading banks are open for business in Western Australia.

42 MORATORIUM NOT TO APPLY

The provisions of any statute whereby the date for payment of any moneys owing under this deed may be extended or postponed or whereby any rate of interest may be reduced or whereby any other condition may be abrogated nullified postponed or otherwise affected shall not apply to limit or affect the terms of this Lease.

43 APPLICABLE LAW

This Lease shall be governed by the law of Western Australia.

44 SEVERABILITY

If any part of this Lease is or becomes void or unenforceable then that part shall be severed from this deed to the intent that all parts of this Lease that shall not be or become

void or unenforceable shall remain in full force and effect and be unaffected by any severance.

45 ESSENTIAL TERMS

45.1 The covenants by the Lessee herein mentioned to pay the Rent in respect of the Property and the provisions of **Clauses 4, 10, 11, 14** and **21** hereof are essential terms of this Lease and any breach of any of those covenants shall be regarded by the Lessor and the Lessee as a fundamental breach of the Lessee of this Lease PROVIDED THAT the reference to clauses in this clause is not to be construed as the only essential terms. Should the Lessor determine this Lease following such a breach then (without prejudicing or limiting any other right or remedy of the Lessor arising from such breach or otherwise under this Lease) the Lessor shall be entitled to recover from the Lessee and the Lessee hereby covenants to pay to the Lessor as and by way of liquidated damages for such breach the aggregate of the Rent and Outgoings which would have been payable by the Lessee for the unexpired residue of the term of this Lease remaining after such determination after making allowance therefore which the Lessor by taking reasonable steps to relet the Property obtains or could reasonably be expected to obtain by reletting the Property for such unexpired residue of the Term on reasonable terms as to rental and otherwise PROVIDED THAT:

(a) any such reletting shall not be required to be on like terms as are herein expressed and implied; and

(b) the acceptance by the Lessor of arrears or any late payment of the Rent or Outgoings shall not constitute a waiver of the essentiality of the Lessee's obligations to make such payments.

45.2 The Lessor's entitlement to recover damages as aforesaid shall not be prejudiced or limited if:

(a) the Lessee abandons or vacates the Property;

(b) the Lessor elects to re-enter the Property or determine this Lease; or

(c) the Lessor accepts the Lessee's repudiation of this Lease,

45.3 The Lessor shall be entitled to institute proceedings to recover damages as aforesaid either before or after any of the events or matters referred to in **Clause 45.2.**

45.4 Any conduct by the Lessor to mitigate damages shall not of itself constitute acceptance of the Lessee's breach or repudiation or a surrender by operation of law.

45.5 Nothing herein expressed or implied shall be construed to mean that no other covenant herein on the part of the Lessee to be observed or performed may be an essential term.

46 EFFECT OF EXECUTION

This Lease shall be binding upon each person who has executed it notwithstanding:

(a) the failure of any other person named as a party to execute it; or

(b) the avoidance or unenforceability of any part of this Lease.

47 TRUSTEE COVENANTS

Where any party executes this Lease in the capacity of a trustee pursuant to any trust deed will deed of settlement or other instrument whatsoever (in this clause called "the Trust Deed") such party (in this clause referred to as "Trustee") warrants and undertakes to and covenants with the Lessor that:

(a) as trustee it has power under the Trust Deed:

(i) to enter into and execute this Lease;

(ii) to be or become indebted to the Lessor and to enter into all other obligations in the manner and to the extent contemplated by this Lease;

(b) it is not a party to any partnership joint venture or any profit sharing or like arrangement with any other person or corporation;

(c) it is not now a trustee and during the currency of this Lease it will not act as trustee of any trust or settlement other than that constituted by the Trust Deed without the written consent of the Lessor;

(d) it is the sole trustee of the trusts created by the Trust Deed;

(e) during the Term of this Lease (and any extension thereof) it will not without the prior written consent of the Lessor:

(i) cause to vest or distribute prior to the final date for distribution under the Trust Deed the whole or any part of the trust property other than the income thereof;

(ii) vary alter or revoke either wholly or in part any of the terms of or powers under the Trust Deed whether by Order of a Court or otherwise howsoever;

(iii) appoint or procure or consent to or concur in the appointment of any person firm or corporation as a new or substitute or custodian trustee under the Trust Deed;

(iv) as trustee under the Trust Deed delegate any power or powers or duty or duties conferred upon it under the Trust Deed;

(v) do any act or thing or omit to do any act or thing so as to harm or impair or be likely to harm this Lease or the covenants terms and conditions thereof;

(f) in the event of a new substitute or custodian trustee being appointed under the Trust Deed it will procure that such new substitute or custodian trustee shall enter into a deed in like form mutatis mutandis with this Lease which deed shall be prepared and stamped by the Lessor's solicitors at the cost in all respects of the Lessee.

48 RELEASE OF LESSOR

The term "Lessor" as used in this Lease so far as the covenants or obligations of the Lessor are concerned shall be limited to and mean only the registered proprietor for the time being of the Land and in receipt of the rents and profits of the Land at the time in question and if the Lessor's interest therein is assigned or transferred in any way (other than by way of security only) the Lessor named herein (and in the case of any subsequent assignments or transfers other than by way of security only the then assignor or transferor) shall be automatically freed and discharged from and after the date of such assignment or transfer from all personal liability for the performance of any covenant or obligation on the part of the Lessor herein contained and under this Lease thereafter to be performed PROVIDED ALWAYS THAT in the event the reversion is transferred by the Lessor to another party the Lessor shall procure that the transferee shall be bound by the terms of this Lease in place of the Lessor.

49 PROVISION OF SERVICES

49.1 The Lessor shall not be obliged to provide any services to the Land including water, sewerage, power, gas or telephone.

49.2 The Lessor shall not be liable for any failure at any time for any services to be provided to the Land by any Local or Public Authority or any supplier of services.

50 REVIEW OF RENT

50.1 The Rental shall be reviewed during the Term on each of the Market Rent Review Dates in accordance with the following provisions namely:

(a) The Lessor may on or after each of the Market Rent Review Dates review the Rent for the following Rent Review Period by giving notice to the Lessee at any time before or after the Market Rent Review Date of the reviewed Rent proposed by the Lessor for the following rent review period; and subject to sub-paragraph (b) of this clause the Rent mentioned in that notice shall be the Rent payable by the Lessee until otherwise reviewed;

(b) If the Lessee does not agree with that reviewed Rent the Lessee may by notice to the Lessor within fourteen (14) days of receipt of the Lessor's notice require the Rent payable until otherwise reviewed hereunder to be determined by a Valuer to be appointed by the President for the time being of the Australian Property Institute (Western Australian Division) who shall act as an expert and not as an arbitrator and who shall assess the Current Market Rental Value of the Property under the terms of this Lease for the period until otherwise reviewed hereunder;

(c) The Current Market Rental Value determined by the Valuer in accordance with paragraph (b) hereof

OR

the Rent payable immediately prior to the Rent Review Date

whichever is the greater shall be the Rent payable by the Lessee until otherwise reviewed hereunder;

(d) The parties shall pay all fees and expenses in respect of a valuation in accordance with the preceding sub-paragraph on an equal basis;

(e) The Lessee is required to pay the Rent immediately prior to the Market Rent Review Date until the reviewed Rent is determined. If a notice is given for the review of rent after a Market Rent Review Date, then the reviewed Rent shall only be payable from the date of that notice. If that the Rent so determined on a Market Rent Review Date is greater than the Rent payable immediately prior to the Rent Review Date then the Lessee shall within twenty one (21) days of such determination of the Rent pay to the Lessor all arrears of Rent and if the reviewed Rent is less than the Rent payable immediately prior to the Market Rent Review Date the Lessor shall within twenty one (21) days of such determination of the Rent pay to the Lessee all overpayments of the Rent.

50.2 The Rental shall be reviewed during the Term on each of the CPI Rent Review Dates and until otherwise reviewed hereunder shall be the Rent determined in accordance with the following:

The Annual Rent payable after review whether specified agreed or determined shall not be less than the amount "AR2" calculated as:

$$AR2 = AR1 \times \frac{CPI2}{CPI1}$$

where:

"**AR1**" means the Annual Rent payable before the relevant review date;

"**CPI2**" means the CPI for the quarter immediately preceding the relevant review date (the Determining Quarter);

"**CPI1**" means the CPI for the Determining Quarter immediately preceding the Commencement Date or the previous relevant review date as the case may be; and

"**CPI**" for the purposes of this clause means the Consumer Price Index (All Groups for the City of Perth) published from time to time by the Australian Bureau of Statistics and, if not so published, then a similar measure of increases in prices as determined by a Valuer agreed between the parties or, failing agreement, appointed for such purposes by the President of the Law Society of Western Australia.

OR

the Rent payable immediately prior to the CPI Rent Review Date (whichever is the greater).

50.3 The obligations of the Lessee to pay the reviewed Rent from the rent review dates under this clause shall not be released varied modified or extinguished by reason of any laches or delay on the part of the Lessor or by reason of the expiration or determination of the Term or by any failure of the Lessor to give notice for the review of Rent.

51 DEFINITIONS AND MEANINGS

51.1 Subject to **Clause 40** the expression "Lessor" in this Lease shall if one person is Lessor include the Lessor and the executor administrator successor in title and transferee of the Lessor and where more than one person is so specified then the Lessor shall mean the Lessors and each of them and their and each of their executors administrators successors in title and transferees and if the Lessor is a corporation then the Lessor shall include the Lessor and the successors in title and Transferees of the Lessor.

51.2 The expression "Lessee" in this Lease shall if one person is specified as Lessee include the Lessee and the executor administrator permitted successors in title and transferees of the Lessee and where more than one person is so specified then the Lessee shall mean the Lessees and each of them and their and each of their executors administrators and permitted successors in title and transferees and if the Lessee is a corporation then the Lessee shall include the Lessee and the permitted successors in title and transferees of the Lessee.

51.3 The expression "Guarantor" in this Lease shall if one person is specified as Guarantor include the Guarantor and the executor administrator permitted successors in title and transferees of the Guarantor and where more than one person is so specified then the Guarantors shall mean the Guarantors and each of them and each of their executors administrators and permitted successors in title and transferees and if the Guarantor is a corporation then the Guarantor shall include the Guarantor and the permitted successors in title and transferees of the Guarantor.

51.4 Words importing the singular number shall include the plural and vice versa and words importing persons shall include corporations.

51.5 Where the day or the last day for doing an act or on which an entitlement is due to arise is a Saturday, Sunday or public holiday or bank holiday within the meaning of the Public and Bank Holidays Act 1972 the day or last day for doing the act or on which the entitlement arises shall for the purposes of this Lease be the next following day that is not a Saturday, Sunday or a public holiday or bank holiday.

51.6 References to institutes, associations, bodies and authorities whether statutory or otherwise shall in the event that any institute, body, association or authority ceases to exist or is reconstituted renamed or replaced or its powers or functions are transferred to any other institute, association, body or authority be deemed to refer respectively to the institute association body or authority established or constituted in place thereof or as nearly as may be succeeds to the powers or functions of the institute association body or authority referred to.

51.7 Unless application is mandatory by law any statute proclamation order regulation or moratorium present or future shall not apply to this Lease so as to abrogate extinguish impair diminish fetter delay or otherwise prejudicially affect any rights powers privileges remedies or discretions given or accruing to the Lessor.

51.8 The word "corporation" shall include all bodies corporate or incorporated associations and the word 'person' shall include "corporation".

51.9 When two or more persons are parties to this Lease the covenants on their part shall bind and be observed and performed by them jointly and each of them severally.

51.10 References to any statute shall include all amendments for the time being in force and any other statute enacted in substitution for and the regulations by-laws rules or orders for the time being made under that statute.

51.11 Except for any headings in the Schedule headings of clauses shall not affect the interpretation of this deed.

51.12 References to the whole of any matter or thing shall include references to part of any such matter or thing.

51.13 Unless repugnant to the context or subject matter the following words or terms in this deed shall have the following meanings:

"**Commencement Date**" means the date of commencement of the term of this Lease as stated in the Schedule hereto;

"**Commencement of Construction**" means all works preliminary to the construction of the Plant including the fencing of the Land, construction of all earthworks and the construction of footings to the Plant.

"**Commonwealth**" means the Commonwealth of Australia;

"**Contamination**" has the meaning given in section 4 of the Contaminated Sites Act 2003.

"**CPI Rent Review Dates**" means the dates mentioned in the Schedule;

"**Crown**" means the Crown in right of the State;

"**Current Market Rental Value**" means the current open market annual rental value that can be reasonably obtained for the Property;

(a) on the basis that the Property is available for leasing for the Term and any additional options for renewal and disregarding the fact that part of the Term will have elapsed at the relevant Market Rent Review Date;

(b) on the terms and conditions and for the permitted use contained in this Lease but having regard to any industrial use to which the Land may be lawfully put;

(c) on the basis that the covenants on the part of the Lessee in this Lease have been fully performed at the relevant Market Rent Review Date;

(d) without taking into account the Lessee's trade fixtures and fittings and any other improvements and installations erected or installed at the Lessee's expense which the Lessee may remove at the expiration of this Lease;

(e) having regard to current open market annual rental values of comparable premises whether vacant or occupied and whether any rental value thereof has been arrived at through new lettings or rent reviews or renewals of existing tenancies or otherwise;

(f) in the event that the Property or improvements on the Land have been damaged or destroyed assuming that the Property and those improvements have been reinstated;

(g) having regard to all Improvements, common user infrastructure, services and facilities of benefit to the Land and its use in the general vicinity of the Land whether provided by the Lessor or not;

but ignoring:

(h) permanent structural or other improvements to the Property installed at the Lessees expense and which the Lessee is permitted to remove at the expiration of this Lease including the Improvements, the Plant and the Plant and Equipment;

(i) any rent free period financial contribution or other concession customarily or likely to be offered to new tenants of vacant premises;

(j) any value attaching to goodwill created by the Lessee's occupation of the Property;

(k) any value attaching to any licence or permit the property of the Lessee in respect of the business carried on by the Lessee at the Property;

(l) any deleterious condition of the Property if such condition results from any work carried out on the Property by the Lessee or by any breach of any terms of this Lease by the Lessee.

"**Default**" in relation to the Lessee means any breach of or non-compliance with any of the Lessee's Covenants by the Lessee;

"**Development**" means Works carried out or Materials supplied by the Lessee upon or with respect to the Property for the purpose of effecting Improvements or installing or constructing Plant and Equipment to the same.

"**Existing Facilities**" means any buildings structures fixtures fittings apparatus and improvements the property of the Lessor which are in existence and located upon the Property at the Commencement Date which have not been brought onto the Property by the Lessee and which the Lessee is not permitted to remove from the Property at any time.

"**Improvements**" means improvements of a capital nature effected or carried out by the Lessee or the Lessor upon the Property and which became fixtures including the Plant and the Plant and Equipment.

"**Land**" means the land mentioned in the Schedule.

"**Lessee's Covenants**" means all or any of the covenants and agreements contained in or implied by this deed to be observed and performed by any person other than the Lessor.

"**Lessor's Remedies**" means all or any of the rights powers and remedies contained or implied in this deed exercisable by the Lessor against any person or in respect of the Property.

"**Local or Public Authority**" means any governmental, semi-governmental, statutory, local or public authority including without limitation the Environmental Protection Authority of Western Australia, the Western Australian Planning Commission, the Water Corporation, the Department of Marine and Harbours, the Main Roads Department, Municipal Council Health Board, Health Commissioner and every and any other Board person or authority whatsoever now or hereafter exercising under any present or future Act of Parliament (Federal or State) any control or jurisdiction over or power in connection with the Property and/or the owner or occupier thereof and/or in connection with any Permitted Use now or hereafter carried on upon the Property and every officer or person acting under the authority of such local or public authority or under the authority of any such Act or By-law thereunder.

"**Market Rent Review Dates**" means the dates mentioned in the Schedule.

"**Materials**" includes plant, equipment, machinery, apparatus, facilities, goods, stores, supplies and raw materials.

"**Option Term**" means the option term mentioned in the Schedule.

"**Outgoings**" means the total amount expended by or on behalf of the Lessor or assessable against or payable by the Lessor to any Local or Public Authority or supplier of services to the Property (including any rates equivalent payable to the Crown under the Western Australian Land Authority Act) or assessable on the Lessee including

provisions and adjustments appropriate for any part of a period to which the assessment relates in respect of the Property including any additions thereto (and not otherwise the direct responsibility of the Lessee within the terms of this Lease or otherwise) and includes GST but only to the extent that the Lessor is not entitled to receive an input tax credit for that GST including the following:

(a) all rates and charges payable to the Local Council, Water Authority or other Local or Public Authority assessed in respect of the Property (including excess water);

(b) all Land Tax, Vermin Tax Metropolitan Region Improvement Tax or any similar tax and other taxes rates charges and assessments and other outgoings of like nature now or hereafter charged upon the whole or any part of the Property or otherwise chargeable against or to the Lessor whether Governmental, semi-Governmental municipal or otherwise PROVIDED THAT for the purpose of this Lease Land Tax shall mean the Land Tax payable by the Lessor in respect of the Property as if it was the only property owned by it in the State of Western Australia;

(c) all charges for garbage, waste disposal, gas, electricity, telephone and other utilities and services.

"**Parties**" means the Lessor and the Lessee.

"**Permitted Uses**" means the use mentioned in the Schedule.

"**Plant**" means the plant mentioned in the Schedule.

"**Plant and Equipment**" means all items of plant and equipment installed or brought upon the Land before or during the Term by the Lessee which are not fixtures and which shall be removed by the Lessee at the expiration, cessation or determination of this Lease subject to the Lessee making good any damage caused by such removal.

"**Plant Operation Date**" means the date mentioned in the Schedule.

"**Pollution**" means direct or indirect alteration of the environment:

(d) to its detriment or degradation;

(e) to the detriment of any beneficial use; or

(f) of a level prescribed pursuant to the Environmental Protection Act 1986.

"**Practical Completion**" means the completion of construction of the Plant in conformity with plans and specifications approved by all Local or Public Authorities. Such practical completion to be evidenced by the delivery to the Lessor of a copy of written permission from the Local Authority for the occupation and use of the Plant or such other evidence as may be reasonably required by the Lessor.

"**Pre-existing Contamination**" means Contamination identified in the Report as existing prior to the Commencement Date.

"**Property**" shall mean the following (but subject to the encumbrances exceptions and reservations mentioned in the Schedule):

(a) the Land;

(b) the Lessor's fixtures and fittings (if any) affixed to the Land including any building or other structure and all fences;

(c) the Improvements; and

(d) the benefit of the rights and subject to the encumbrances exceptions and reservations mentioned in the Schedule.

"**Remediation**" has the meaning given in section 3 of the Contaminated Sites Act 2003.

"**Rent**" means the rent mentioned in the Schedule.

"**Report**" means the report from Golder and Associates dated October 2007 in relation to Contamination on the Land and signed by the parties for the purpose of identification.

"**Schedule**" means the schedule to this Lease

"**State**" means the State of Western Australia.

"**Term**" means the term commencing on the Commencement Date and expiring on the expiry date mentioned in the Schedule.

"**Uncontrollable Event**" means any of the circumstances set out in **Clause 37.**

"**Valuer**" means a natural person who:

(a) is licensed under the Land Valuers Licensing Act 1978; and

(b) has not less than ten (10) years experience (including not less than five (5) years experience in Western Australia); and

(c) is a member of the Australian Property Institute (Western Australian Division); and

(d) has experience in assessing rental values of properties of a similar nature to the Property.

"**Works**" includes works labour and services by experts consultants servants agents and contractors in relation to design surveying construction engineering and other fields relating to the installation or construction of any buildings or other Improvements.

"**Works Commencement Date**" means the date mentioned in the Schedule.

"**Works Completion Date**" means the date as mentioned in the Schedule.

52 GOODS AND SERVICES TAX

52.1 For the purposes of this clause, the following terms shall apply:

"GST" has the meaning given in Section 195-1 of the GST Act;

"**GST Act**" means A New Tax System (Goods and Services Tax) Act 1999 and any legislation substituting or amending that Act;

"**GST Law**" has the meaning given in Section 195-1 of the GST Act.

"**Tax Invoice**" has the meaning given in Section 195-1 of the GST Act;

"**Taxable Supply**" has the meaning given in Section 195-1 of the GST Act.

52.2 The Rent and any other amounts payable by the Lessee to the Lessor under this Lease are exclusive of GST.

52.3 The Lessee agrees to pay additional to the value of payments set out in this Lease (including Rent) any GST payable in respect of such payments. Where GST has been applied the Lessor shall provide a Tax Invoice prior to the Lessee being required to pay any GST.

52.4 A written statement given to the Lessee by the Lessor of the amount of GST that the Lessor is liable to pay on a Taxable Supply made or to be made under this Lease is conclusive between the parties except in the case of an obvious error.

52.5 Subject to **Clause 52.3** the Lessee must pay to the Lessor the amount of the GST that the Lessee is liable to pay under this Lease:

(a) at the same time; and

(b) in the same manner,

as the Lessee is obliged to pay for the Taxable Supply.

52.6 Where a Taxable Supply is not separately supplied to the Lessee, the liability of the Lessee for any amount for GST, in relation to that Taxable Supply, is determined on the same basis as the Lessee's proportion of that Taxable is determined.

53 RENEWAL OF TERM

If the Lessee wishes to take a lease of the Property for a further term and gives to the Lessor notice to that effect at least six (6) months prior to the expiration of the Term but not earlier than twelve (12) months prior to the expiration of the Term and at the time of giving the notice and at the expiration of the Term:

(a) there shall be no outstanding breach of the Lessee's Covenants of which the Lessor has given the Lessee written notice;

(b) the Lessor's right of re-entry shall not have arisen;

(c) during the Term there shall not have been any breach of the Lessee's Covenants which was not rectified within sixty (60) days of notice of that breach being given by the Lessor;

THEN the Lessor shall at the reasonable cost of the Lessee grant to the Lessee a lease of the Property for the Option Term at a rent determined in accordance with **Clause 50** but otherwise upon the same terms and conditions other than the right of renewal contained in this clause.

54 GUARANTOR

54.1 In consideration of the Lessor having agreed at the request of the Guarantor to accept the Lessee as Lessee of the Property the Guarantor:

(a) GUARANTEES:

(i) payment by the Lessee of all money payable by the Lessee to the Lessor under this Lease; and

(ii) the observance and performance by the Lessee of the Lessee's Covenants; and

(b) AGREES that if any money payable by the Lessee to the Lessor under this Lease shall not be recoverable from the Guarantor under the Guarantee under this clause by reason of any legal limitation disability or incapacity on or of the Lessee or by reason of any avoidance of the liability of the Lessee or of any other fact or circumstance then the Guarantor shall hold the Lessor fully indemnified at all times against all loss or damage which the Lessor may suffer or incur by reason of any limitation disability incapacity failure fact or circumstances including all consequential damages.

54.2 The Guarantor COVENANTS AND AGREES with the Lessor as follows:

(a) to pay all money due and payable to the Lessor by the Lessee under this Lease;

(b) the liability of the Guarantor shall not be affected by:

(i) the granting of time or other indulgence by the Lessor to any person;

(ii) any compounding compromise release abandonment waiver or variation of the right of the Lessor or any omission;

(iii) the avoidance of any payment of money or other obligation by the Lessee or the Guarantor to the Lessor;

(iv) any other dealing matter or thing which but for this provision operates to affect the liability of the Guarantor;

(v) any extension of the Term of this Lease (whether by the exercise of any option or otherwise) any assignment of this Lease or any variation to the terms of this Lease;

(vi) the fact that any other person who was intended to execute this document or otherwise to become a co-surety for the payment of moneys payable by the Lessee has not done so or has not done so effectively.

(c) this guarantee is an irrevocable and continuing guarantee and shall remain in effect in favour of the Lessor in respect of all liabilities of the Lessee arising from this Lease as from the Commencement Date and shall not be discharged by the winding up liquidation bankruptcy amalgamation or reconstruction of the Lessee or the Guarantor or by any assignment or sub-lease of the Property;

(d) upon liquidation or bankruptcy of the Guarantor the Lessor shall be entitled to prove for the total indebtedness of the Lessee under this Lease notwithstanding that the Lease has not been terminated;

(e) upon liquidation or bankruptcy of the Lessee the Guarantor will not prove in competition with the Lessor and the Guarantor authorise the Lessor to prove for all moneys which the Guarantor has paid under this Lease and retain as may be appropriate at the discretion of the Lessor any amount received by the Lessor;

(f) the liabilities of the Guarantor created by this clause shall not be affected by reason of any security taken by the Lessor being or becoming void or defective.

54.3 The Guarantor further agrees that the Lessor may proceed against the Guarantor (or any one or more of them) before or instead of, proceeding against the Lessee without affecting the liability of the Guarantor as herein provided.

55 ENVIRONMENTAL

55.1 The Lessee acknowledges and agrees that:

(a) it has inspected the Property; and

(b) it has had the opportunity prior to the execution of this Lease to test the Property and undertake due diligence on the Property to satisfy itself as to the condition of the Property.

55.2 The Lessee releases and discharges the Lessor from all claims whatsoever in relation to the Contamination on the Property whether caused by the Lessor or not other than Pre-existing Contamination.

55.3 The Lessee is fully responsible and liable for all investigations, Remediation (whether insitu clean up, removal or disposal of Contamination) and all other costs whether direct or indirect associated with Contamination on the Property other than Pre-existing Contamination.

55.4 The Lessee agrees it will comply with all present or future laws in relation to the notification of Contamination and the removal, containment or Remediation of any Contamination on the Property (other than Pre-existing Contamination).

55.5 The Lessee agrees to indemnify and keep indemnified the Lessor in respect of any actions, claims, proceedings, liability, loss or damage (including consequential loss) made against or incurred by the Lessor in respect of any loss or injury or damage to any person caused by any Contamination on the Property or the failure of the Lessee to remove, contain or otherwise Remediate the Contamination PROVIDED THAT this indemnity shall not apply to the extent that the loss or damage suffered by the Lessor was caused or attributable to the act, omission, neglect or default of the Lessor.

55.6 The Lessee shall be taken to have satisfied itself as to the extent and nature of any Contamination on the Property and shall be deemed to enter into this Lease in reliance solely upon such examination, inspection, enquiry, perusal, opinion and advice only and not upon any or any alleged statement, warranty, condition or representation whatsoever made or alleged to have been made to the Lessee by the Lessor or any employee, contractor or agent of the Lessor.

55.7 If permitted under the Contaminated Sites Act, the Lessor may require that approval is obtained under the Contaminated Sites Act to transfer responsibility for Remediation of any Contamination other than any Pre-existing Contamination to the Lessee pursuant to the Contaminated Sites Act for the Term (and including the period required to satisfy all obligations on the part of the Lessee upon termination of this Lease).

55.8 The Lessee shall promptly provide all information the Lessor reasonably requires in order to allow the Lessor to obtain approval pursuant to **Clause 55.7** including but not limited to providing any financial or other information required as to the capacity of the Lessee to carry out Remediation, removal or containment of Contamination on the Property and shall sign such documents and do such matters and things as may be necessary or desirable to obtain such approval.

55.9 For the purposes of the provisions of this Lease relating to termination, the Lessee shall ensure that on termination of this Lease the Lessee shall:

(a) remove, contain or otherwise deal with any Contamination other than Pre-existing Contamination as reasonably required by the Lessor and in accordance with the requirements of any Local or Public Authority; and

(b) deliver up the Property in a condition consistent with the performance of the Lessee's obligations under this Lease.

SCHEDULE

1. LAND

Lot 13 on Deposited Plan 39572 the whole of the land in Certificate of Title Volume 2230 Folio 46.

2. ENCUMBRANCES

Nil

3. TERM OF LEASE

A term of twenty years (20) years commencing on the date of execution hereof and expiring twenty (20) years thereafter.

4. RENT

The Rent for the Term shall be the sum of THREE HUNDRED AND NINETY SEVEN THOUSAND DOLLARS ($397,000) (plus GST) which shall be payable by monthly instalments of THIRTY THREE THOUSAND AND EIGHTY THREE DOLLARS THIRTY THREE CENTS ($33,083.33) (plus GST) each the first of which shall be payable on the date of execution hereof and thereafter on the first day of each month.

5. PERMITTED USES

Power generation plant and associated uses.

6. PLANT

Gas fired generation plant details of which are to be provided by the Lessee subject to the approval of the Lessor (such approval not to be unreasonably withheld).

7. WORKS COMMENCEMENT DATE

1 January 2009

8. WORKS COMPLETION DATE

30 September 2010

9. PLANT OPERATION DATE

1 October 2010

10. CPI RENT REVIEW DATES

On each anniversary of the Commencement Date other than a Market Rent Review Date (including any Option Term).

11. MARKET RENT REVIEW DATES

On the expiration of each five (5) years from the Commencement Date (including any Option Term).

12. OPTION TERM

Ten (10) years commencing on the date of expiration of the initial term mentioned in Item 3 of this Schedule.

13. COMMENCEMENT DATE

~~April 2008~~

1st May 2008

ATTESTATION SHEET

PAGE

Dated this 17th day of June 2008

LESSOR/S SIGN HERE (Note 10)

Signed on behalf of the **WESTERN AUSTRALIAN LAND AUTHORITY** by person(s) authorised by its Board in accordance with Section 45(2)(b) of the Western Australian Land Authority Act 1992.

Authorised Officer

Authorised Officer

WESTERN AUSTRALIAN LAND AUTHORITY Common Seal

THE COMMON SEAL of WESTERN AUSTRALIAN LAND AUTHORITY was hereunto affixed with the authority of its Board in the presence of:

CHIEF EXECUTIVE OFFICER ROSS HOLT

BOARD MEMBER TERRY BUDGE

LESSEE/S SIGN HERE (Note 10)

Executed by **PERTH ENERGY PTY LTD** (ACN 087 386 445) in accordance with section 127 of the Corporations Act by:

Director

Director / ~~Secretary~~

SHAUN DARRYL S. FLUKES

Name (Please Print)

KY CAO

Name (Please Print)

Executed by **WESTERN ENERGY PTY LTD** (ACN 109 984 252) in accordance with section 127 of the Corporations Act by:

Director

Director / Secretary

SHAUN DARRYL S. FLUKES.

Name (Please Print)

KY CAO

Name (Please Print)

ATTACHMENT 1B
ASIC COMPANY EXTRACT

ASIC
Australian Securities & Investments Commission

Australian Company

WESTERN ENERGY PTY LTD
ACN 102 984 252

Extracted from ASIC's database at AEST 17:23:41 on 17/03/2025

Company Summary	
Name:	WESTERN ENERGY PTY LTD
ACN:	102 984 252
ABN:	64 102 984 252
Registration Date:	28/11/2002
Next Review Date:	15/08/2025
Status:	Registered
Type:	Australian Proprietary Company, Limited By Shares
Locality of Registered Office:	SYDNEY NSW 2000
Regulator:	Australian Securities & Investments Commission

Further information relating to this organisation may be purchased from ASIC.

ATTACHMENT 2
PREMISES MAP

Aerial photography by Nearmap (14/09/2024)

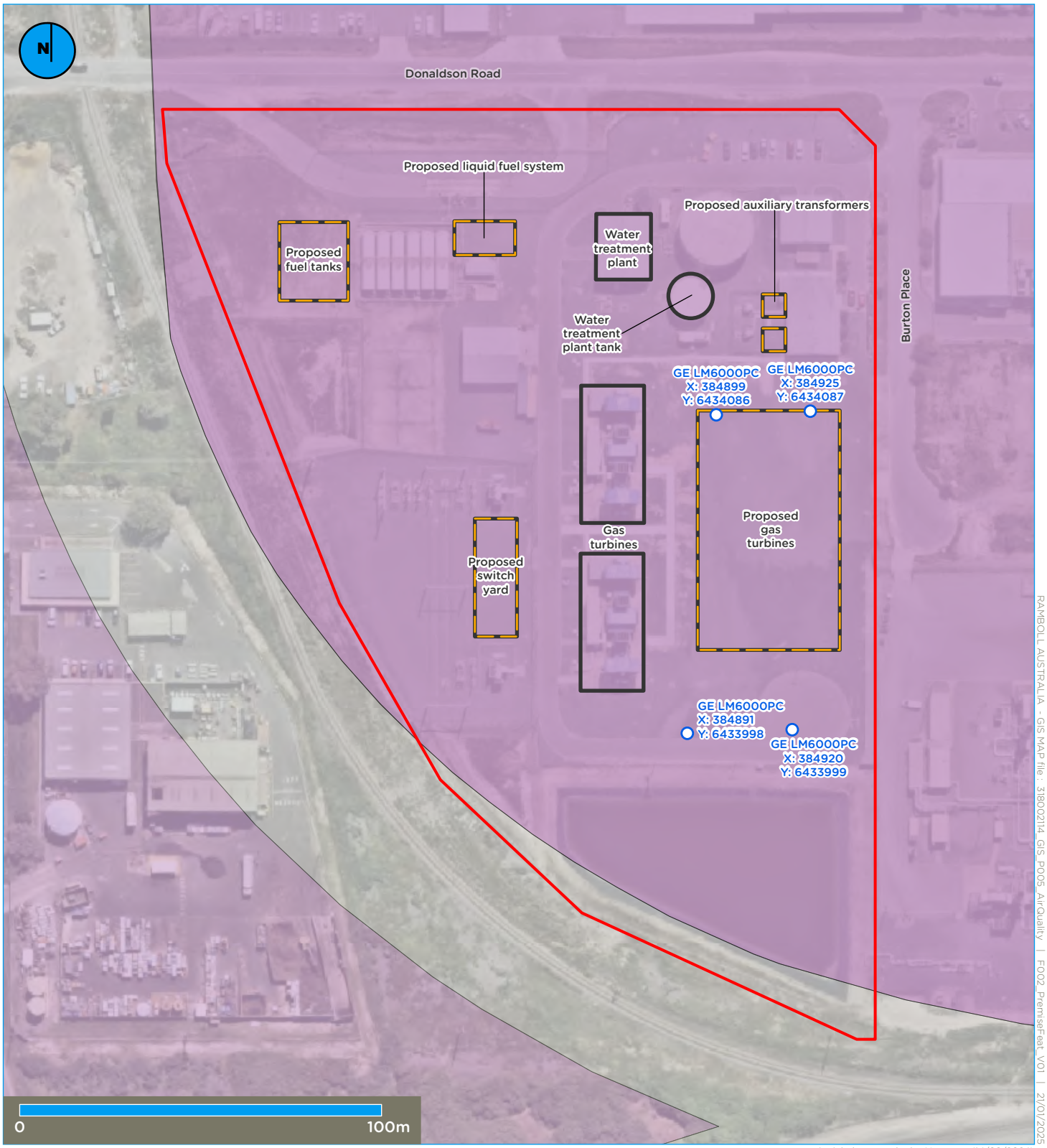
Legend

Total project development area

A4
1:1,500

Premise Map

Kwinana Swift Power Station Expansion Approvals



Aerial photography by Nearmap (14/09/2024)

RAMBOLL AUSTRALIA - GIS MAP file - 318002114_GIS_P005_AirQuality | F002_PremiseFeat_V01 | 21/01/2025

Legend

- Total project development area
- Proposed site features
- Existing site features
- Proposed stack location

Zones and Reserves (DPLH-071 and 023)

- Industrial
- Railways

A4
1:1,500

Precise Map with Identifying Features

Kwinana Swift Power Station Expansion Approvals

ATTACHMENT 8
ADDITIONAL INFORMATION FOR WORKS APPROVAL

Intended for
Western Energy Pty Ltd

Document type
Works Approval Supporting Information Report

Date
March 2025

Supporting information for Works Approval

Kwinana Swift Power Station Expansion (K2 Project)

RAMBOLL Bright ideas. Sustainable change.

Supporting Information for Works Approval
Kwinana Swift Power Station Expansion (K2 Project)

Project name	**Kwinana Swift Power Station Expansion**
Project no.	**318002114**
Recipient	**Western Energy Pty Ltd**
Document type	**Supporting information for Works Approval**
Version	**Final**
Date	**21 March 2025**
Prepared by	**Stephanie Yap**
Checked by	**Marc Barendrecht**
Approved by	**Jeff Barham**
Description	**Report compiling the supporting information for the Works Approval Application**

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Revision	Date	Prepared by	Checked by	Approved by	Description
1.0	21 March 2025	Stephanie Yap	Marc Barendrecht	Jeff Barham	Final

Ramboll Australia Pty Ltd.
ACN 095 437 442
ABN 49 095 437 442

Contents

Figures

Tables

Appendices

1. Introduction

1.1 Purpose

This report is Attachment Eight to the Works Approval form for Western Energy Pty Ltd's (Perth Energy) proposed expansion of the existing functional gas-fired Kwinana Swift Power Station (KSPS). This Attachment Eight contains supporting information for a works approval application under Part V of the *Environmental Protection Act 1986* (EP Act) for the prescribed premise. The current KSPS operates under Operating Licence (L8471/2010/1), which was amended (L8471/2010/2) and reissued on 3 September 2015 and remains current. L8471/2010/2 is valid until 2033.

1.2 Background

Perth Energy, a subsidiary of AGL Energy Limited (AGL) proposes to construct and operate an expansion (K2 Project) of the existing functional gas-fired KSPS at 1 Burton Place, Kwinana Breach, Western Australia 6167 (Lot 13 DP39572) (the Site), in the City of Kwinana, Western Australia.

As described below, the existing KSPS has a generation capacity of 120 MW. The K2 Project will expand upon the existing KSPS through the development and operation of up to four new gas-powered turbines and ancillary structures, which would allow for additional generation capacity of up to 250 MW from the Site. Together with the existing operational units, the proposed turbine units would increase the total generation capacity of the Site by up to 370 MW.

Amongst other things, and for the reasons considered further in this document, the K2 Project:

- is consistent with, and capable of approval under both the relevant local and State planning frameworks and as an expansion of an existing industrial land use which has operated since 2010 from the Site without incident.
- will provide the firming capacity necessary to support the roll out of renewables, and to achieve AGL's strategy to deliver a portfolio of flexible, low emissions generation.
- is aligned with State objectives for energy security in the transition from retiring coal powered electricity generation.
- has the endorsement of Energy Policy WA (a sub-department within the WA Department of Energy, Mines, Industry Regulation and Safety) as a State significant project that will provide critical flexible firming capacity to the Wholesale Energy Market.

The power station expansion will operate as a prescribed premise for Electric Power Generation (Category 52) under the *Environmental Protection Regulations 1987* (Schedule 1) – see extract in **Table 1-1** below.

Table 1-1: Extract from the Environmental Protection Regulations (Schedule 1)

Category Number	Description of Category	Production or design capacity
52	Electric power generation: premises (other than premises within category 53 or an emergency or standby power generating plant) on which electrical power is generated using a fuel.	20 MW or more in aggregate (using natural gas) 10 MW or more in aggregate (using a fuel other than natural gas)

For this Works Approval application, the following reports and studies are considered relevant and are annexed as follows:

- Air Quality Assessment (Appendix 1)
- Contamination Desktop Assessment (Appendix 2)
- Noise Impact Assessment (Appendix 3)
- Hazardous Emissions Annual Compliance report (Appendix 4)

1.3 Site Information

Perth Energy proposes to expand the KSPS that is located at Lot 13 Burton Place, Kwinana (Lot 13 on Deposited Plan: 39572). The Site context is shown in **Figure 1-1**, detailed in **Section 2** and summarised in **Table 1-2**.

Table 1-2: Summary of Site information

Item	Details
Local Government Area	City of Kwinana
Suburb	Kwinana Beach
Address	Lot 13, 1 Burton Pl, Kwinana Beach, Western Australia 6167
Size	3.55 hectares
Lot details	Lot 13 on Deposited Plan 39572
Registered proprietor	Western Australian Land Authority (Development WA)
Leases	The title is subject to registered Lease K655398 to Western Energy Pty Ltd (being the applicant for the purpose of this application), which includes the grant of two easement benefits – being K794662 (for pipeline and carriageway purposes) and K795726 (for water and wastewater pipeline and telecommunication cable easement purposes).

The Site is located approximately 40km south of Perth in the Kwinana Industrial Area (KIA), from which Perth Energy has operated the KSPS since August 2010 and pursuant to a lease agreement with Western Australian Land Authority (Development WA), and related approvals. The existing and authorised KSPS functions as a 120 MW open cycle aeroderivative gas turbine peaking plant.

The Site is zoned 'Industrial' under the Metropolitan Region Scheme (MRS). A narrow strip in the southwest of the Site is reserved under the MRS for 'Railways'.

The Site is zoned under the Kwinana Town Planning Scheme No. 2 (LPS2) as 'General Industry'. The Site is also within LPS2 'Policy Area 15 – Kwinana Industrial Strip'.

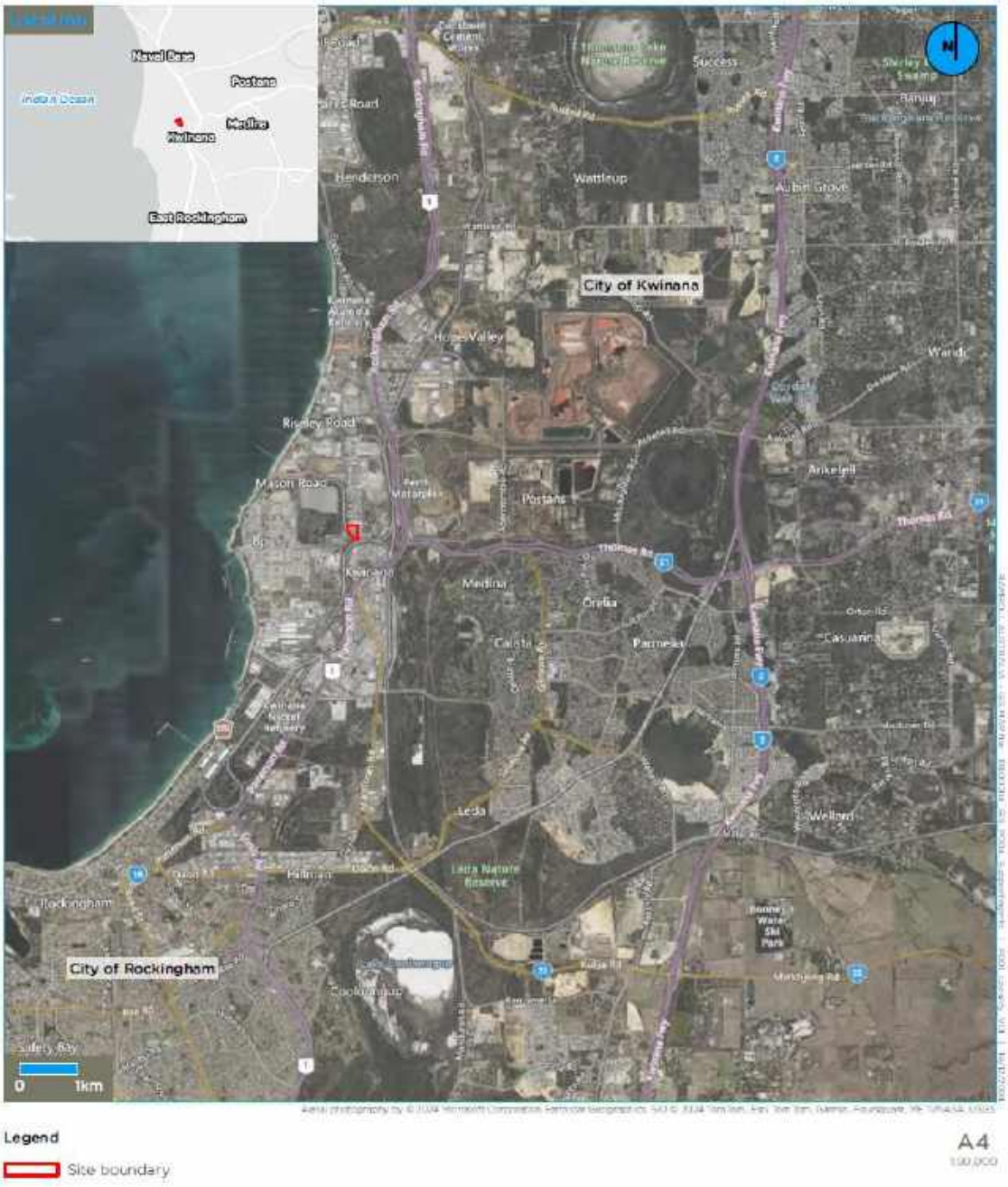
The surrounding land is used as an established, intensive industrial area with various operational industrial sites.

Surrounding land uses are shown on **Figure 1-2** as follows:

- Dampier Bunbury Gas Pipeline Compression Station
- Cleanaway waste management facility

- Kleenheat Production facility
- Metal recycling facility
- Battery re-cycling facility
- Railway reserve

In summary, the Site is densely surrounded by heavy industrial land use, which continues to the west meeting the coastline. Nearest sensitive land uses (residential areas) are located approximately 2 km southeast of the Site.



Site context

Kwinana Swift Power Station Expansion Approvals

Figure 1-1: Site Context

Figure 1-2: Surrounding Land Uses

2. Proposed Development

2.1 Land description

The K2 project will be sited within the existing KSPS Site, which is broadly bound by Donaldson Road to the north, Burton Place to the east and a railway reserve to the west and south. The current height of the existing stack exhausts on Site is 12 m. These are currently the tallest structures on the Site. Additional stack exhausts will also be required which have been modelled at 18m high and 3m diameter. This is subject to detailed design.

The portions of the Site that will accommodate the expanded power station are largely sealed with asphalt and void of vegetation apart from minimal landscape planting surrounding the main office entrance. The Site is identified by three broad areas which are described in **Section 2.2**.

2.2 Project description

Perth Energy is proposing to expand the current KSPS site with a maximum additional 250 MW of generation capacity. The project forms part of AGL's strategy to deliver a portfolio of flexible, low-emissions generation to the energy market.

The Site is defined by three broad areas, as shown on **Figure 2-1**, and described further below.

- Gas turbines and auxiliary equipment area – this area contains the four existing gas turbines and the footprint of the proposed gas turbines. The auxiliary infrastructure includes the overflow evaporation pond in the south of the Site and the infrastructure linking the turbines to the substation area.
- Substation area – this area is to the west of the gas turbines and contains the existing and proposed switchyards and power supply infrastructure required to convert the power supply to a form that can be accepted by the Western Power substation.
- The Balance of Plant area in the northern portion of the Site contains the existing support infrastructure including fuel storage, water treatment, offices, and auxiliary transformers.

A retention basin is in the southeast corner of the Site which receives stormwater runoff from across the Site. The water treatment plant on site disposes wastewater from the operations into the Water Corporation's Kwinana Water Recycling Plant (KWRP), after which treated water discharges to the local Point Peron Water Corporation Sepia Depression Ocean Outlet Line (SDOOL), under a licence held by Water Corporation. AGL would maintain the current agreement or enter a new agreement with the Water Corporation to meet water quality discharge requirements of the KWRP operating licence to allow it to be utilised for the K2 Project's wastewater disposal.

To achieve the additional expected 250 MW, one or more (but no greater than 4) new turbine units are proposed to be built. These new gas-turbine units may be fuelled by natural gas, diesel, distillate, ethane, liquefied natural gas (LNG), liquefied petroleum gas (LPG) and/or hydrogen. Gas-turbines are likely to be able to operate as synchronous condensers. Each gas turbine has one stack and thus, the total number of emission points depends on the number of turbine units built. An indicative turbine unit is presented below (**Figure 2-2**). The stack height that has been modelled in the air quality assessment is 18 metres elevation and the diameter is three metres. It is anticipated that the chosen turbine units will not exceed these parameters.

Site layout
Kwinana Swift Power Station Expansion Approvals

Figure 2-1: Site Layout

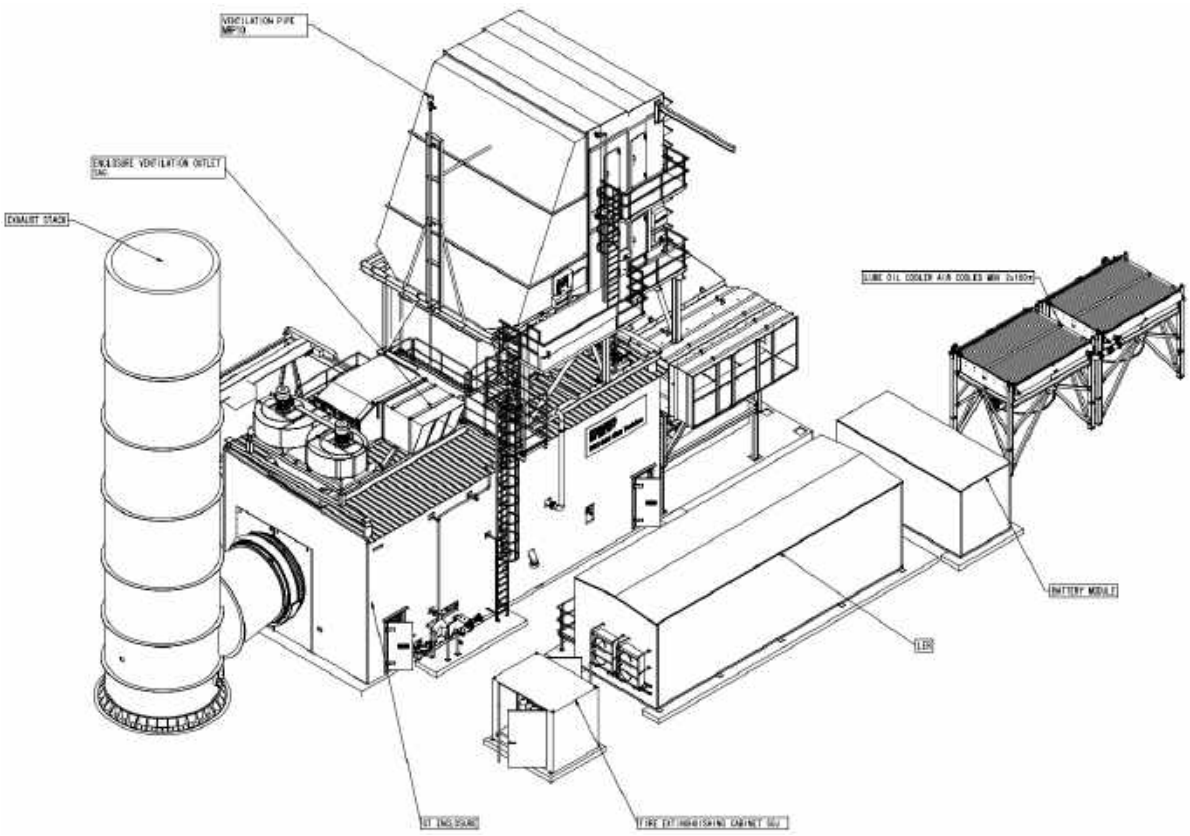


Figure 2-2: Indicative gas-turbine unit

In addition to the turbine units and associated Original Equipment Manufacturer (OEM) supplied skids on which they will be constructed, the following components are likely to be proposed for the K2 project:

- Demolish, modify, reconfigure and/or augment any, or all, existing plant facilities.
- Demolish, modify, reconfigure and/or augment any, or all, existing high voltage (HV) connection assets or construct new HV connection to adjacent/nearby substation or to other existing or future substation as required by Western Power.
- Temporary site offices and laydown areas.
- Storage of equipment, chemicals, and machinery.
- New control room and buildings or augmentation of existing control room and office building, maintenance building and warehousing.
- All related and required site investigations, geotechnical studies, and preliminary site works.
- Fuel gas compression and fuel pre-treatment systems (including compression, regulation, heating, filtering, and pre-treatment) as required.
- Installation of required infrastructure to ensure that the plant is capable of combustion of hydrogen and future fuels.
- Power augmentation systems, evaporative cooling, chillers and/or wet compression systems and associated equipment.
- Electrical switch rooms, cabling, and associated infrastructure.
- High-voltage electrical substation equipment including Gas Insulated Switchgear (GIS) or Air Insulated Switchgear (AIS).
- Site access, internal roads and external roads, and car parking.

- Drainage and stormwater management – including evaporation pond/s considerations/requirements if required.
- Modify, augment, upgrade, reconfigure or replace existing security fencing, lighting, and CCTV and associated infrastructure.
- Gas supply infrastructure new or modifications/upgrades to increase gas delivery capacity.
- Connection to Western Power substation.
- Modify, augment, upgrade, reconfigure or replace existing water supply pipeline.
- Modify, augment, upgrade, reconfigure or replace existing water treatment, desalination and associated storage and reject water system augmentation.
- Modify, augment, upgrade, reconfigure or replace existing wastewater storage tanks and existing evaporation pond.
- Modify, augment, upgrade, reconfigure or replace existing KWRP wastewater pipeline.

The generalised site layout is presented in **Figure 2-1**.

3. Approvals Overview

3.1 Planning framework

The planning framework is noted in **Section 1.3**.

The Planning Approval application has been submitted. To facilitate the use and development of the K2 Project under the relevant planning frameworks, planning approval is required from both the City of Kwinana (under the provisions of its Local Planning Scheme No. 2) and the Western Australian Planning Commission (under the provisions of the Metropolitan Region Scheme).

3.2 Other Approval licences and permits

The following sections outline the 'other' approval licence and permits that are applicable to the K2 project.

3.2.1 *Environmental Protection and Biodiversity Conservation Act 1999*

Based on an EPBC self-assessment, and previously conducted referrals in the vicinity of the project area, the project is not expected to have a significant impact on Matters of National Environmental Significance (MNES) and a referral under the EPBC Act is not required.

3.2.2 Environmental Protection Act 1986 (Part IV)

The EP Act is the primary environmental legislation that governs environmental protection and Environmental Impact Assessment (EIA) in Western Australia. Part IV, Division 1 of the EP Act, provides for the referral and assessment of proposals that may result in significant impacts to the environment. The Part IV process is administered by the Environmental Protection Authority Services Unit of the Department of Water and Environmental Regulation (DWER).

AGL previously met with Environmental Protection Authority (EPA) Services Unit to discuss the project's approvals obligations under Part IV of the EP Act. AGL was advised that, pending further technical analysis, the K2 Project would require assessment under Part IV of the EP Act by reference to EPA's Environmental Factor Guideline for Greenhouse Gas Emissions.

In the intervening period since that meeting, the EPA has released a revised Greenhouse Gas policy but the core platforms in that policy remain. Consequently, AGL intend to provide supporting information for referral of the Proposal to the EPA under s. 38 of the EP Act to enable the EPA to determine if EIA is required under Part IV of the EP Act and if so, the level of assessment. A core document forming part of the s.38 referral will be a Greenhouse Gas Management Plan for the Project.

3.2.3 Dangerous Goods Safety Act 2007 (DGS Act)

Due to the nature and quantity of stored dangerous goods, in accordance with the DGS Act a dangerous goods licence is required. The existing Kwinana Swift Power Station dangerous goods licence will be amended to include the K2 Project.

4. Stakeholder Engagement

Stakeholder engagement undertaken to date is summarised in **Table 4-1**.

Table 4-1: Stakeholder Engagement

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
Australian Gas Infrastructure Group (AGIG)	26 Jul 24	Project introduction and next steps/requirements to progress the project and gas connection.	To keep AGIG informed, no further actions at this stage.
Western Power (WP)	23 Aug 24	Project introduction and next steps/requirements to progress the project and high voltage electrical connection.	To keep WP informed, no further actions at this stage.
State Development Assessment Unit (SDAU) – Land Use Planning	27 Aug 24	Overview of project focusing on the criteria of state significance (SS).	Linked AGL with State Referral Co-ordination unit (SCRU).
State Referral Coordination Unit (SRCU)	3 Sept 24	Overview of project focusing on planning approval pathways.	SRCU is happy to assist when/as required. Provided suggestions of Agencies to meet with.
Kwinana City Council	9 Sept 24	Overview of project focusing on planning approval pathways.	Ongoing engagement regarding lodgement of planning approval.
EPA/DWER	16 Sept 24	Overview of project focussing on Part IV.	DWER advised a Scoping meeting with Part V team should occur.
Kwinana Council Mayor AGL - CEO	19 Sept 24	Overview of project focusing on planning approval pathways.	Council should be kept updated with Development Application timing.
EPA/DWER	20 Sept 24	Overview of project focussing on Part V.	Further discussions as needed.
Westport	14 October 2024	AGL/Ramboll presented the project to Westport.	Project is of interest but no significant impacts or concerns to Westport.
Contaminated Sites Branch	02 October 24	Telephone conversation with Janet Asquith Charleton.	Assessment of land contamination issues would occur through the EP Act Part V process.

5. Environmental Management

5.1 Introduction

The following sections provide a summary of the environmental assessment of the anticipated impacts associated with the proposed development to the receiving environment.

5.2 Air quality

5.2.1 Overview

An air quality assessment has been undertaken for the K2 Project and is presented in the report titled *Kwinana Swift Power Station Expansion: Air Quality Assessment* (Ramboll, 2024c). The report is summarised below and provided in **Appendix 1**. The assessment has considered the potential air quality impacts arising from emissions of oxides of nitrogen (NOx) expressed as nitrogen dioxide (NO_2), associated with five scenarios.

5.2.1.1 Existing environment

Air Emissions

In July 2024, Ektimo undertook an annual compliance assessment for the KSPS to produce a stack emissions testing report which is summarised below and provided in full in **Appendix 4**. The report was to quantify emissions from four discharge points to determine compliance with the KSPS's Environmental Licence L8471/2010/2 through a series of monitoring events. Stack emissions are a crucial factor to consider for power stations hazards and wastes and monitoring the emissions ensures the power station operates within legal and environmental regulations, mitigates negative environmental impacts, and helps maintain sustainable operations.

The Ektimo report indicates all analytes (CO and NO2) were found to be below the licence limit set by the WA DWER as per licence L8471/2010/2.

Emissions

AGL are proposing to build up to four new turbine units which could be operational on natural gas, diesel, distillate, ethane, liquefied natural gas (LNG), liquified petroleum gas (LPG) and/or hydrogen. Each gas turbine has one stack (proposed to be placed east of the existing stacks) and thus, the total number of emission points depends on the number of turbine units built. Potential air quality impacts arising from emissions of concern would NOx\NO_2. Emissions of carbon monoxide and particulates are also expected to be emitted from the turbines, however, in the context of ambient air quality guidelines, the concentrations of these pollutants are negligible. The only emission of concern associated with the Project would be Nitrogen Dioxide (NO_2). However, as discussed below, modelled NO2 emissions do not pose health or amenity risks.

Sensitive receptors

Exceedance of the 1-hour average NO_2 criteria which was predicted for the normal operations, shutdown, and startup scenarios to the east of the Site at approximately 2 km was predicted to not occur over sensitive receptor locations.

The air dispersion modelling conducted suggested the K2 Project poses a low health risk to all sensitive receptors in the region, with predicted emission concentrations staying below air quality criteria, despite a few short-term exceedances near the Site in an industrial area. It was advised (Ramboll, 2024) to set up ambient air quality monitoring for NO_2 near the closest sensitive receptors to ensure concentrations comply with guidelines through the operational stage.

Sensitive receptors in proximity to the K2 Project include predominately adjacent and surrounding industrial land use types in the KIA, with some areas of residential land uses approximately 2 km east of the Site.

Sensitive receptors identified in proximity to the K2 Project for the purpose of air quality dispersion modelling assessment are presented in **Figure 5-1** and include:

- Wells Park
- Golf Course
- Thomas Oval
- Residence x 2
- North Rockingham AQMS
- Hope Valley
- Calista Primary school
- Wombat Wallow Childcare Centre
- South Lake AQMS

Figure 5-1: Nearest Sensitive Receptors

Ambient air quality

The existing air quality of the K2 Project site is representative of the Kwinana airshed which comprises mixed-use industrial and residential land uses.

Table 5-1: Ambient air quality criteria

Pollutant	Averaging Period	Criteria µg/m³	Reference
Nitrogen Dioxide (NO_2)	1-hour	151	NEPC (2021)
	Annual	28	

Air quality monitoring station (AQMS)

The DWER conduct ongoing air quality monitoring of the Kwinana region for NO_2 which showed in its latest data that the concentrations were well below the ambient air quality guideline values.

The assessment by Ramboll (2024) required background concentrations of NO_2 when assessing potential cumulative impacts and accounted for other major sources of NO_x in the KIA, however, no sources in the region such as vehicles or other minor sources. The assessment compared predicted background level concentrations of NO_2 with relevant ambient air quality criteria for emissions of concern potentially associated with the proposed K2 Project. The criteria is presented in **Table 5-1** and was derived from the *Air Quality Modelling Guidance Notes* (Department of Environment, 2006), the draft *Guideline: Air Emissions* (Department of Water and Environmental Regulation, 2019) and the National Environment Protection Measures (NEPMs).

5.2.1.2 Potential impacts

Construction

Activities that are likely to affect air quality during construction of the K2 project development would involve construction vehicles generating exhaust emissions, excavation and backfilling activities generating dust and, vehicles travelling over access tracks and surfaces generating airborne dust. However, these activities are anticipated to be localised and temporary in nature and will have limited nuisance air quality impacts to sensitive receptors.

Operation

The assessment utilised the CALPUFF modelling system to undertake air dispersion modelling. In addition to the grided receptors for CALPUFF, discrete receptors were positioned throughout the modelling domain to represent residential dwellings and recreational locations to provide a quantitative assessment of NO_2 concentrations in sensitive areas of interest. The discrete residential receptors are presented in **Figure 5-2**.

Air dispersion modelling results predicted a maximum 1-hour average and annual concentrations to all sensitive receptor locations within the region below the relevant ambient air quality criteria for all modelled scenarios. No exceedances of the annual average criteria were predicted at any location within the modelled domain, specifically noting that at the nominated receptor locations recordings were all below relevant NO_2 criteria presented in **Table 5-1**. The model suggested that the health risk posed to the sensitive receptors in the region was low.

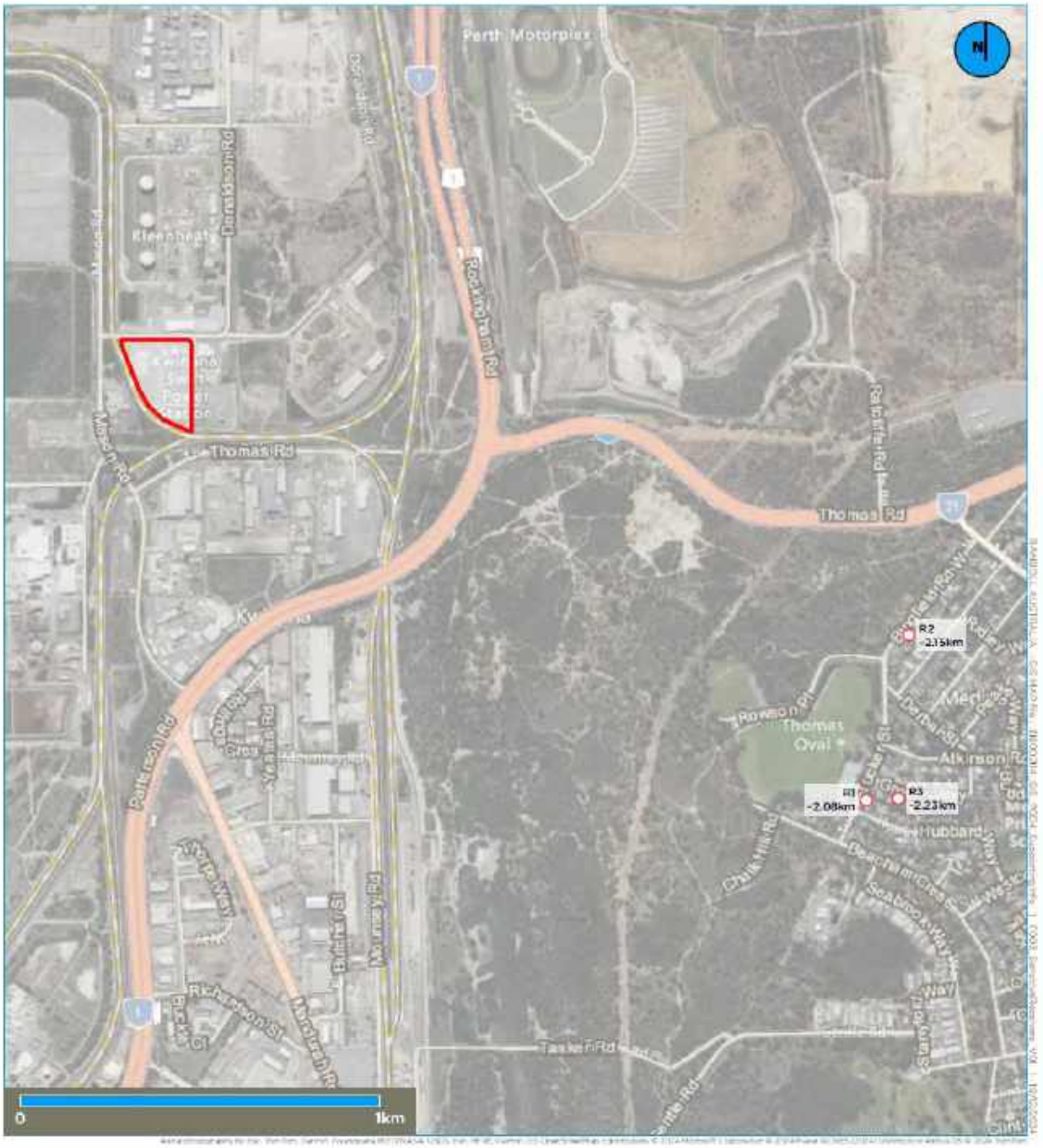
Potential dust emissions from the operations would include any dust lift off from unsealed surfaces during windy conditions which would be localised.

5.2.2 Management

Proposed measures to manage and/or mitigate air quality impacts from the Project are detailed in the following **Table 5-2**.

Table 5-2: Management and mitigation measures – air quality

ID	Management/ mitigation measure	Timing
AQ1	A community liaison phone number and permanent site contact will be established so that the air quality related complaints, if any, can be received and addressed in a timely manner.	Construction, operation
AQ2	Potentially affected sensitive receptors will be advised of the proposed construction period at least one week prior to the commencement of works.	Construction
AQ3	Ambient air quality monitoring for NO_2 would be established at one or near the closest sensitive receptors (residential area of Medina) to the east of the facility to confirm that concentrations remain below ambient air guidelines once the facility is operational.	Construction, operation
AQ4	The current management and mitigation measures in place at the site pre-K2 Project would be maintained and expanded in scope to incorporate the upgrade added infrastructure.	Operation
AQ5	Construction phase dust controls will be retained for the operations.	Operation



Residential receptors
Kwinana Swift Power Station Expansion Approvals

Figure 5-2: Residential Receptors

5.3 Biodiversity

To execute the K2 project, no native vegetation needs to be cleared as the Site is currently used for industrial purposes (current KSPS) and is located within an existing industrial area. No additional land clearing in the area will be undertaken for any stage of the K2 project, therefore, significant impacts are not likely to occur for listed Threatened Ecological Communities (TEC) or listed Threatened Communities (TC) in the K2 project area.

The Site is not considered a significant nesting/resting area for migratory birds due to the area's high level of disturbance being located within the KIA. Significant adverse impacts on migratory birds are highly unlikely.

The low impact status of this project is due to the following reasons:

- The Site and surrounding areas are presently used for heavy industrial purposes and have been of an industrial nature for the last 70 years.
- The Site and surrounding areas have been cleared of most vegetation.
- There is a significant distance between the subject Site and watercourses.
- There will be no direct discharge from the operations into the marine environment.
- The likelihood of threatened species to occur in this area under the above conditions is limited; and
- The modelled emissions of NO_x/NO_2 are unlikely to cause significant adverse impacts on MNES.

Based on an EPBC self-assessment, and previously conducted referrals in the vicinity of the project area, the project is not expected to have a significant impact on MNES and a referral under the EPBC Act is not considered to be required.

5.4 Contamination

5.4.1 Overview

The Site is subject to Memorial K718986 made under s 58 of the *Contaminated Sites Act 2003* (WA) (**CS Act**). The function of the memorial on title is to identify that the Site has been classified as 'Possibly Contaminated – Investigation Required' under the CS Act.

A DWER Basic Summary of Records search result identifies that the reasons for the Site's classification relate to broader-scale and historical operations, which predate Perth Energy's construction and commencement of operation of the KSPS (circa 2010), and are in no way in connection with the current land use and development for which this application seeks to expand.

Specifically:

> *"The Site was reported to the Department of Environment and Conservation (DEC) prior to the commencement of the Contaminated Sites Act 2003. The Site classification is based on information submitted to the Department by December 2003.*
>
> *The Site forms part of a larger area of land that was historically used for a variety of industrial uses since 1954 including blast furnace power house, steel merchant, raw material and product storage, production waste deposits including slag, dusts, and demolition waste, mixed and putrescible wastes, land uses that have the potential to cause*

contamination as per the guideline "Potentially Contaminating Activities, Industries and Land Uses" (Department of Environment, October 2004).

No soil investigations have been carried out targeting this Site. However, the Site formed part of a larger area of industrial land that was subject to a soil and groundwater investigation undertaken in 2001. The soil investigations identified widespread industrial slag and cinders in the vicinity of this Site that were found to contain elevated concentrations of heavy metals exceeding ecological investigation and health investigation levels (for industrial and commercial uses) as published in the guideline "Assessment Levels for Soil, Sediment and Water" (Department of Environment, draft November 2003). The groundwater investigation identified the widespread presence of nitrate contamination and localised heavy metal contamination at concentrations exceeding Marine Water Ecosystems criteria as published in guideline "Assessment Levels for Soil, Sediment and Water" (Department of Environment, draft November 2003).

As soil at this Site has not been investigated, or subject to risk assessment, a comment cannot be made on the suitability of the Site for the existing or future land use or whether the Site represents a risk to health, the environment or any environmental value.

As the Site has been subject to historical potentially contaminating land uses including the disposal of industrial waste, and groundwater contamination has been identified, there are grounds to indicate the possible contamination of the Site; and the Site has been classified as "Possibly Contaminated – Investigation Required".

DEC has classified this Site based on the information available at the time of classification. It is acknowledged that the contamination status may have changed since this time, and as such the usefulness of this information may be limited.

In accordance with Department of Health advice if groundwater is being, or is proposed to be, abstracted DEC recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use."

This classification was not imposed to reflect concerns arising from the KSPS (which post-dates the classification) and does not function to prohibit any form of development on the Site or impose any additional approvals or remediation obligation under the CS Act.

Rather, in accordance with s 58(6) of the CS Act, a responsible authority (here, the City of Kwinana and the Western Australian Planning Commission) is not to grant approval under a scheme (here, both the LPS2 and the MRS) without '*first seeking, and taking into account, the advice of the CEO* [of DWER] *as to the suitability of the land for the … development'*.

A desktop contamination assessment has been completed *Contamination Desktop Assessment* (Ramboll, 2024a) which confirms the suitability of the Site for the development of the K2 Project **(Appendix 2)**.

This is as:

- despite the historical classification of the Site under the CS Act and for reasons which pre-date, and are unrelated to the KSPS, the current land use and development on the Site (KSPS) has been authorised to proceed, is subject to conditions under Licence No. L8471/2010.2 (issued under Part V of the EP Act) which requires routine monitoring for contamination and reporting, and has operated without incident since 2010; and

- the K2 Project subject of this application merely seeks to expand the existing land use and development, which is not of a sensitive nature, and is located within a purposely designated industrial precinct which has historically and continues to accommodate for State significant industrial assets.

5.4.1.1 Existing environment

The Site is 3.55 ha including potentially polluting areas such as the turbine areas, fuel storage and unloading areas and transformers that are bunded and drain to an oil/water separator. Waste oil sludge is pumped out by a licenced contractor and is sent off-site for recycling.

Ramboll conducted a desktop review of previous reports for the Site to conclude that the Site was suitable for the K2 Project development. Previous contamination reports are summarised below.

Golders Report

A baseline Environmental Site Assessment (ESA) by Golder in October 2007 was prepared prior to the initial power station development. This found the Site was suitable to use for industrial purposes, however, the exceedance of ecological screening criteria for Polyaromatic Hydrocarbons (PAHs) in soils had a recommendation to contact the DWER to confirm whether the Site had been reported or classified under the CS Act. Since development as a power station, Perth Energy have undertaken bi-annual groundwater monitoring which found heavy metals concentrations that exceeded adopted screening criteria and elevated nutrients in the groundwater. However, it was also concluded the sources of the elevation were unlikely to be attributed to on-site activities. Annual Environmental Reports (2020 – 2023) consistently conclude the Site was well maintained and groundwater quality had little changes from previous levels indicated in monitoring events. Bunded areas for storing hydrocarbons and chemicals, a lined evaporation pond, and audit histories showing no major spills imply that the Site's operations are unlikely the cause of the elevated contaminated levels in the groundwater. Recent biannual ground water monitoring at the Site conducted in February 2024 concluded groundwater quality had remained consistent with historical monitoring, with some minor increases and that groundwater did not represent risk to current or future site users.

SWER Basic Summary of Records

In February 2024, AGL detected PFAS contamination in the bio pond, which was attributed to a firefighting event at a nearby Cleanaway site. Testing identified PFAS levels of up to 14 ug/kg. Hazardous waste disposal and pond cleaning followed, including liner repairs. Groundwater testing in May 2024 showed one sample with PFAS at 0.05 ug/L, below drinking water guidelines. Repeat testing in September 2024 confirmed increased PFAS concentration at one location, but still below thresholds. Approximately 40 litres of alternative firefighting foam (Ansulite) containing trace PFOS/PFOA was noted. No PFAS sources were found on Lot 13, and adjacent lands have contamination history.

5.4.1.2 Potential impacts

Construction

The main impact that could occur during construction would be the excavation activities could release contaminants from the soil at the Site and/or to the surrounding area. There is also potential for contamination to occur from spills or leaks of fuel, oil, or chemicals.

Operation
During operation contamination could occur from spills or leaks of fuel, oil or chemicals from the infrastructure or vehicles on the Site.

5.4.2 Management

Proposed measures to manage and/or mitigate contamination impacts from the Project are detailed in the following **Table 5-3**.

Table 5-3: Management and mitigation measures - contamination

ID	Management/ mitigation measure	Timing
C1	An unexpected finds protocol must be prepared to detail the steps to be followed if potential contamination is discovered.	Construction,
C2	All oils, fuels and other chemicals will be handled, stored, and transported in a manner to minimise spill risk.	Construction, Operation
C3	All existing groundwater monitoring wells should be protected during earthworks and construction of the proposed development to the extent practicable. Monitoring wells which are destroyed during construction should be replaced.	Construction
C4	Biannual groundwater monitoring will continue during operation of the facility.	Operation
C5	At the end of the lease period, the sampling should be repeated to assess for any changes in the contamination status at the previous sampling locations.	Operation
C6	Oil/water separator infrastructure would be inspected daily, and waste oil (sludge) pumped out by a licenced contractor and send off-site for recycling.	Operation

5.5 Noise

5.5.1 Overview

An environmental noise assessment has been undertaken for the project in accordance with the *Environmental Protection (Noise) Regulations 1997* (WA) and is presented in the report titled *Environmental Acoustic Assessment* (Herring Storer Acoustics , 2024). The report is provided in full in **Appendix 3**.

5.5.1.1 Existing environment

Sensitive receptors
In the assessment, the nearest residential premises of concern were located and are shown in **Figure 5-2**. Three main residential receiver points were identified. It was found that the influencing factor for each residential premise would be:

- R1 - +3 dB(A)
- R2 - +1 dB(A)
- R3 – 0 dB(A)

Noise criteria

The environmental noise assessment by Herring Storer Acoustics (2024) identified the noise criteria for the proposed development is in accordance with the *Environmental Protection (Noise) Regulations 1997.* For noise-sensitive areas such as residential premises, the regulations assign allowable noise levels based on an influencing factor (IF) calculated from land usage within specified radii around the premises. The noise criteria are reproduced in the following **Table 5-4.**

Table 5-4: Assigned outdoor noise levels.

Type of premises receiving noise	Time of day	Assigned level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises: highly sensitive area (i.e., within 15 metres of a dwelling)	Monday to Saturday (7am to 7pm)	45 +IF	55 + IF	65 + IF
	Sunday and public holidays (9am to 7pm)	40 + IF	50 + IF	65 + IF
	All days (7pm to 10pm)	40 + IF	50 + IF	55 + IF
	Monday to Saturday (10pm to 7am) and Sunday and public holidays (10pm to 9am)	35 + IF	45 + IF	55 + IF
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90
Industrial and utility premises in the Kwinana Industrial Area	All hours	75	85	90
Note:	The $L_{A\ 10}$ noise level is the noise level that is exceeded for 10% of the time The $L_{A\ 1}$ noise level is the noise level that is exceeded for 1% of the time The $L_{A\ max}$ noise level is the maximum noise level recorded IF = Influencing Factor dB = decibels			

5.5.1.2 Potential impacts

Construction

Noise generating activities from the Project during construction may include:

- Noise generated from the use of equipment/machinery.
- Vehicle noise including heavy vehicles and reversing alarms within the Site, as well as vehicles delivering equipment and materials to the Site.
- Installation and removal of a construction compound.
- Loading and unloading of materials and plant.

Noise levels during construction would be sufficiently managed through the implementation of the mitigation measures outlined in **Section 5.5.2**.

Operation

The Herring Storer noise assessment modelled operational noise received at the sensitive receptors (residential premises) from the proposed final expected 370MW capacity of the power station. The assessment has been based on the power station operating at full capacity.

Under this scenario, noise received at the residences could comply with the Regulatory requirements during the day and evening periods but could exceed these requirements during the night period by +2 dB(A).

However, it is typically the case that during the night period, there would be a reduction in noise emissions, not only due to lower demand on the power station, but the lower ambient temperature resulting in less air required for cooling.

Noise received at the boundary of the premises, could exceed the assigned noise level by 1 dB(A). As part of the design process noise mitigation options will be assessed and incorporated as required to ensure compliance at the Regulator requirements are achieved.

5.5.2 Management

Proposed measures to manage and/or mitigate noise impacts from the Project are detailed in the following **Table 5-5**.

Table 5-5: Management and mitigation measures - noise

ID	Management/ mitigation measure	Timing
N1	As part of the design process noise mitigation options will be assessed and incorporated as required to ensure compliance at the Regulator requirements are achieved.	Design
N2	Where necessary, turbines will be rotated to face away from the east, making the noise outlets face north or west away from sensitive receptors.	Design
N3	A community liaison phone number and permanent site contact will be established so the noise related complaints, if any, can be received and addressed in a timely manner.	Construction, Operation
N4	Potentially affected sensitive receptors will be advised of the proposed construction period at least one week prior to the commencement of works.	Construction

ID	Management/ mitigation measure	Timing
N5	Construction work must be conducted in accordance with *Australian Standard 2436-2010 Guide to noise and vibration control on construction, demolition, and maintenance sites*.	Construction
N6	An approved Noise Management Plan must be implemented for out-of-hours work (i.e. if works occur before 7am or after 7pm). The Noise Management Plan needs to be approved by the City of Kwinana local government.	Construction
N7	Five dB(A) will be deducted from the determined assigned noise levels to ensure noise emissions from the Site are not significantly contributing to the overall noise level at the nearest noise sensitive premises.	Construction, Operation
N8	Noise received at residential premises will need to comply with the assigned LA10 noise level as the noise received from the power station will occur for more than 10% of the time.	Construction, Operation
N9	AGL will maintain the community liaison phone number and site contact so that community complaints relating to noise can be received relating to operations.	Operation
N10	Machinery, plant, and equipment will be maintained in accordance with suppliers' specifications.	Operation
N11	Machinery, plant, equipment, and operational practices will be adopted based on the option that will produce the lowest practical level of noise.	Operation

5.6 Hazards and wastes

5.6.1.1 Existing environment

Solid Waste

Solid waste produced during construction and operation will include packaging crates, wood, paper, plastics, and domestic rubbish. Hydrocarbon and chemical waste will be removed from the Site by a licensed contractor for disposal to an approved facility in accordance with the *Environmental Protection (Controlled Waste) Regulations 2004*. Oil drums, oil filters and batteries will be collected and stored appropriately prior to removal by a licensed contractor.

Liquid Waste

Once operational, the main sources of liquid waste from the Project will be:

- Discharge from the demineralisation (water treatment) system.
- Surface runoff from around the plant site.
- Other stormwater drainage.

A waste oil tank for collection and storage of waste oil from the oily water separator will be constructed and bunded in accordance with Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) requirements, with oils collected for disposal offsite by a licensed contractor.

5.6.2 Management

Proposed measures to manage and/or mitigate hazard and waste impacts from the project are detailed in the following **Table 5-6**.

Table 5-6: Management and mitigation measures – hazards and wastes

ID	Management/ mitigation measure	Timing
H&W1	A Waste Management Plan will be prepared and implemented to address the control of litter from the individual development during construction and show plans to incorporate rubbish management in the design of the development on the lot.	Prior to construction and operation
H&W2	The existing Dangerous Goods licence will be reviewed for the project by the licensee prior to any additional dangerous goods being brought to Site.	Prior to operation
H&W3	Any hazardous chemicals to be used during construction will be stored and handled in a manner consistent with their Material Data Sheet and all relevant Australian Standards to minimise spill risk. No potentially hazardous materials such as chemicals, fuels, and/or waste will be stored within or adjacent to drainage lines or unsealed surfaces.	Construction
H&W4	Chemicals will be stored in dedicated concrete bunds to contain any spills and covered with protective coatings to prevent concrete corrosion.	Operation
H&W5	Wastewater generated at the Site would be managed under a Trade Waste agreement with the Water Corporation.	Operation
H&W6	Appropriate receptacles will be provided for the depositing of litter and other waste materials and their contents will be sent for reuse, recycling, or disposal on a regular basis.	Operation
H&W7	Appropriate signage, awareness and encouragement of staff and contractors would be implemented to minimise waste generation and promote use of recycling practices.	Operation
H&W8	Retained vegetation and setback areas will be kept free of litter and Declared Weeds.	Operation
H&W9	All hazardous waste materials will be packaged appropriately and transported off site.	Operation

6. Risk Identification and Assessment

6.1 Overview

A risk assessment has been prepared to identify the potential emissions from the proposed activities and the potential sources, pathways and receptors of those emissions, and proposed controls to manage potential emissions to determine a risk rating. The risk assessment has been based on the DWER Guidance Statement: *Risk Assessments* (released by the then named Department of Environmental Regulation in 2017, revised 2020) and based on the following risk rating matrix (**Table 6-1**):

Table 6-1: Risk Rating Matrix

	Consequence				
Likelihood	Slight	Minor	Moderate	Major	Severe
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

Risk = consequence x likelihood

The following criteria (DWER 2017) are used to determine the consequence and likelihood of a risk event occurring (**Table 6-2** and **Table 6-3**).

Table 6-2: Consequence Matrix

Consequence	Consequence description	
	Environment	**Health**
Severe	On-site impacts: catastrophic Off-site impacts (local scale): high level Off-site impacts (wider scale): mid-level Mid to long term or permanent impact to an area of high conservation value or special significance	Loss of life Adverse health effects: high level or ongoing medical treatment Local scale impacts: permanent loss of amenity
Major	On-site impacts: high level Off-site impacts (local scale): mid-level Off-site impacts (wider scale): low level Short term impact to an area of high conservation value or special significance	Adverse health effects: mid-level or frequent medical treatment Local scale impacts: high level impact to amenity
Moderate	On-site impacts: mid-level Off-site impacts local scale: low level Off-site impacts wider scale: minimal	Adverse health effects: low level or occasional medical treatment Local scale impacts: mid-level impact to amenity
Minor	On-site impacts: low level Off-site impacts (local scale): minimal Off-site impacts (wider scale): not detectable	Local scale impacts: low level impact to amenity
Slight	On-site impacts: minimal	Local scale impacts: minimal impacts to amenity

Table 6-3: Likelihood Matrix

Likelihood	Likelihood description
Almost certain	The risk event is expected to occur in most circumstances.
Likely	The risk event will probably occur in most circumstances.
Possible	The risk event could occur at some time.
Unlikely	The risk event will probably not occur in most circumstances.
Rare	The risk event may only occur in exceptional circumstances.

The potential emissions, sources, pathways, and receptors that have been identified for the construction, commissioning and operation of the proposed facilities are outlined in **Table 6-4**. This table also identifies the potential impacts, proposed controls, and associated risk ratings.

Table 6-4: Risk Assessment

Source	Potential Emissions	Pathway	Potential Receptors	Potential Impacts	Proposed Controls	Consequence	Likelihood	Risk Rating
Construction Phase								
Construction of K2 project facilities	Dust	Airborne: particulate (dust) emissions generated during construction activities including building and vehicle movements.	Residential: None, nearest receptor is Kwinana residential area approx. 2 km away.	Health and amenity: Given the nature of construction activities and distance to the nearest receptor, dust generated during construction is not expected to affect public health or amenity.	Dust will be managed via the requirements of the Works Approval and Licence. An Environmental Management Plan will be prepared for the K2 project proposal and the presented controls in these Plans will be implemented. Standard management procedures are expected to effectively mitigate the risk of dust emissions during construction. Mitigation and management measures are detailed in **Section 5.2**.	Minor	Rare	**Low**
			Terrestrial ecosystems: Flora and fauna	Given that the premises has been cleared of native vegetation and there is no threatened and priority flora or fauna in the vicinity of the premises and the short-term duration of construction activities, dust is expected to have a negligible impact on flora and fauna.				
	Noise and vibration	Airborne: noise emissions generated during construction activities.	Residential: None, nearest receptor is Kwinana residential area approx. 2 km away.	Health and amenity: Given the distance to the nearest receptor and noise generating activities being limited to occur during the daytime, noise generated during construction is not expected to affect public health or amenity.	*Environmental Protection (Noise) Regulations 1997* and standard operating procedures are expected to effectively mitigate the risk of noise during construction. An Environmental Management Plan and Construction Management Plan will be prepared for the power station and the presented controls in these Plans will be implemented, including: • A community liaison phone number for noise and vibration complaints. • Sensitive receptors will be advised of potential effects at least one week prior. Mitigation and management measures are detailed in **Section 5.5**.	Minor	Rare	**Low**
	Light	Airborne: light spill generated during construction activities.	Residential: None, nearest receptor is Kwinana residential area approx. 2 km away.	Health and amenity: Given the distance to the nearest receptor, light emissions are not expected to affect health or amenity.	Light spill will be managed via the standard operating procedures, including: • Lighting design in areas that require night lighting will ensure light is directed to work areas and minimal light spill occurs (including use of directional lighting and covered lenses). • Standard management procedures are expected to effectively mitigate the risk of light spill during construction.	Minor	Rare	**Low**
			Terrestrial ecosystems: Nocturnal native fauna	Given that there is no threatened and priority fauna in the vicinity of the premises and the short-term duration of construction activities, light spill is expected to have a negligible impact on surrounding fauna.				

Source	Potential Emissions	Pathway	Potential Receptors	Potential Impacts	Proposed Controls	Consequence	Likelihood	Risk Rating
	Chemical and hydrocarbon spills	Land	Contamination of soil, surface water or groundwater	Given the distance to the closest surface waterbody (Indian Ocean) and the quantity and quality of the chemicals at the power station, chemical and hydrocarbon spills are not expected to affect surface waterbodies. Chemical and hydrocarbon spills are expected to have a negligible effect on groundwater and soil due to the small amount of chemicals and hydrocarbons stored on the premises and the implemented precautionary measures.	Appropriate design, management, inspection, and maintenance of chemical and hydrocarbon storages is expected to mitigate the risk of chemical or hydrocarbon contamination during operations. Proposed controls include: • Appropriate storage areas for chemicals and hydrocarbons at the premises. • Regular inspections of operating equipment to identify leaks. • Premises will be stocked with appropriate spill response equipment. • In case of soil contamination, the contaminated soil will be removed to an offsite approved disposal facility. • Chemical (depending on its characteristics) or hydrocarbon contaminated waste materials will be segregated from other wastes and removed to an offsite approved disposal facility. • Where possible, storage of chemicals and hydrocarbons will be carried out on sealed areas with purpose-built bunds.	Minor	Rare	**Low**
	Bushfire	Electrical failure, combustion and weather conditions.	Land, all residential and sensitive receptors.	Bushfire may have impact within the Site and surrounding environments. Effects can include loss of habitat, damaged equipment on the Site, air and soil pollution and health risks.	Bushfire will be managed by the following controls: • Facility design will incorporate an emergency access route for firefighting emergency vehicles. • Asset Protection Zone will be established and maintained in accordance with Schedule 1 of the Guidelines for Planning in Bushfire Prone Area and the Bushfire Risk Management Plan and Emergency Evacuation Plan. • Construction contractors will implement a hot works permit system. • Equipment, machinery and surrounding environmental factors will all be maintained to minimise risk of fire. • All surrounding stake holders understand the Fire Danger Day Index and DEFES warnings. • Firefighting equipment will always be kept onsite and tested when the manager inspects risk precautions and reviews the Bushfire Evacuation Plan. • Internal access ways will be constructed and maintained. Management of bushfire is dealt with under the Planning and Development Act 2005 by Kwinana City Council. A Development Application is currently being progressed.	Minor	Rare	**Low**

Source	Potential Emissions	Pathway	Potential Receptors	Potential Impacts	Proposed Controls	Consequence	Likelihood	Risk Rating
Operation Phase								
Operation of power station facilities	Dust	Airborne: windborne particulate (dust) emissions generated during operation.	Residential: None, nearest receptor is Kwinana residential area approx. 2 km away. Environmental: None.	Health and amenity: Given the distance to the nearest receptor and mitigation measures in place, dust generated during operation is not expected to affect public health or amenity, or any sensitive environmental receptors.	Dust will be managed via the requirements of the Works Approval and subsequent Licence. An Environmental Management Plan will be prepared for the power station and the controls will be implemented accordingly. Standard and management procedures are expected to effectively mitigate the risk of dust emissions during operation. Mitigation and management measures are detailed in **Section 5.2**.	Minor	Rare	**Low**
	Noise and vibration	Air pressure noise emissions generated during operation	Residential: None, nearest receptor is Kwinana residential area approx. 2 km away. Environmental: None.	Health and amenity: Given the distance to the nearest receptor and mitigation measures in place, noise generated during the operation is not expected to affect public health or amenity, or any sensitive environmental receptors.	*Environmental Protection (Noise) Regulations 1997* and standard operating procedures are expected to effectively mitigate the risk of noise during operation. An Environmental Management Plan will be prepared, and the presented controls will be implemented. Environmental Noise Assessment was prepared, and the assessment confirmed (with conservative approach involving a 5dba deduction from assigned noise levels) that no noise limits will be exceeded at the closest receptors during day or night operations. Mitigation and management measures are detailed in **Section 5.5**.	Minor	Rare	**Low**
	Light	Light spill generated during operation.	Residential: None, nearest receptor is Kwinana residential area approx. 2 km away. Terrestrial ecosystems: Nocturnal native fauna	Health and amenity: Given the distance to the nearest receptor, light emissions are not expected to affect health or amenity. There are no nearby threatened nocturnal priority fauna that would be affected by nighttime operations.	Light spill will be managed via the standard operating procedures, including: Lighting design in areas that require night lighting will ensure light is directed to work areas and minimal light spill occurs (including use of directional lighting and covered lenses). Standard management procedures are expected to effectively mitigate the risk of light spill during operation.	Minor	Rare	**Low**

Source	Potential Emissions	Pathway	Potential Receptors	Potential Impacts	Proposed Controls	Consequence	Likelihood	Risk Rating
	Chemical and hydrocarbon spills	Land and water	Local soil and groundwater systems. Residential: None. Environmental: None.	Contamination of soil and groundwater. Health and amenity: Given the distance to the nearest receptors and mitigation measures in place, any hydrocarbons spills during the power plant's operation are not expected to affect public health or amenity, or any sensitive environmental receptors.	Appropriate design, management, inspection, and maintenance of chemical and hydrocarbon storages will mitigate the risk of chemical or hydrocarbon contamination during operations. Proposed controls include: • Appropriate storage areas for chemicals and hydrocarbons at the premises. • Daily inspection of oil/water separator infrastructure to identify leaks. • Premises will be stocked with appropriate spill response equipment. • In case of soil contamination, the contaminated soil will be removed to an offsite approved disposal facility. • Groundwater monitoring will be conducted bi-annually and groundwater monitoring wells will be protected during earth works and constriction, and if damaged they will be replaced. • Chemical (depending on its characteristics) or hydrocarbon contaminated waste materials will be segregated from other wastes and removed to an offsite approved disposal facility. • Where possible, storage of chemicals and hydrocarbons will be carried out on sealed areas with purpose-built bunds. Mitigation and management measures are detailed in **Section 5.4**.	Minor	Rare	**Low**
	Smoke	Airborne: smoke created by a fire in the Plant.	Residential: nearest receptor is Kwinana residential area approx. 2 km away. Environmental: None.	Health and amenity: The location of the Plant means that strong westerly winds could blow smoke towards the residential receptors in the City of Kwinana.	Due to the potential explosive nature of fuel storage tasks, controls to reduce or eliminate the risk of sparks will be implemented. The design of the fire mitigation system shall comply with the following Australian Standards: • AS 1940: The storage and handling of flammable and combustible liquids. • AS 1851: Maintenance of fire protection systems and equipment. • AS 2118: Automatic fire sprinkler systems. • AS 5062: Gas suppression systems for fire protection. • AS 5601: Gas installations. • AS 60079 series: Explosive atmospheres standards. • AS 3000: Electrical installations (for electrical components).	Minor	Rare	**Low**
	Stormwater	Waste: main sources of liquid waste from the K2 Project.	Residential: None, nearest receptor is Kwinana residential area approx. 2 km away. Environmental: None.	Contamination of waterbodies and soil.	Construction will occur of a retention basin is in the southeast corner of the K2 project site that will receive stormwater runoff from across the Site to mitigate the risk of stormwater pollution to the environment.	Minor	Rare	**Low**

7. References

Department of Environment. (2006). *Air Quality Modelling Guidance Notes.* Perth.

Department of Water and Environmental Regulation. (2019). *Guideline Air Emissions.*

Ecosystem Solutions. (2024a). *Bushfire Management Plan.*

Ecosystem Solutions. (2024b). *Bushfire Risk Management Plan & Emergency Evacuation Plan.*

Ektimo. (2023). *Kwinana Swift Power Station Annual Compliance 2023 .*

Herring Storer Acoustics . (2024). *Environmental Acoustic Assessment .*

Main Roads WA. (2024, September). *Crash Information (last 5 years)*. Retrieved from Portal main roads open data arc GIS: https://portal-mainroads.opendata.arcgis.com/datasets/mainroads::crash-information-last-5-years/explore?location=-32.217225%2C115.776320%2C14.58

PGV Environmental. (2011a). *Rockingham Industry Zone: Environmental Management Plan.*

Ramboll. (2024a). *Contamination Desktop Assessment.*

Ramboll. (2024b). *Kwinana Swift Power Station Expansion: EPBC Self-Assessment.*

Ramboll. (2024c). *Kwinana Swift Power Station Exxpansion: Air Quality Assessment.*

Terra Rosa Consulting. (2024). *Desktop due diligence assessment of the proposed AGL power station expansion project for Ramboll Australia Pty Ltd.*

Transcore. (2024). *Kwinana Swift Power Station Upgrade, 1 Burton PLace, Kwinana Beach: Transport Impact Statement.*

Western Australian Planning Comission. (2016). *Transport Impact Assessment Guidelines for Developments, Volume 4 – Individual Developments.*

Western Australian Planning Commission. (2021). *Guidelines for Planning in Bushfire Prone Area.*

Appendix 1
Air Quality Assessment prepared by Ramboll (2024c)

Intended for
AGL Energy Limited

Document type.
Draft

Date
February 2025

KWINANA SWIFT POWER STATION EXPANSION – AIR QUALITY ASSESSMENT

RAMBOLL Bright ideas. Sustainable change.

KWINANA SWIFT POWER STATION EXPANSION – – AIR QUALITY ASSESSMENT

Project name	**Kwinana Swift Power Station Expansion – Air Quality Assessment**
Project no.	**318002114**
Recipient	**AGL Energy Limited**
Document type	**Draft Report**
Version	**Final**
Date	**18/2/2024**
Prepared by	**Martin Parsons**
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1. INTRODUCTION

1.1 Background

In the 2024 Wholesale Energy Market (WEM) Electricity Statement of Opportunities (ESOO), published on 18 June 2024, the Australian Energy Market Operator (AEMO) has signalled a capacity investment shortfall starting from the 2027-28 capacity year, largely driven by planned retirement of most of the existing coal fired generation fleet.

The proposed KSPS expansion (the K2 Project) will contribute additional electricity supply to address forecast electricity capacity deficits resulting from increased demand and the retirement of thermal coal fire generation of State-owned Collie, Muja C and Muja D power stations. The K2 Project would provide critical flexible firming capacity to the WEM. In addition, the K2 Project will be designed to meet AEMO's new Flexible Capacity criteria, which is designed to play a crucial role in flexible fast response generation to complement batteries and intermittent renewable generation.
The KSPS is located 40 km South of Perth in the Kwinana Industrial Area (KIA) at 1 Burton Place, Kwinana Beach (Lot 13 DP39572) in the city of Kwinana. The KSPS is a dual-fuel 120 MW peaking power station. The site is licensed as a prescribed premises for Electric power generation (L8471/2010/2) under the Environmental Protection Regulations. The premises have been operating under this licence without incident, since 2010.

The KSPS features four 30MW gas turbines connected to two common generators. The expansion would involve installing additional gas turbines within the existing site to provide a total additional capacity of up to 250MW. It is proposed that the turbines would be open cycle units that could operate on gas, distillate, LNG, LPG and/or hydrogen.

The existing plant is primarily operational during times of peak energy usage in Perth and the surrounding region, and the expansion of the plant will not change these operations. The power station by nature, will not operate continuously. AGL intends to obtain all necessary environment and planning approvals for up to four types of gas turbines which will correspond to four different plant configurations. The gas turbine will be selected after the environment and planning approval is obtained.

AGL requested Ramboll undertake an air quality assessment as part of their approvals support for the expansion of the KSPS. The assessment included modelling potential air quality impacts arising from emissions of concern which in this instance is oxides of nitrogen (NOx) (expressed as nitrogen dioxide (NO_2)). Emissions of carbon monoxide and particulates are also expected to be emitted from the turbines; however, the concentrations of these pollutants are negligible in the context of ambient air quality guidelines and have not been assessed further as part of this assessment.

1.2 Purpose of this Report

This report presents the assessment of the potential air quality impacts arising from emissions of NOx. The approach, methodology and results of the air dispersion modelling are detailed as well as the predicted impacts.

Figure 1: KSPS Locations

Figure 2: Indicative Layout of the proposed Facility

2. AIR QUALITY CRITERIA

2.1 Ambient Air Quality Criteria

The Department of Water and Environmental Regulation (DWER) published the Guidance Statement for Risk Assessments in February 2017 (DWER, 2017) and the draft Guideline: Air Emissions in October 2019 (DWER, 2019), which refers to air quality criteria that may be considered in determining public health and environment impacts. The publication containing air quality criteria relevant to this assessment is the National Environment Protection (Ambient Air Quality) Measure (NEPM) (NEPC, 2015 & 2021).

A summary of the current applicable air quality criteria for NO_2 is presented in Table 1, and a summary of the previously applied criteria is presented in Table 2.

Table 1: Ambient Air Quality Criteria

Compound	Averaging Period	Concentration (µg/m^3)[1]	Reference
NO_2	1-hr	151	NEPC (2021)
	Annual	28	

Notes
1. Referenced to 25ºC, and 101.3 kPa.

3. AMBIENT MONITORING

3.1 Ambient Air Quality

The DWER conduct ongoing ambient air quality monitoring within the Kwinana region for NO_2. The closest air quality monitoring station (AQMS) to the KIA is at the North Rockingham AQMS (See Figure 3). Data from the North Rockingham station was obtained for the modelled period (1st July 2023 and 30th June 2024). A summary of the monitored data is presented in Table 2 below. The results show that the monitored concentrations at this station were well below the ambient air quality guideline values as presented in Table 1.

Table 2: Monitored Concentrations at North Rockingham AQMS (1st July 2023 and 30th June 2024)

Data Availability	Concentration µg/m³						
	Max 1-hour[2]	99th percentile 1- hour	98th percentile 1-hour	95th percentile 1-hour	90th percentile 1-hour	70th percentile 1-hour	Annual Average[3]
95.8%	59.8	40.2	35.4	28.1	20.3	8.3	8.1

Notes
1. Referenced to 25ºC, and 101.3 kPa.
2. 1-hour average NO_2 criteria – 151 µg/m³
3. Annual average NO_2 criteria – 28 µg/m³

Background concentrations of NO_2 are required to assess potential cumulative impacts for the purposes of this study. Whilst other major sources of NOx emissions in the KIA have been included in the modelling assessments, this does not account for other sources of NOx in the region such as vehicles or other minor sources. No specific guidance for selection of an appropriate background level is provided or endorsed by the DWER in Western Australia. Accordingly, in Victoria, the State Environment Protection Policy (Ambient Air Quality) (SEPP (AQM)) (Gov. of Vic., 2001) states that the 70th percentile concentration (concentration which is exceeded by 30% of concentrations for that averaging period) could be adopted as the background level for shorter term averaging periods.

The DWER reports annually the 75th percentile for NO_2 1-hour average concentration at its monitoring stations in Western Australia. Previous correspondence with the DWER has indicated that due to the prevailing winds of the region, the 70th percentile concentrations recorded at the North Rockingham AQMS might not be adequately considered conservative for use in an air quality assessment of sources in the KIA.

Hence, in absence of reported 70th percentile values, the more conservative 75th percentile for 1-hour averages and the annual average concentrations of NO_2 measured at another nearby DWER monitoring station (South Lake AQMS) were assessed. Concentrations over several years were analysed and concentrations for the year 2019, were considered to be the most conservative. The concentrations monitored in 2019 at the South Lake AQMS have been utilised in this assessment to conservatively represent background sources of NOx other than those that were not explicitly modelled.

Table 3: 2019 Monitored Concentrations – South Lake Monitoring AQMS

Compound	Averaging Period	Concentration (µg/m³)
NO_2	75th percentile 1-hour	39.5
	Annual	13.2

Notes
1. Referenced to 25ºC, and 101.3 kPa.

It should be noted that the values used as indicative of background concentrations are likely conservative as they would contain contributions from the industrial sources that have been explicitly modelled. In addition, the South Lake monitor whilst in the direction of the prevailing winds of the region, is located some distance from the KIA near the Kwinana Freeway and would be impacted by traffic emissions, however it provides a conservative basis on which to assess the potential risk associated with the project.

Figure 3: Background Air Quality Monitoring Study Ambient NO_2 Monitoring Sites

4. AIR DISPERSION MODELLING AND METHODOLOGY

4.1 Air Dispersion Model

The CALPUFF modelling system was utilised to undertake air dispersion modelling. CALPUFF is a multi-layer, multi-species, non-steady-state puff dispersion model. It utilises three-dimensional wind fields to simulate the effects of the temporal and spatial meteorological conditions on pollutant transport, transformation, and removal. CALPUFF also allows for three-dimensional characterisation of land use and surface characteristics such as height and density of vegetation. CALPUFF is often used in a regulatory environment in situations where other regulatory models such as AERMOD may not be suitable due to complex terrain or proximity to the coast.

The following model set-up options within CALPUFF were used:

- Meteorological grid of 29 km by 39 km encompassing the KIA, Rockingham, and South Lakes
- Meteorological grid spacings of 1 km;
- Sampling grid of 20 km by 25 km and 200 m spacing; and
- No chemical transformation.

In addition to the gridded receptors for CALPUFF, discrete receptors were positioned throughout the modelled domain to represent residential dwellings and recreational locations to provide a quantitative assessment of NO_2 concentrations in sensitive areas of interest. These discrete receptors are summarised in Table 4 and are also highlighted in Figure 4.

Table 4: Discrete Receptor Locations

Receptor	Easting (MGA94) (m)	Northing (MGA94) (m)
Wells Park	383,090	6,431,590
Golf Course	386,587	6,431,618
Thomas Oval	386,468	6,432,951
Oval	385,925	6,434,681
Residence	386,723	6,432,276
North Rockingham AQMS	382,112	6,429,858
Residence	387,347	6,430,608
Hope Valley	386,300	6,436,000
Calista Primary School	387,961	6,431,708
Wombat Wallow Childcare Centre	387,344	6,433,024
South Lake AQMS	390,061	6,446,712

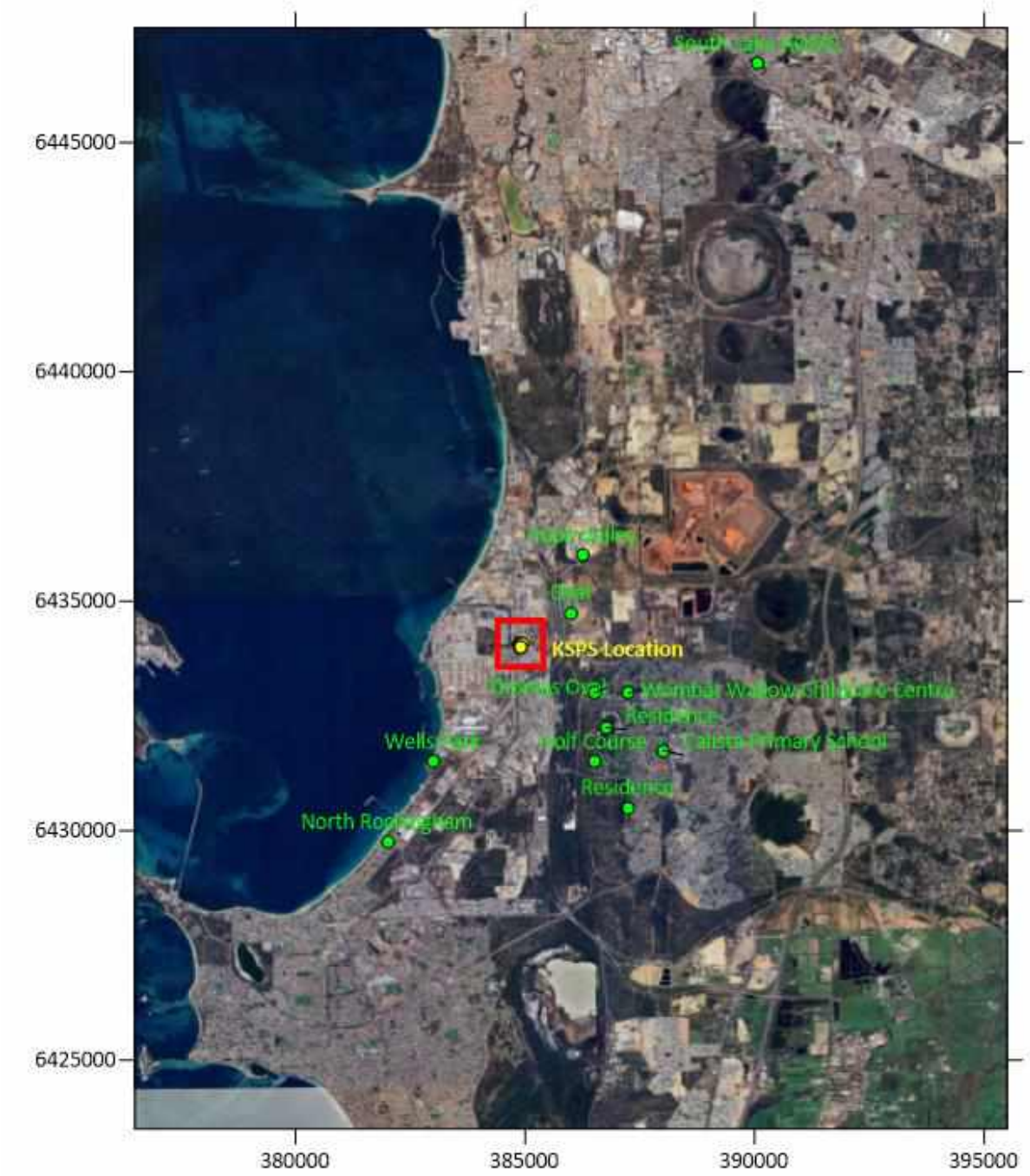


Figure 4: Receptor locations in relation to the proposed operations

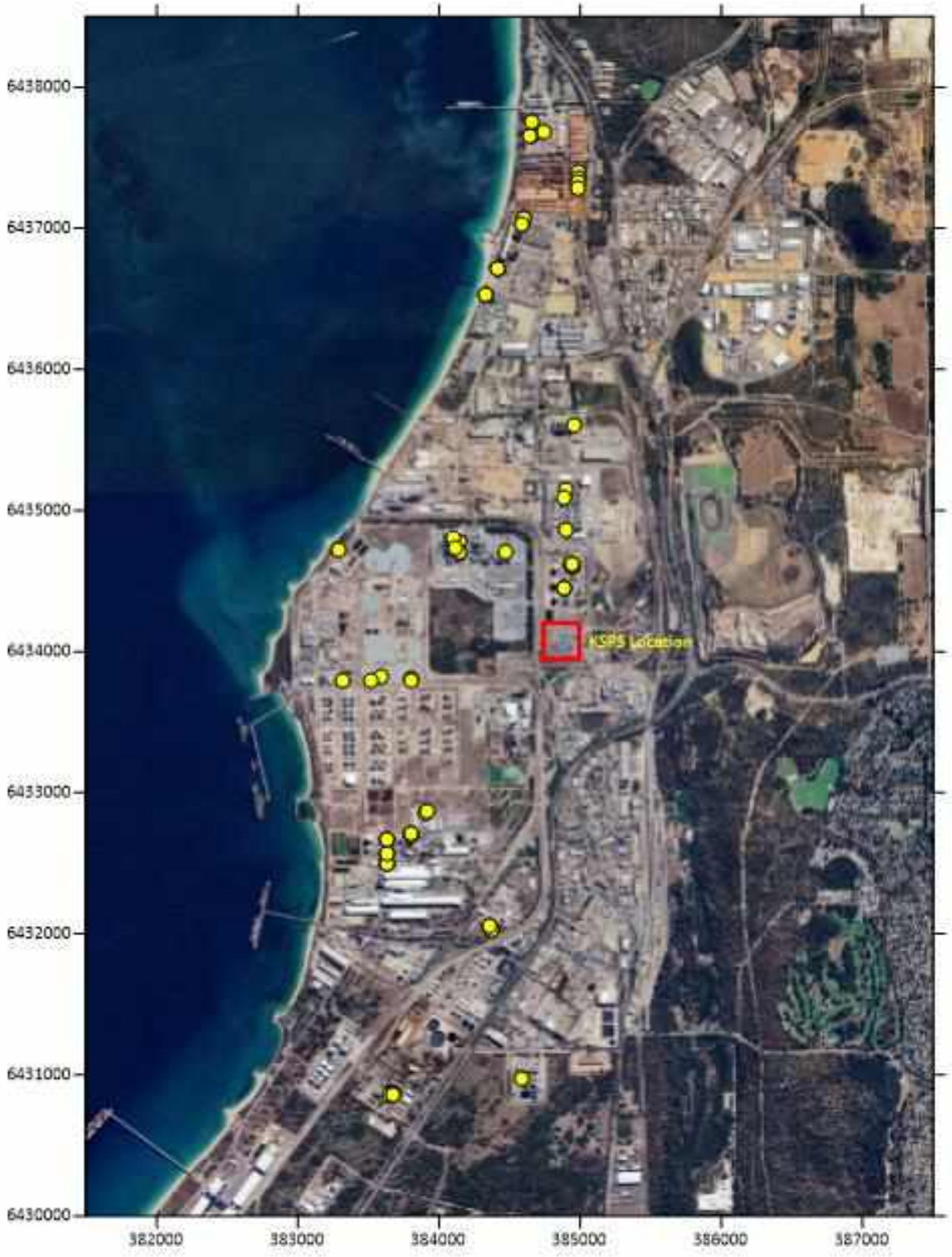


Figure 5: Significant Current and Future Sources of NOx emissions within the KIA that were included in the Background and Future Scenarios as represented by the Yellow Dots

4.2 Meteorological Data

The meteorology of the required site was simulated using the Weather Research and Forecasting Model (Michalakes et al. 2001), subsequently referred to as "WRF". This is a state-of-the-artnumerical model, which uses the basic laws of physics and thermodynamics to calculate the

evolution of a region's meteorology in time and space. While originally released in 2001, it has been continuously updated since that date. The version used in this work was numbered 4.2.

It represents the interactions of many variables, including wind velocity, air pressure, temperature and humidity, cloud, rain, plus surface characteristics like soil moisture, land use type, vegetation structure, ground roughness and water surface temperature. These are represented on a set of three-dimensional grids, covering the full depth of the atmosphere and a horizontal region that may be only a few kilometres wide, or cover the whole globe. Normally it is used in "nested" mode, in which the broader scales surrounding a region of particular interest are represented at coarse resolution, while those centred on that region are represented on a fine scale.

The model was considered appropriate in this instance for use with the CALPUFF model as it takes into consideration the complex meteorology of a coastal environment and incorporates the impacts of the thermally induced boundary layer that impacts emissions from sources in the KIA.

4.2.1 Metrological Model Configuration

The model was run using four nests, with south-north resolution 27000, 9000, 3000 and 1000 metres, and west-east resolution 85% of these values.

The centre of the modelling region was set at -32.175°S, 115.75°E. All four nested grids were of size 37 by 46 cells, using a polar grid, each centred within the next largest (Figure 6). The extent of the outermost grid was chosen to ensure that a large width of ocean was represented to the west and south of Western Australia, experience showing that this was needed to ensure adequate model accuracy.

The run simulated the period 1 July 2023 to 30 June 2024. This period was preceded by a three-day "run up", provided to permit model parameters to stabilise. Experience has shown that since the model was initialised using high-resolution measured data, a good match between modelled and measured values developed within a few hours.

Input boundary and initial conditions for the model were obtained using the ERA5 reanalyses (Herzbach et al. 2023). The data used comprised a subset of the global data set, at 1° horizontal resolution with 16 levels from the surface to 50 hPa, covering the region from 90° to 165°E and 65° to 0°S.

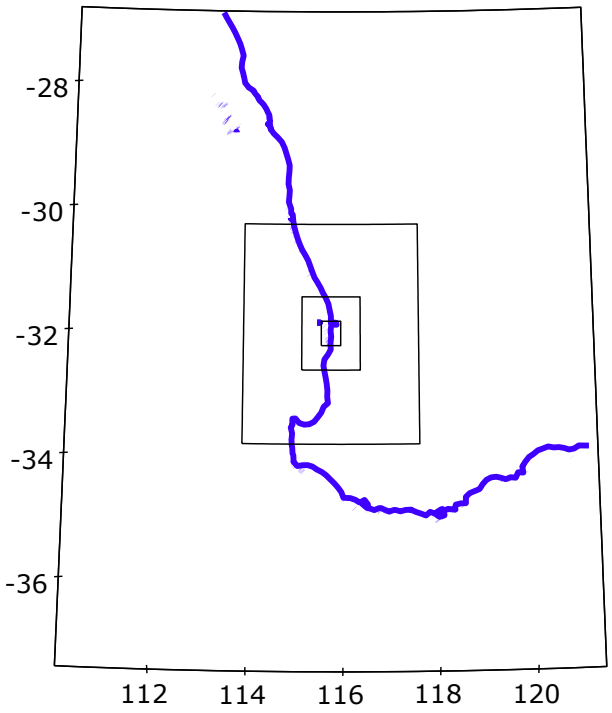


Figure 6: Boundaries of the four nested grids used for modelling, with an outline of the Western Australian coastline for reference.

Other configurations comprised:

- providing for time-varying sea surface temperatures, based on global data records;
- output of model results at hourly intervals for the innermost grid, three-hourly intervals for the next three and six-hourly for the outermost;
- lateral boundary conditions for the outermost nest provided by global measured data, with two-way transfer of boundary data at the edges of inner nests;
- adaptive time steps;
- 28 model layers, with interfaces between near-surface layers at heights of about 20, 50, 90, 160, 250, 360, 550 and 760 m;
- Microphysics using the WRF Single-Moment 6-class scheme (option 6), cumulus physics using the Kain-Fritsch scheme (option 1), longwave radiation using the Rapid Radiative Transfer Model (option 1), shortwave radiation using the Dudhia scheme (option 1), surface layer using the revised MM5 surface layer scheme (option 1). These were found not to be crucial options, all reasonable choices giving similar results;
- Surface physics using the Noah Land Surface Model;
- 4 soil layers;
- Boundary layer physics using the YSU scheme. This choice has been found to give reliable results, and also permits the use of the topographic wind adjustment scheme (which had negligible effect in this case);
- Non-hydrostatic modelling for all nests; and
- Nested boundary relaxation width of 4 cells.

Land use classes employed in the model were based on the MODIFIED_IGBP_MODIS_NOAH data set, with the exceptions:

- For the region of Jandakot Airport, index 17 corresponding to bare ground was used.

- Land use classes in the section of the innermost grid west of 115.85° and south of -32.05° were altered based on satellite imagery of the area, on a grid of 9 arc seconds.

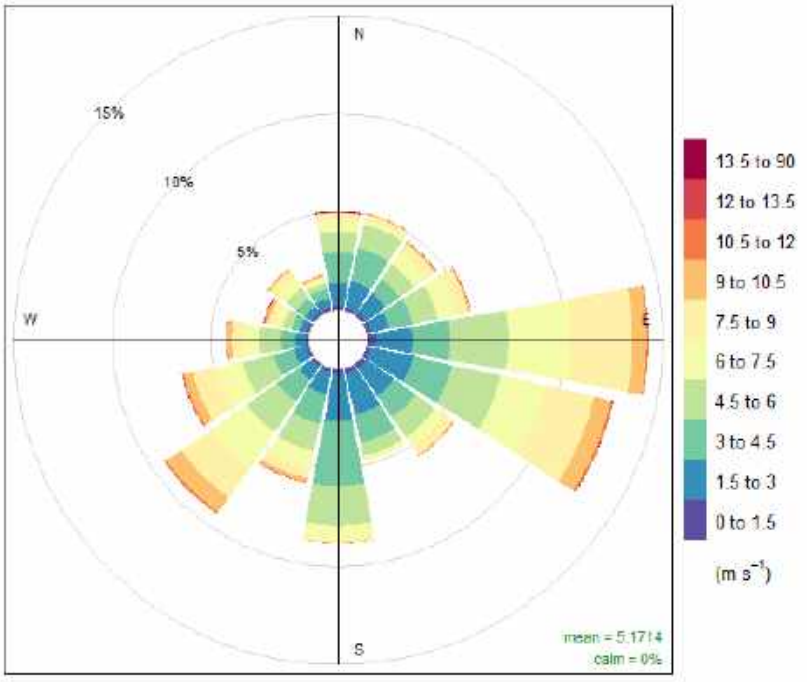
WRF was run using only the standard initial and boundary condition inputs:

- Site measurements were not included, because it was desired to be able to compare model estimates with measurements. Should data from measurement sites have been incorporated in the model run, this would not have been feasible, since the validation process would have involved comparison of measurements with a derivative of those measurements; and
- Nudging of model calculations towards the ongoing values in the ERA5 analyses (using the "grid nudging" approach) was evaluated, but the results of an analysis run showed little effect on model estimates.

The CALMET meteorology files were generated for the period 28 June 2023 to 30 June 2024 (noting that the initial three days were a run-up period for WRF) with a grid size of 29 points west-east and 39 points south-north, and 12 levels corresponding to the lowest 12 levels used by WRF. The southwest grid origin was located at UTM zone 50, 367000 m east and 6419000 m north, using grid intervals of 1000 m. This grid was located within innermost WRF modelling grid, with about 4 cells clear on all sides to exclude the region of transition of meteorological fields from the next larger modelling grid.

4.2.2 Analysis of Meteorological Model Results

Model estimates were compared against measurements made at the nearest locations of publicly available meteorological data, the Bureau of Meteorology site at Jandakot Airport, and three on Garden Island (Garden Island HSF, Colpoy's Point and Armament Jetty). The Jandakot site is within an open airfield area, so tends to experience increased wind speeds. Figure 7 compares the wind roses for the measured and modelled winds at Jandakot. The two wind roses show general similarity, except for more frequent and generally stronger measured winds from the east. As shown in Figure 7, despite the use of the "barren land" land use class for the aerodrome, there was little enhancement of mean wind speeds. The lower modelled wind speeds compared to measurement are shown as a quantile-quantile plot in Figure 9, as a drop in the curve about 6 m/s. It appears that to achieve improved validation at Jandakot, modelling at higher resolution would be required.



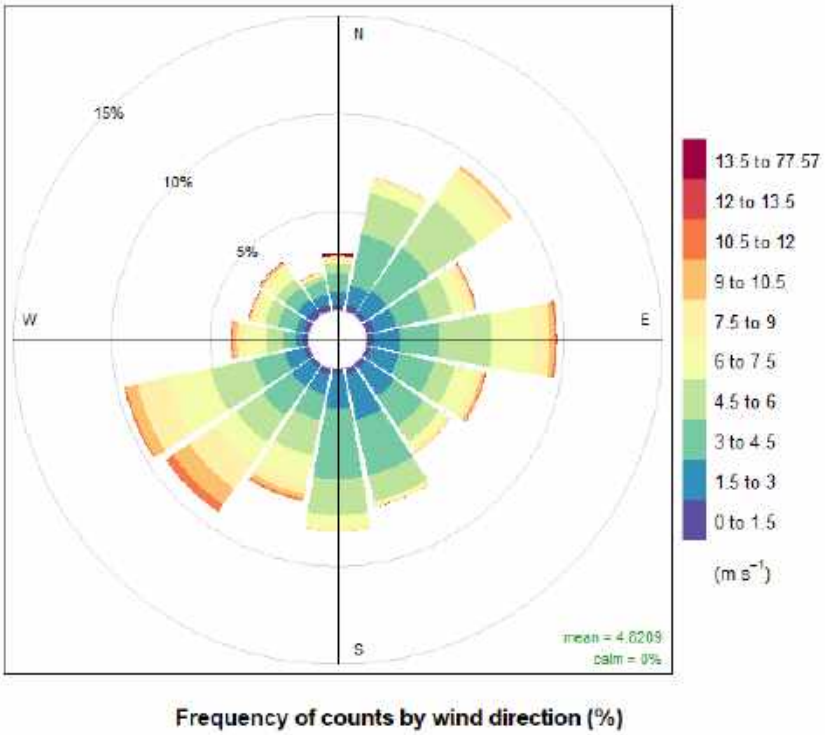


Figure 7: Comparison of measured (above) and modelled (below) wind roses for Jandakot

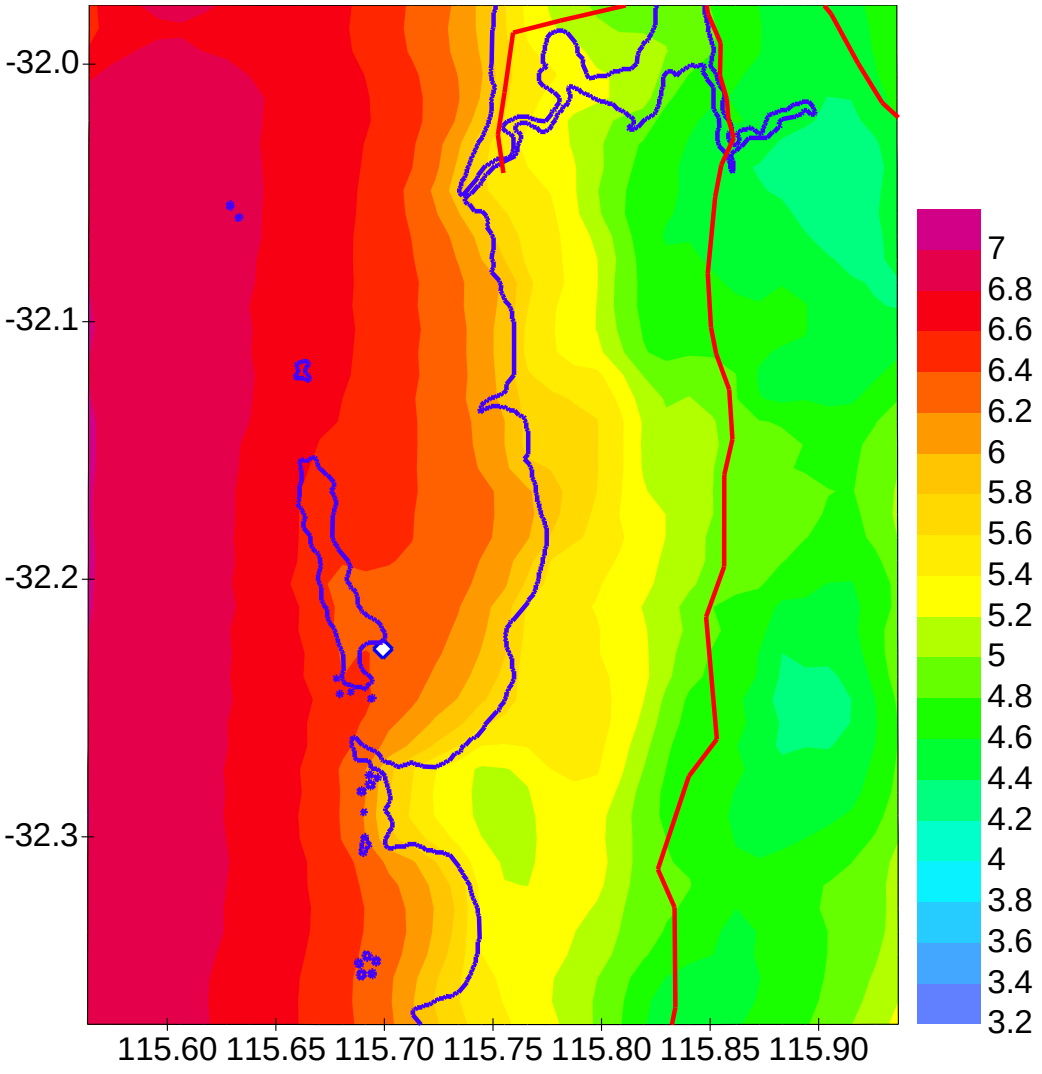


Figure 8. Mean wind speeds for the innermost grid. The location of the Colpoy's Point meteorological site is shown by the small diamond.

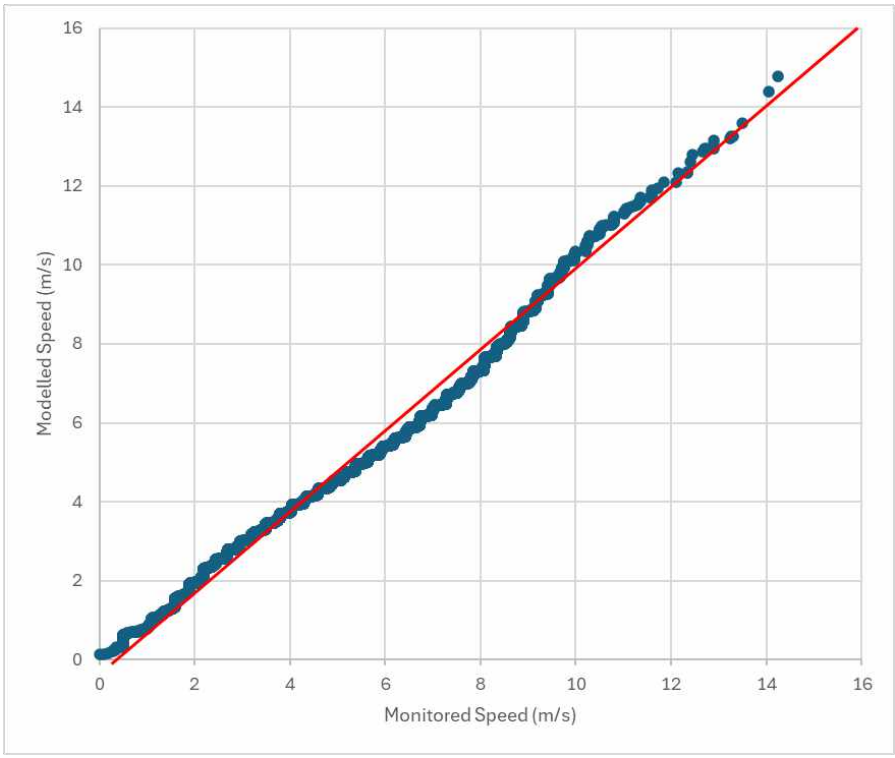
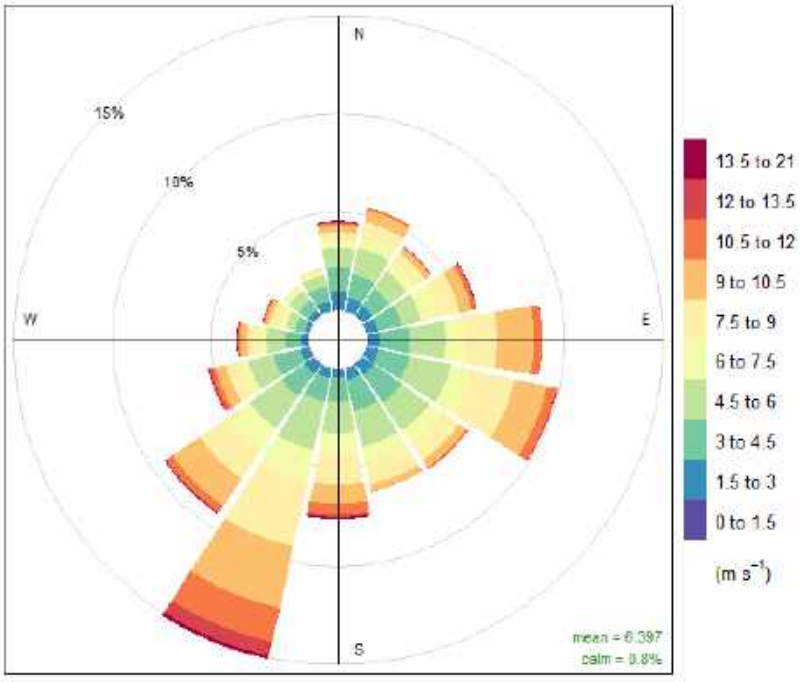


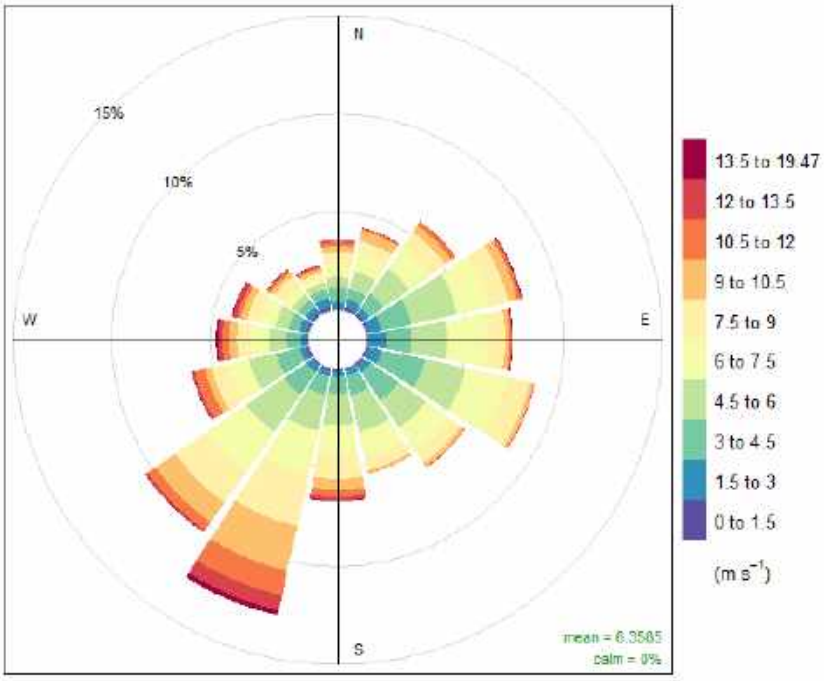
Figure 9: Quantile-quantile plot of modelled and measured wind speeds at Jandakot.

Modelling of winds in the vicinity of Garden Island might be expected to be problematic, due to the poor resolution of the island on a 1 km grid. However, the comparison of modelled and measured values at all sites showed reasonable agreement.

For example, Figure 10 shows wind roses for the Colpoys Point site, which is located on the horn-shaped point in the northern section of the naval base. There is an appearance of broad similarity, which is confirmed by the quantile-quantile plot comparing the two wind speed distributions (Figure 11). Comparisons for the Garden Island HSF and Armament Jetty sites were closely similar.



Frequency of counts by wind direction (%)



Frequency of counts by wind direction (%)

Figure 10 Comparison of measured (above) and modelled (below) wind roses at Colpoy's Point.

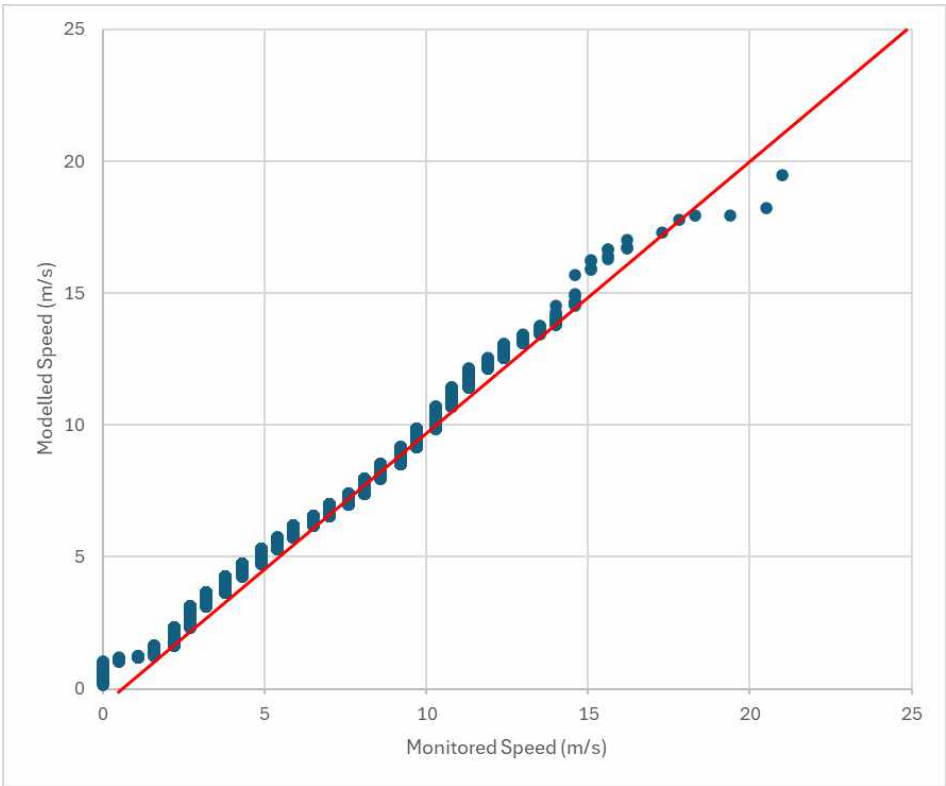


Figure 11: Quantile-quantile plot of modelled and measured wind speeds at Colpoys Point

Figure 12 shows a comparison of modelled and measured temperatures at the Jandakot site. This corresponds to a scatter plot, in which modelled and measured values matched in time are plotted against each other, but instead of a mass of dots, the data are presented as a frequency distribution. The standard deviation of the relationship was 1.9°C, with a slope of 0.96, both considered to be reasonable results.

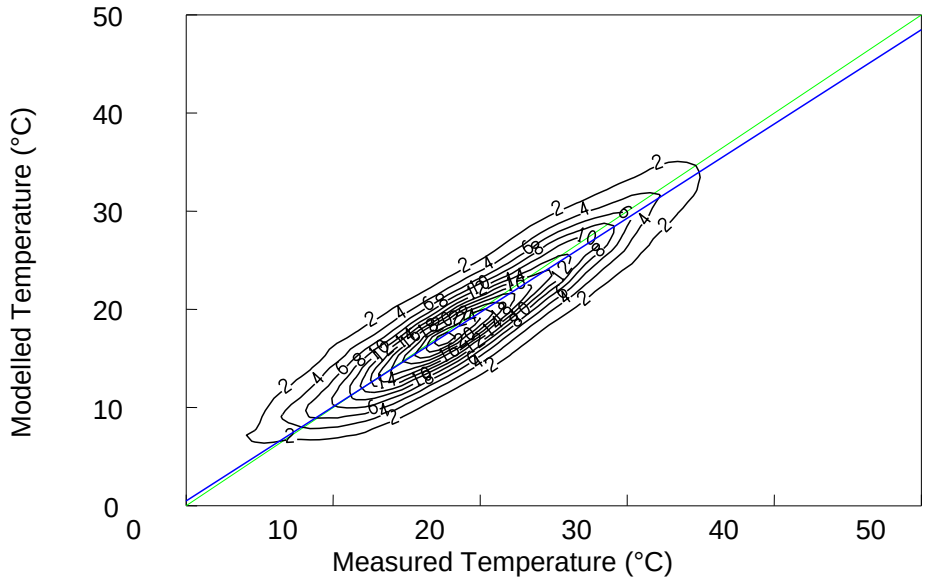


Figure 12: Frequency plot for the distribution of modelled against measured temperatures at Jandakot.

4.2.3 Meteorological Validation

To validate the use of the WRF gridded meteorological dataset for the current modelling assessment, three statistical measures comparing wind speed and wind direction from WRF-predicted and BOM-observed data for the modelled dataset were evaluated. The statistical measures for evaluation include:

- Wind Speed – Root Mean Square Error (RMSE): This is an acceptable average measure of the difference or error between predicted and observed values. Low RMSE values in a model indicate that the model is explaining most of the variation in the observations. The benchmark for wind speed RMSE of <2 m/s has been extracted from Emery et al., 2001.
- Wind Speed – Index of Agreement (IOA): IOA reflects the ratio of the total RMSE to the sum of two differences – between each prediction and the observed mean, and each observation and the observed mean. Emery et al., 2001 suggests that an IOA of 60% or greater represents a good correlation. An IOA of 1 means a perfect correlation between predicted and observed.
- Wind Direction – Gross Error (E): calculated as the mean absolute difference in prediction-observation pairings with valid data within a given analysis region and for a given time period (hourly or daily). The benchmark for wind speed RMSE of ≤30 degrees has been extracted from Emery et al., 2001.

The benchmarks, derived from Emery et al., 2001, were based upon the evaluation of the Pennsylvania State University/ National Centre for Atmospheric Research (PSU/NCAR) Fifth generation Mesoscale Model (MM5) and the Regional Atmospheric Modelling System (RAMS) application. They provide context, when comparing predicted results to observed results, for the reviewer. A result which does not meet the benchmark does not necessarily determine the strength of the predicted values and critical evaluation is therefore imperative when understanding the results.

A summary of the WRF performance evaluation results at Colpoy's point and Jandakot Airport is presented in Table 5.

Table 5: Performance Evaluation Summary – Wind Speed and Wind Direction

Pollutant	Units	Performance Evaluation Criteria	Colpoy's Point	Jandakot Airport
Wind Speed total RMSE	m/s	<2	1.87	1.67
Wind Speed IOA	%	>60%	84%	80
Wind Direction Gross Error	degrees	≤30	26.0	30.9

The results indicate that the wind direction gross error was marginally over the performance benchmark for wind direction, however the other performance benchmarks were met at Jandakot and all benchmarks at Colpoy's Point closer to the sources of interest were met indicating that the modelled meteorological data is considered suitable for use in the KIA area.

4.3 Modelled Scenarios

A summary of the scenarios considered in this air quality assessment are provided below:

4.3.1 Scenario 1 – Existing

Scenario 1 included all known significant existing operations in the KIA excluding current and proposed AGL sources that were operating during the modelled period between 1st July 2023 and 30th June 2024.

The sources that were included in the existing scenario included the following sources:

- AGR's sodium cyanide plant;
- CSBP's nitric acid plant;
- CSBP's ammonia plant;
- Synergy's HEGT facility;
- Alcoa's refinery including the powerhouse, calciner and liquor burner;
- Newgen power station;
- Cockburn 2 power station;
- The Kleenheat gas processing facility; and
- Nickel West's refinery.

Emissions information and source parameters were obtained from a number of publicly available information including studies undertaken by the DWER, approvals documentation and values reported to the NPI as well as emissions information supplied by some operators in the region.

In addition to these sources, an assumed background concentration for predicted concentrations as discussed in Section 3.1 was included at all modelled locations.

A validation assessment was undertaken using existing sources where the results of the modelling were compared against monitored data at the North Rockingham AQMS for the modelling period. The results of this validation are discussed further in Section 5.1.

4.3.2 Scenario 2 – Future Sources:

Scenario 2 included the emissions and background concentrations as outlined in Scenario 1 but with the addition of future approved (yet to operate) and expected operational sources in the KIA. This included the addition of the following sources:

- CSBP's ammonia plant expansion;
- The Kwinana waste to energy facility;
- The East Rockingham waste to energy facility;
- The Covalent lithium plant;
- The Tianqui lithium plant; and
- The BP renewable energy project.

4.3.3 Scenario 3a – Normal Operations in Isolation:

The normal operations in isolation scenario included emissions estimates and stack parameters from the proposed KSPS power station expansion turbines in isolation. Emissions of NOx from four proposed turbines operating on natural gas/diesel were included under the normal operations scenario. Manufacturers specifications guarantee NOx emissions of 42ppm of NOx, referenced to an oxygen content of 15%. AGL indicated that due to emissions controls that are expected to be implemented, most of the time the turbines will be operating below 25 ppm of NOx when combusting natural gas. However, the more conservative limit of 42 ppm was used in this assessment.

The KSPS power station is expected to continue operating as peaking power station with estimates indicating that in the future it would expect to operate on average approximately 25% of the year. Whilst up to four additional turbines will be installed, it is expected that only three of these turbines will generally operate at the one time with one turbine kept in reserve. This assessment has however conservatively assumed that operations from both the existing and future KSPS would occur continuously all year and that the four proposed turbines would be operational at the same time.

4.3.4 Scenario 3b – Normal Operations - Cumulative:

The proposed normal operations scenario included emissions from all emissions sources and background concentrations as outlined in Scenario 2. It included emissions estimates and stack parameters from the existing KSPS power station that were based on conservative results from stack testing data undertaken at the facility as well as the continuous operation of the KSPS power station expansion turbines. Emissions of NOx from four proposed turbines were as described in Scenario 3a.

4.3.5 Scenario 4 – Start Up Operations:

Emissions from the proposed turbines under a startup scenario were assessed using the emissions provided by the manufacturers. Like the normal operations scenario (Scenario 3b), emissions under this scenario were considered cumulatively with emissions and background concentrations as described in Scenario 2 as well as with emissions from the existing AGL plant operating in a normal mode. Startup emissions are expected to occur over a 10-minute period. It was conservatively assumed that normal operations were occurring for the other 50 minutes in an hour.

4.3.6 Scenario 5 – Shut Down Operations:

Emissions from the proposed turbines under a shutdown scenario were assessed using the emissions information provided by the manufacturers with other sources as described in Scenario 4. Like the startup emissions, shutdown emissions are expected to occur over a 10-minute period. It was conservatively assumed that normal operations were occurring for the other 50 minutes in an hour.

4.4 Emission Estimates and Stack Parameters

A summary of the stack parameters and emissions data for the existing and proposed KSPS sources that were used in the assessment is provided in Table 6 and Table 7.

Table 6: AGL Stack Parameters and Emission Rates for Normal Operations

Source	X [m]	Y [m]	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]	NOX g/s
Existing KSPS Sources							
GTG 100A	384868	6434075	9	3.18	46.0	672	9.34
GTG 100B	384868	6434085	9	3.18	46.0	672	9.00
GTG 200A	384868	6434029	9	3.18	46.0	672	8.47
GTG 200B	384868	6434039	9	3.18	46.0	672	7.60
Proposed KSPS Sources							
Proposed Stack 1	384899	6434086	18	3	63.9	733	13.69
Proposed Stack 2	384925	6434087	18	3	63.9	733	13.69
Proposed Stack 3	384891	6433998	18	3	63.9	733	13.69
Proposed Stack 4	384920	6433999	18	3	63.9	733	13.69

Table 7: AGL Stack Parameters and Emission Rates for Startup and Shutdown Operations

Source	X [m]	Y [m]	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]	NOX g/s
Proposed KSPS Turbines Under Startup Conditions							
Proposed Stack 1	384899	6434086	18	3	63.9	733.15	16.93
Proposed Stack 2	384925	6434087	18	3	63.9	733.15	16.93
Proposed Stack 3	384891	6433998	18	3	63.9	733.15	16.93
Proposed Stack 4	384920	6433999	18	3	63.9	733.15	16.93
Proposed KSPS Turbines Under Shutdown Conditions							
Proposed Stack 1	384899	6434086	18	3	63.9	733.15	16.22
Proposed Stack 2	384925	6434087	18	3	63.9	733.15	16.22
Proposed Stack 3	384891	6433998	18	3	63.9	733.15	16.22
Proposed Stack 4	384920	6433999	18	3	63.9	733.15	16.22

4.5 Treatment of Oxides of Nitrogen

Ramboll has applied the Ozone Limiting Method (OLM) to predict ground level concentrations of NO_2 as specified by the USEPA (see Cole and Summerhays 1979; Tikvart 1996) and NSW Environment Protection Authority (NSW EPA, 2016). This method assumes that all the 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 the reaction often takes place over a number of hours.

Measured hourly average ozone concentrations were obtained from the North Rockingham AQMS between 1st July 2023 and 30th June 2024. A summary of the ozone concentrations in the assessment.

Table 8: Monitored Concentrations at North Rockingham AQMS (1st July 2023 and 30th June 2024)

Data Availability	Max 1-hour[2]	Max 8-hour[2]	70th percentile 1-hour	Annual Average
99.9%	64.2	48.9	29.5	24.4

Notes
1. Referenced to 25ºC, and 101.3 kPa.
2. 8-hour average O_3 criteria – 65 ppb

The CALNO2 module from CALPUFF was used to apply the OLM in this assessment.

5. MODELLING RESULTS

5.1 Model Validation

To assess the potential performance of the model, predicted concentrations were compared against monitored data at the North Rockingham AQMS as shown in Figure 13. The quantile-quantile plot shows that predicted concentrations using an assumed background concentration of 30 µg/m^3 showed the model was performing reasonably at this location when the winds were coming from the direction of the KIA. The plot shows that the highest modelled concentrations were overpredicting when compared to the monitored values by approximately 5-7 µg/m^3. Despite the slight over prediction, the model is considered to be performing reasonably and is suitable to assess potential impacts from the proposed turbines at the KSPS. Use of a more conservative background concentration (39.5 µg/m^3) as outlined in Table 3 will further add to the conservativity of the assessment outcomes.

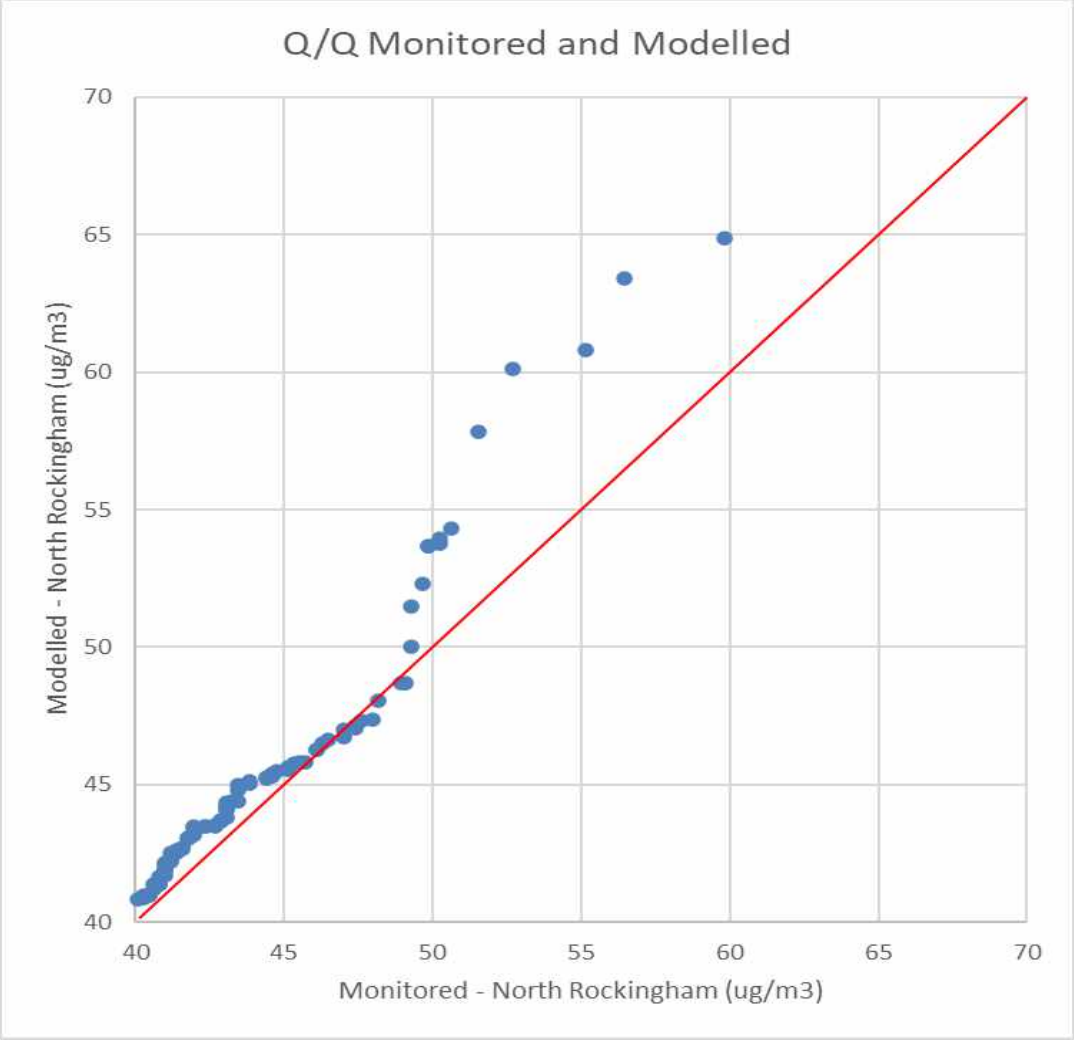


Figure 13: Quantile-Quantile Plot of Predicted and Monitored 1-hour Average Concentrations at the North Rockingham AQMS

5.2 Modelling Results

Predicted maximum 1-hour average and annual average concentrations at the nominated receptor locations (as outlined in Table 4) are presented in Table 9 below. The results presented at the nominated receptor locations are all below the relevant NO_2 criteria. Contour plots of the predicted ground level concentrations (GLCs) for each of the scenarios and relevant averaging periods are presented from Figure 14 to Figure 37.

The contour plots show that in general all the predicted concentrations are below the relevant criteria except for some isolated exceedances of the 1-hour average NO_2 criteria predicted to occur in close vicinity to various sources including the KSPS. No exceedances were predicted of the annual average NO_2 criteria at any location in the modelled domain.

An exceedance of the 1-hour average NO_2 criteria was predicted for the normal operations, shutdown, and startup scenarios to the east of the KSPS facility at approximately 3km although the exceedance was predicted to occur in an industrial area and not over sensitive receptor locations. The maximum predicted cumulative 1-hour average concentrations at this location for normal operations, shutdown operations and startup operations were 158 $\mu g/m^3$, 164 $\mu g/m^3$ and 168 $\mu g/m^3$ respectively. Analysis of the number of exceedances predicted at this location indicated that only a single hour of exceedance was predicted at this location.

Table 9: Summary of Predicted Cumulative Maximum 1-hour Average and Annual Average Predicted GLCs at Sensitive Receptor Locations

Maximum 1-hour Average Ground Level Concentrations												
Receptor	Criteria	Sc 1 - Existing		Sc 2 - Future Approved		Sc 3a - Normal Ops Isolation		Sc 3b - Normal Ops Cumulative		Sc 4 - Shutdown		Sc 5 - Startup	
		µg/m^3	% Criteria	µg/m^3	% Criteria	µg/m^3	% Criteria	µg/m^3	% Criteria	µg/m^3	% Criteria	µg/m^3	% Criteria
Wells Park	151	83	55%	83	55%	21	14%	84	55%	84	56%	84	56%
Golf Course		70	47%	78	52%	83	55%	131	86%	132	88%	133	88%
Thomas Oval		83	55%	88	58%	52	34%	109	72%	110	73%	110	73%
Oval		99	66%	99	66%	65	43%	128	85%	130	86%	130	86%
Residence		81	54%	85	57%	49	32%	107	71%	114	75%	115	76%
North Rockingham AQMS		75	49%	70	47%	26	18%	72	47%	72	48%	72	48%
Residence		69	46%	69	46%	55	36%	110	73%	120	80%	123	82%
Hope Valley		96	64%	94	63%	47	31%	101	67%	102	68%	102	68%
Calista Primary School		78	52%	80	53%	25	17%	101	67%	101	67%	101	67%
Wombat Wallow Childcare Centre		95	63%	95	63%	43	28%	100	66%	100	66%	100	66%
South Lake AQMS		61	41%	55	37%	6	4%	61	41%	62	41%	62	41%
Annual Average Ground Level Concentrations													
Receptor	Criteria	Sc 1 - Existing		Sc 2 - Future Approved		Sc 3a - Normal Ops Isolation		Sc 3b - Normal Ops Cumulative		Sc 4 - Shutdown		Sc 5 - Startup	
		µg/m^3	% Criteria	µg/m^3	% Criteria	µg/m^3	% Criteria	µg/m^3	% Criteria	µg/m^3	% Criteria	µg/m^3	% Criteria
Wells Park	28	14.6	52%	14.7	52%	0.2	1%	15.0	54%	15.1	54%	15.1	54%
Golf Course		14.0	50%	14.2	51%	0.2	1%	14.6	52%	14.6	52%	14.6	52%
Thomas Oval		14.2	51%	14.6	52%	0.3	1%	15.2	54%	15.2	54%	15.2	54%
Oval		15.0	54%	15.6	56%	1.1	4%	17.3	62%	17.5	62%	17.5	62%
Residence		14.0	50%	14.3	51%	0.2	1%	14.7	53%	14.7	53%	14.8	53%
North Rockingham AQMS		13.9	50%	14.1	50%	0.2	1%	14.3	51%	14.3	51%	14.4	51%
Residence		13.7	49%	13.9	50%	0.2	1%	14.2	51%	14.2	51%	14.2	51%
Hope Valley		15.0	54%	15.5	55%	0.6	2%	16.6	59%	16.7	60%	16.7	60%
Calista Primary School		13.8	49%	13.9	50%	0.2	1%	14.3	51%	14.3	51%	14.3	51%
Wombat Wallow Childcare Centre		14.1	50%	14.3	51%	0.3	1%	14.7	53%	14.8	53%	14.8	53%
South Lake AQMS		13.8	49%	13.7	49%	0.1	0%	13.9	50%	13.9	50%	14.0	50%

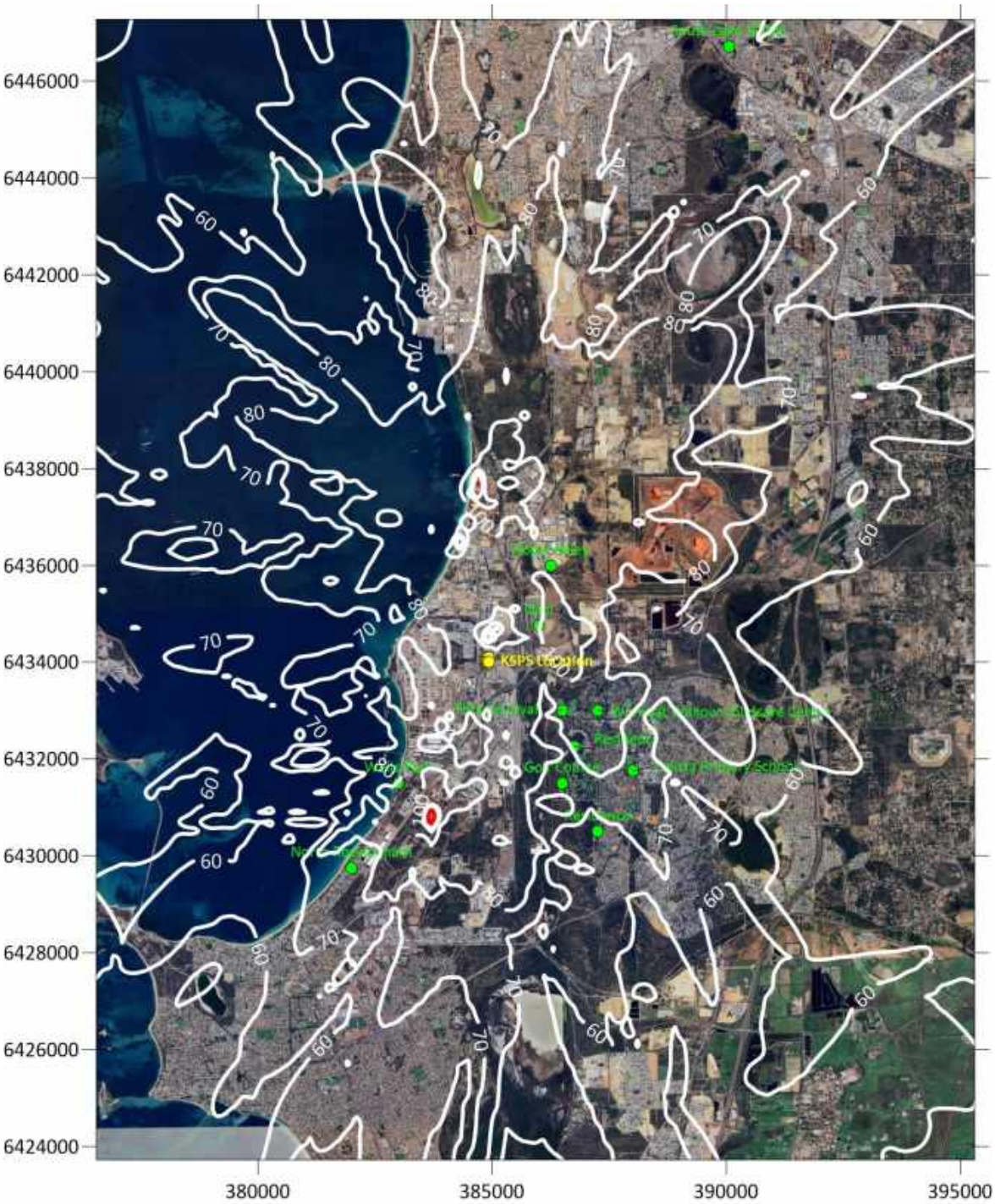


Figure 14: Predicted Maximum 1-hour Average GLCs of NO_2 (Across Modelled Domain) – Scenario 1: Existing Sources

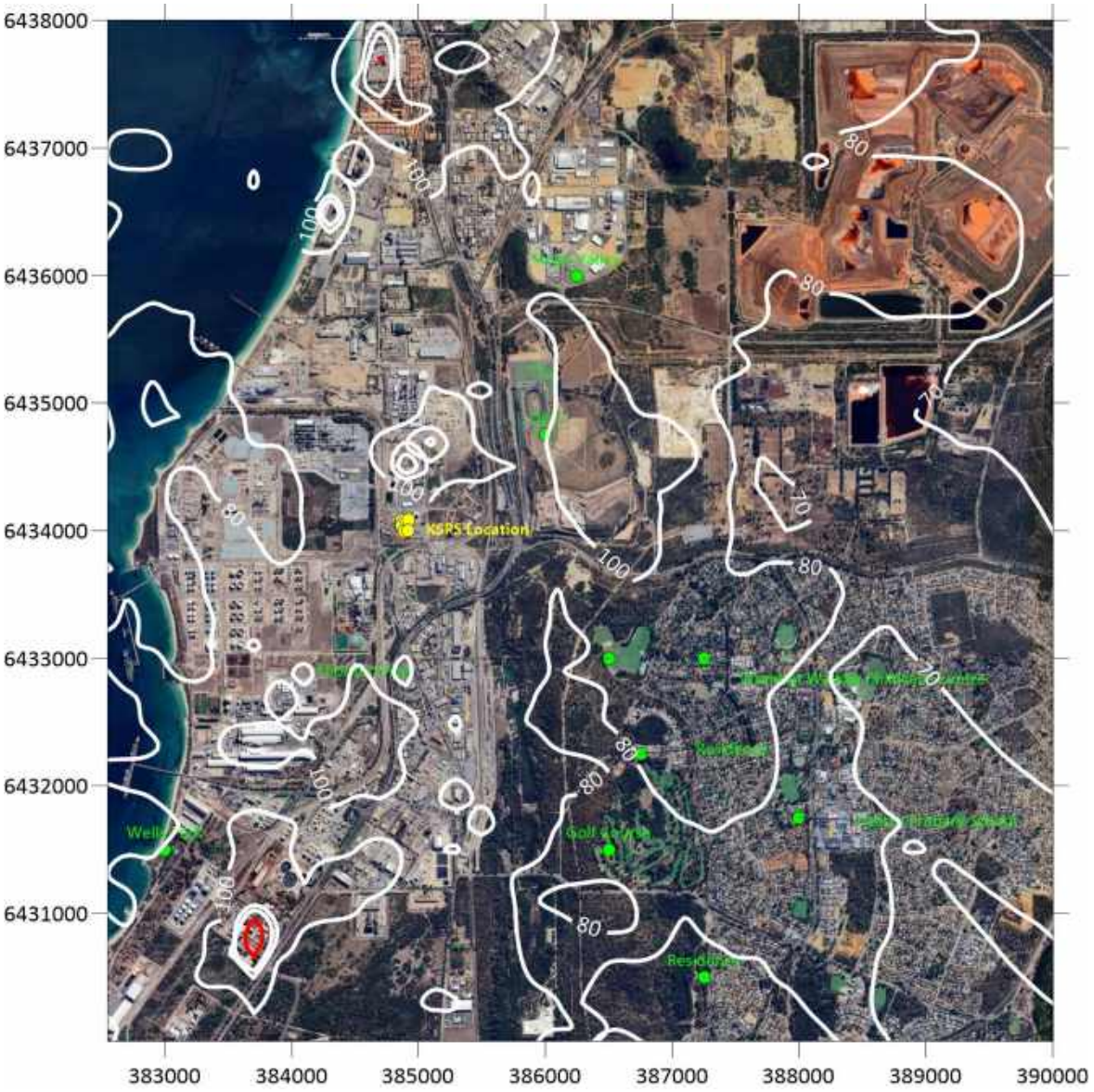


Figure 15: Predicted Maximum 1-hour Average GLCs of NO_2 (Zoomed In) – Scenario 1: Existing Sources

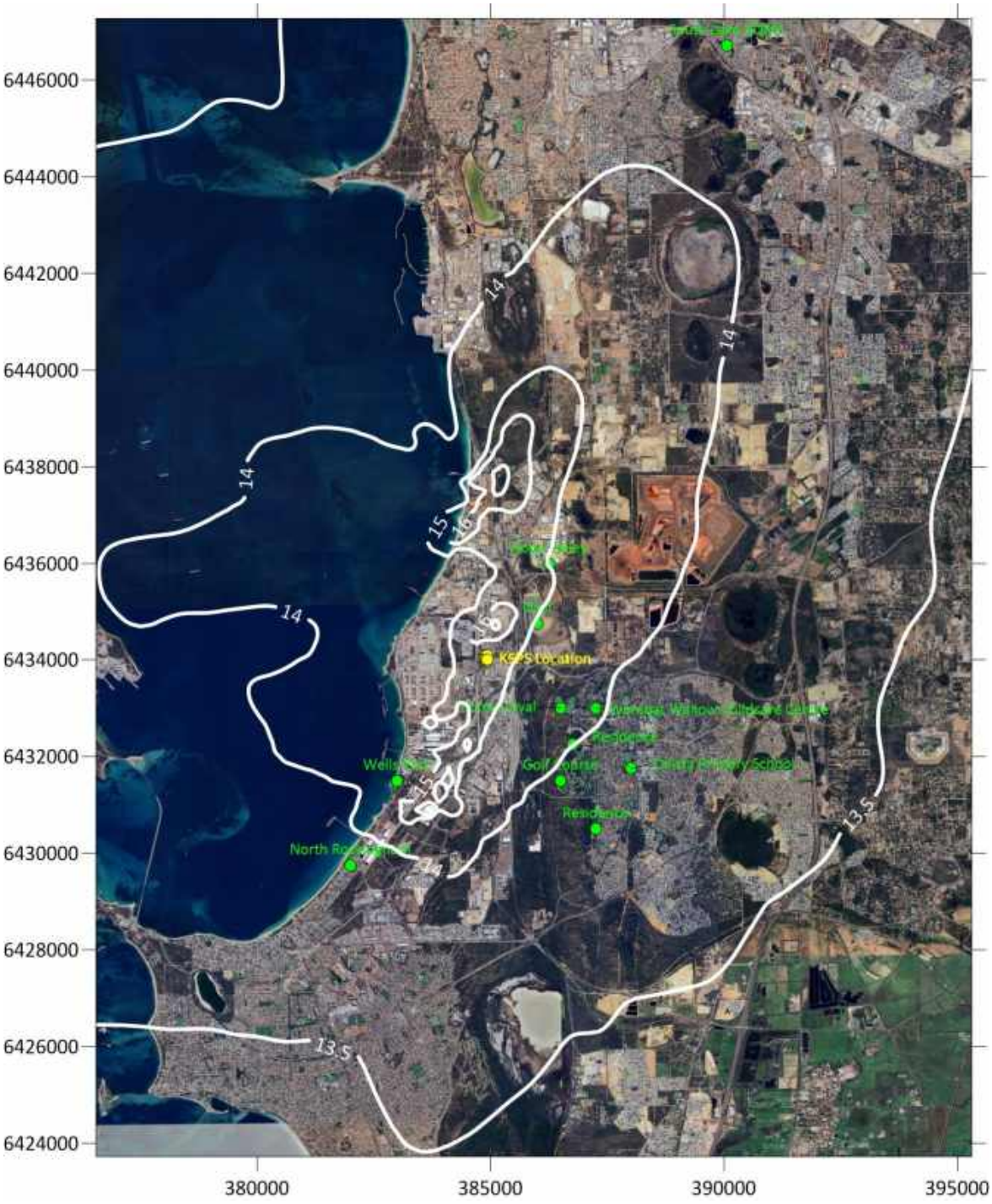


Figure 16: Predicted Annual Average GLCs of NO_2 (Across Modelled Domain) – Scenario 1: Existing Sources

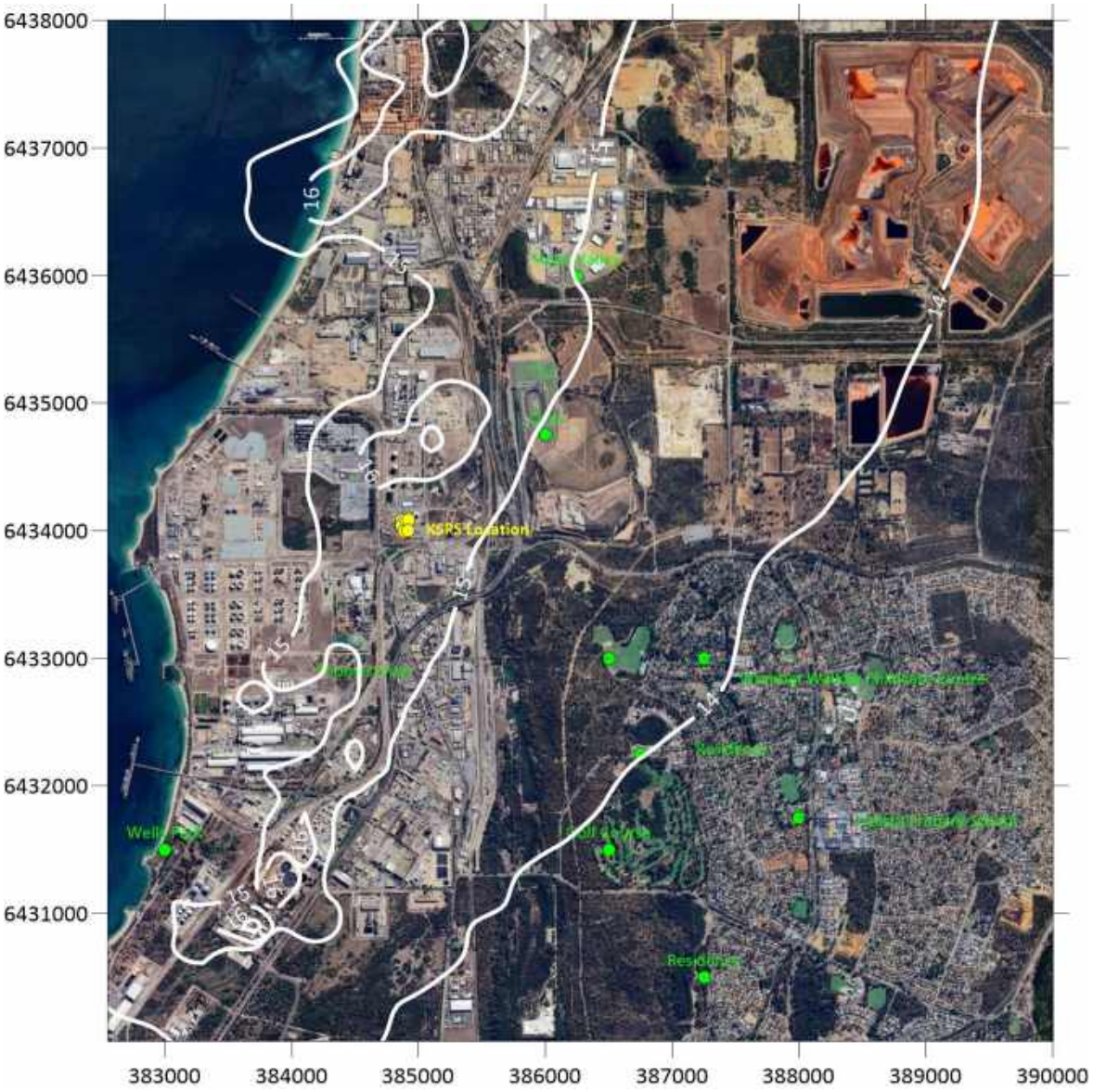


Figure 17: Predicted Annual Average GLCs of NO_2 (Zoomed In) – Scenario 1: Existing Sources

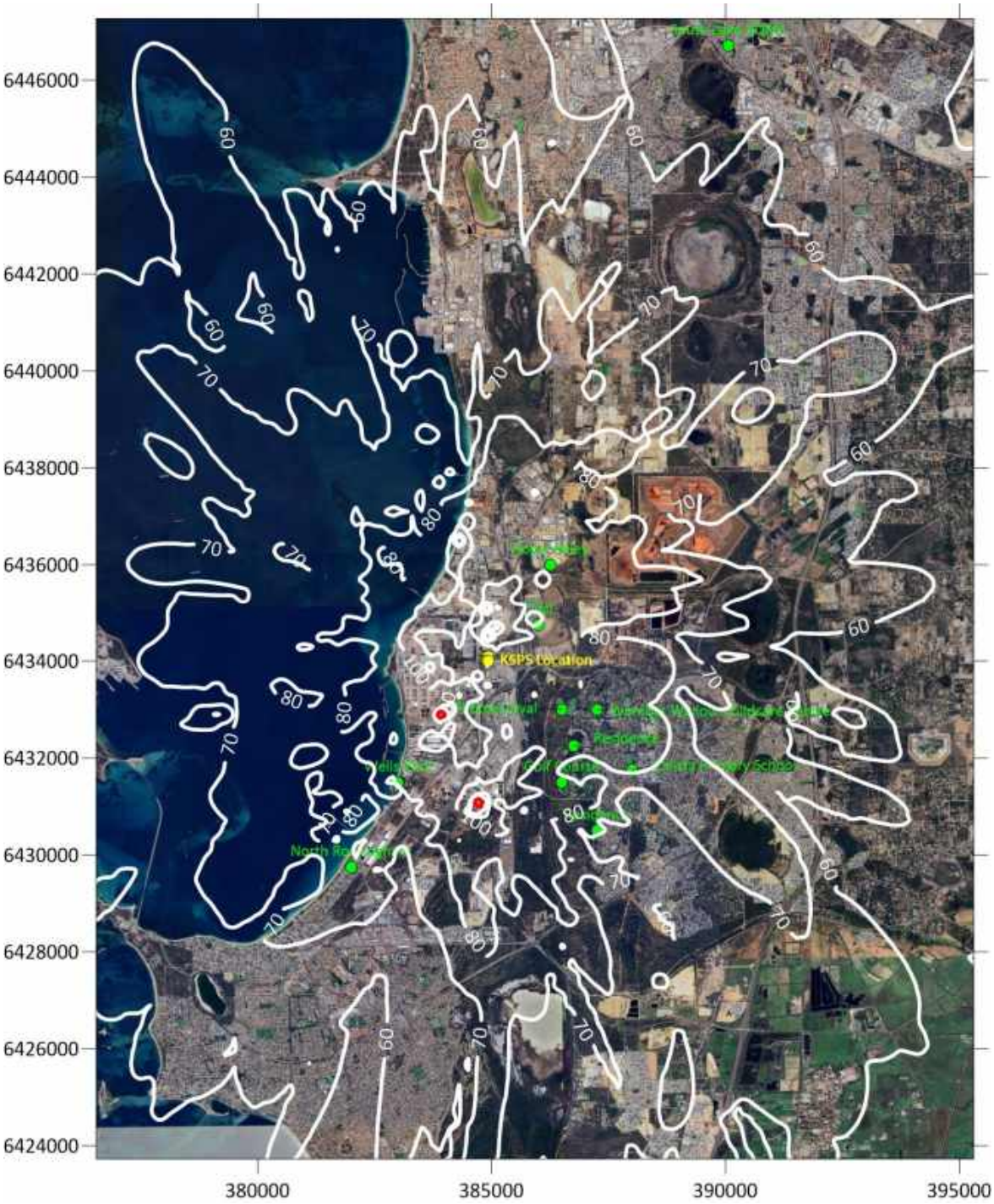


Figure 18: Predicted Maximum 1-hour Average GLCs of NO_2 (Across Modelled Domain) – Scenario 2: All Future Sources

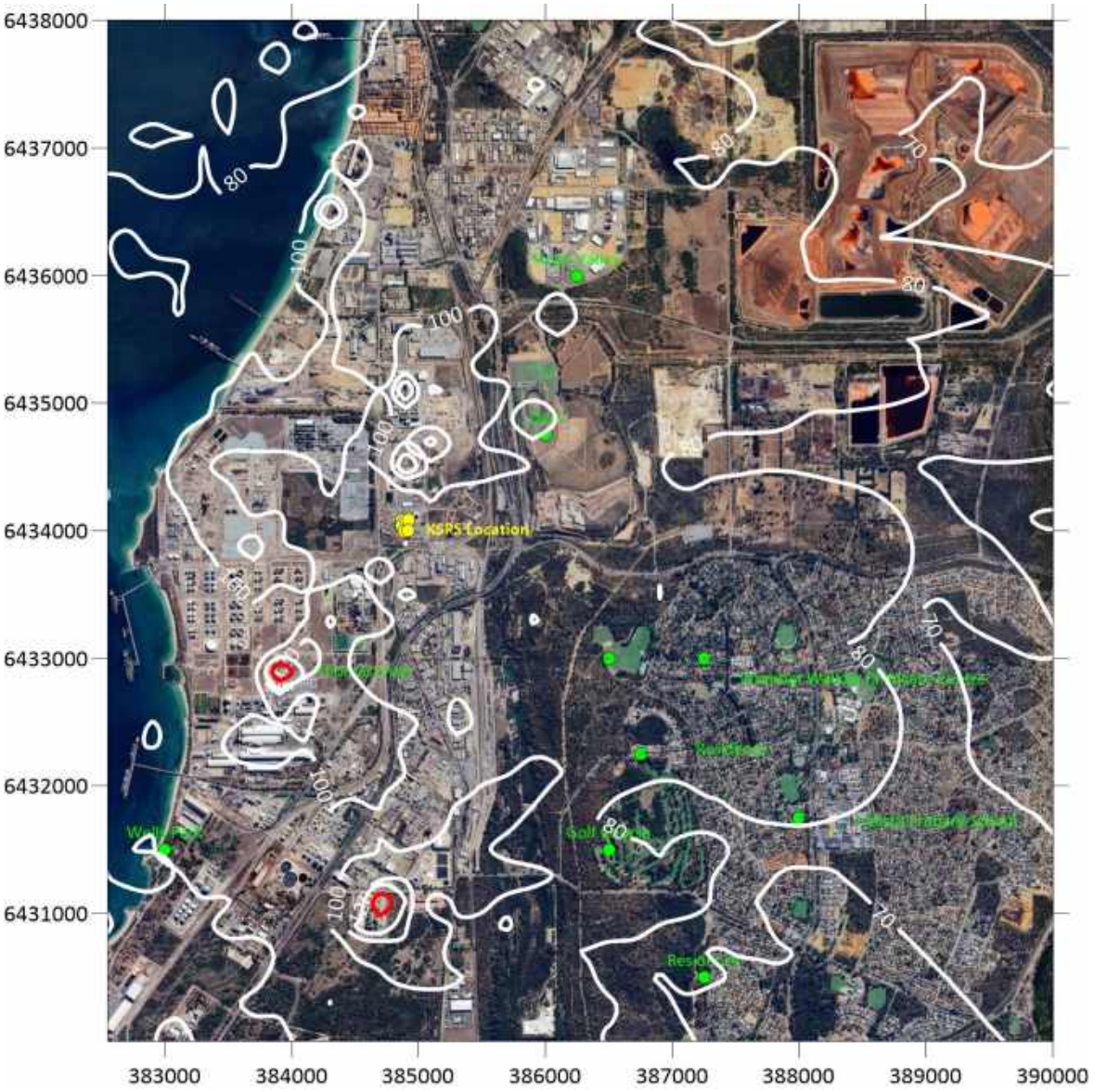


Figure 19: Predicted Maximum 1-hour Average GLCs of NO_2 (Zoomed In) – Scenario 2: All Future Sources

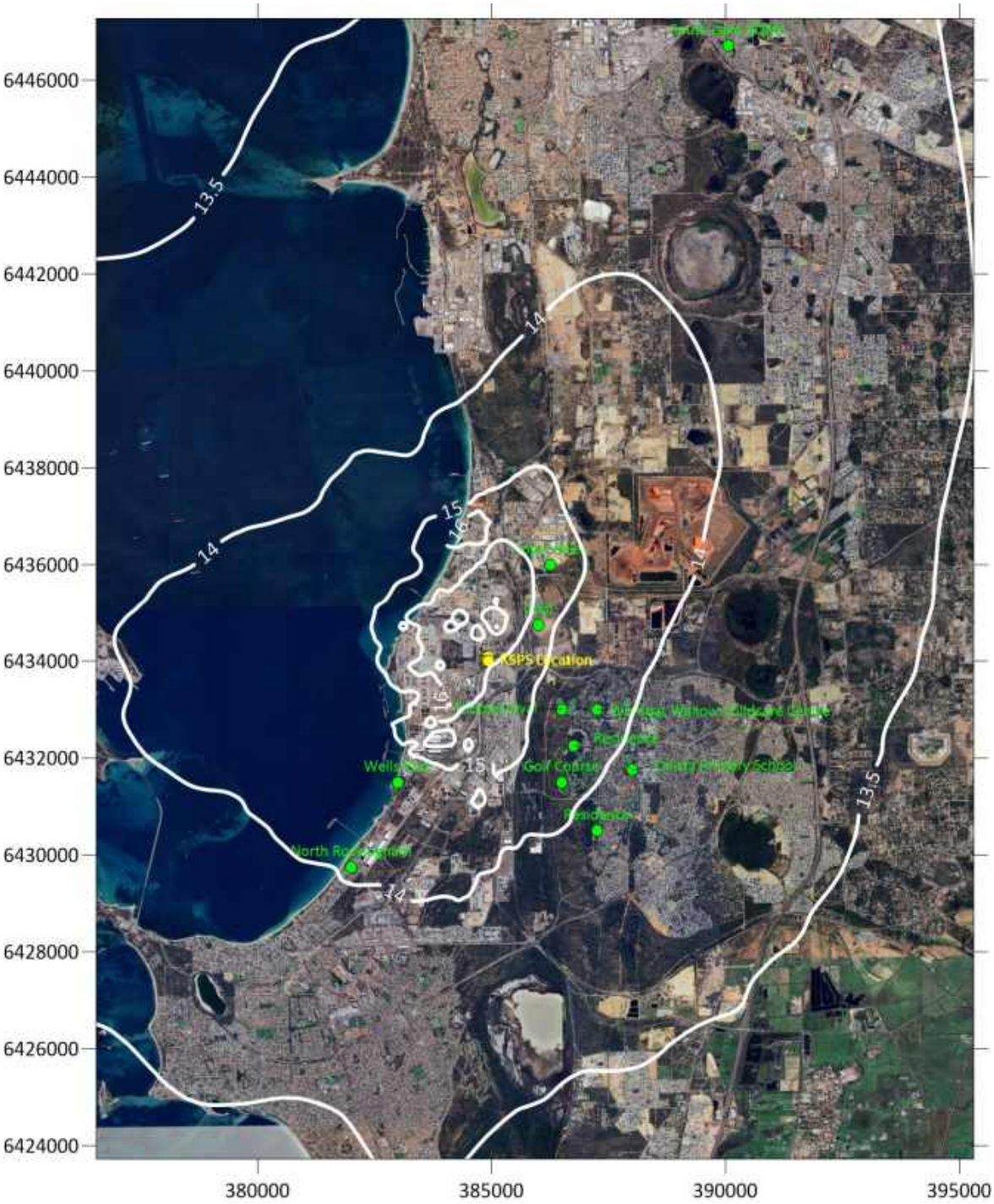


Figure 20: Predicted Annual Average GLCs of NO_2 (Across Modelled Domain) – Scenario 2: All Future Sources

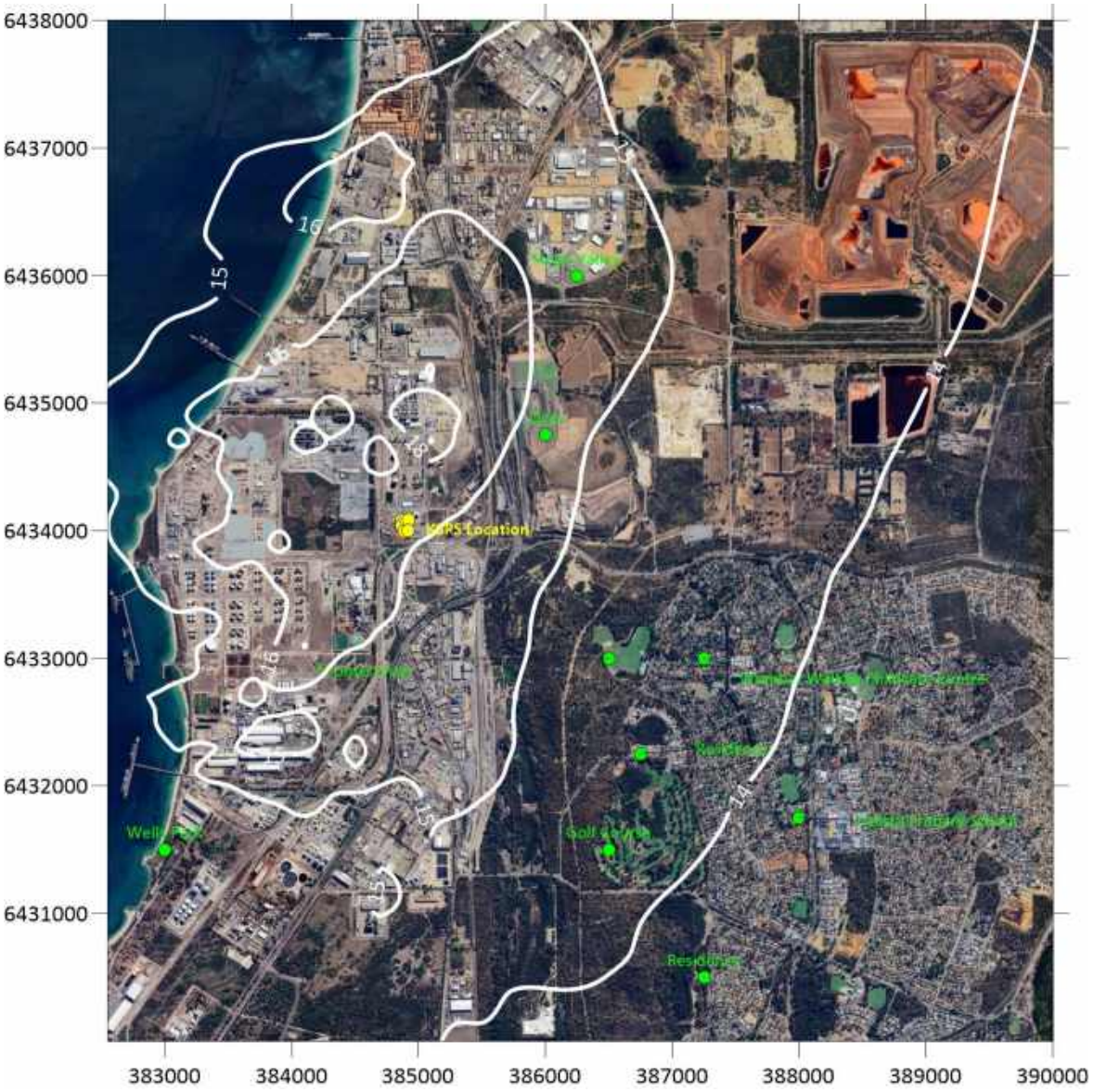


Figure 21: Predicted Annual Average GLCs of NO_2 (Zoomed In) – Scenario 2: All Future Sources

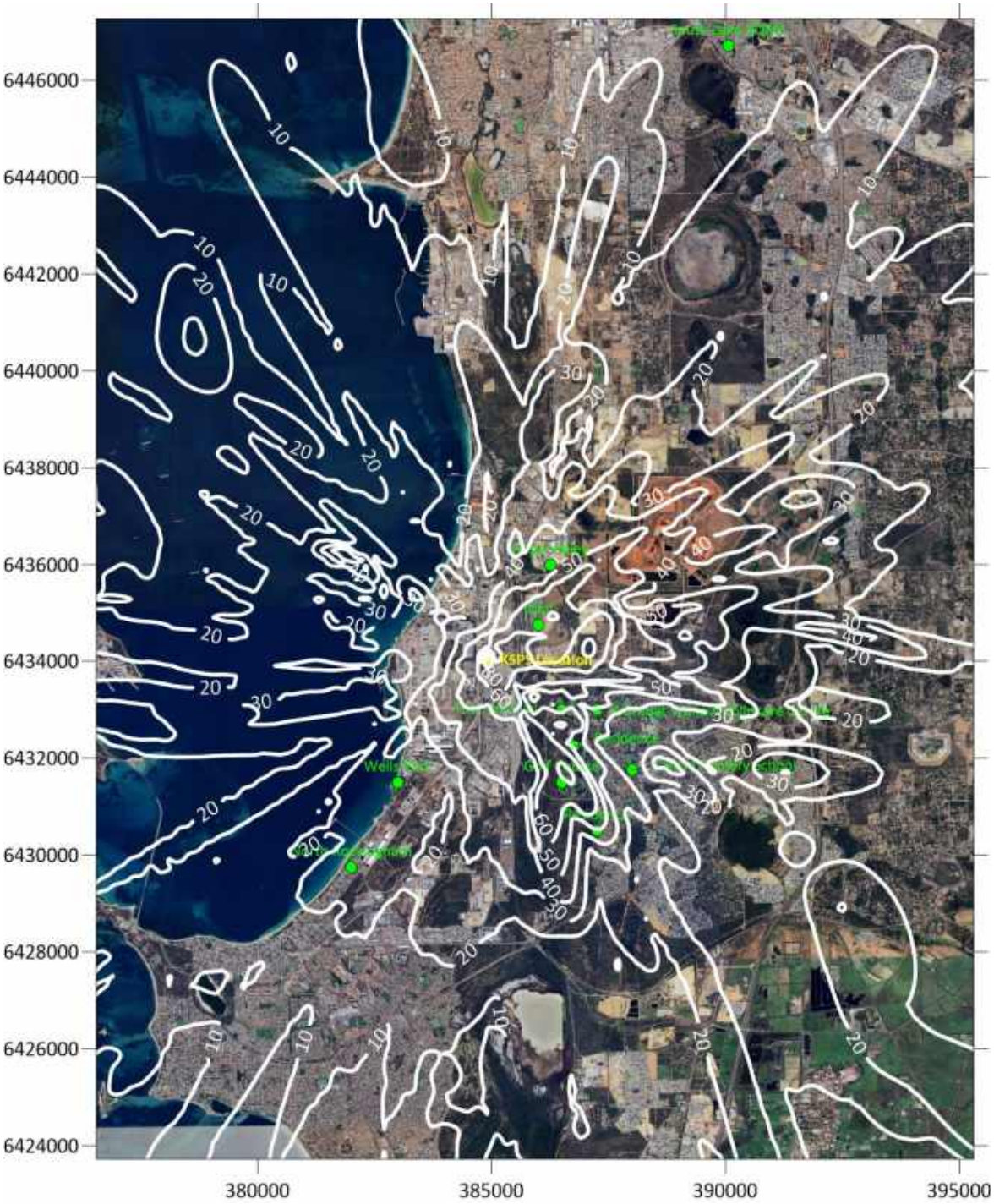


Figure 22: Predicted Maximum 1-hour Average GLCs of NO_2 (Across Modelled Domain) – Scenario 3a: Normal Operations in Isolation

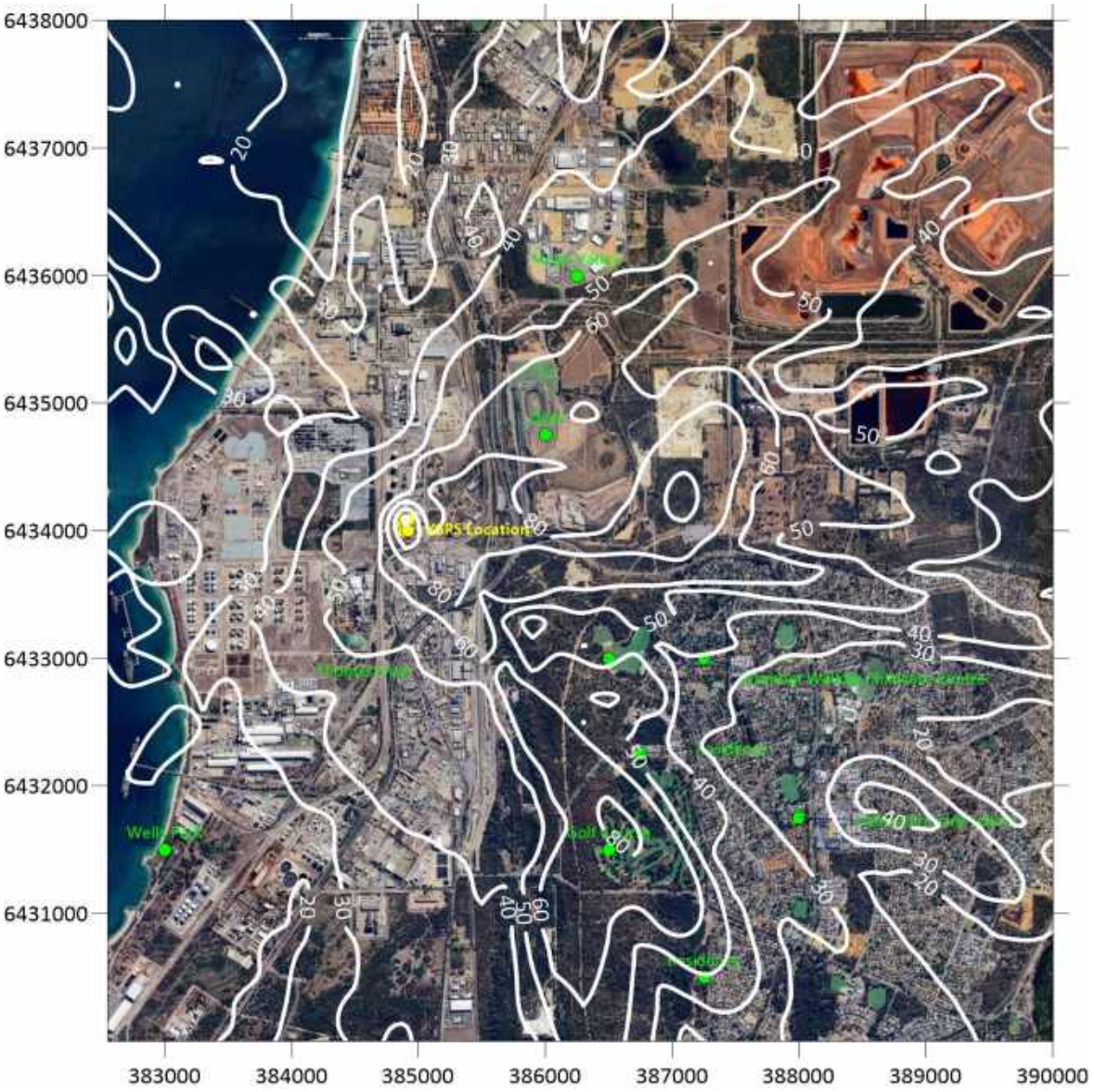


Figure 23: Predicted Maximum 1-hour Average GLCs of NO_2 (Zoomed In) – Scenario 3a: Normal Operations in Isolation

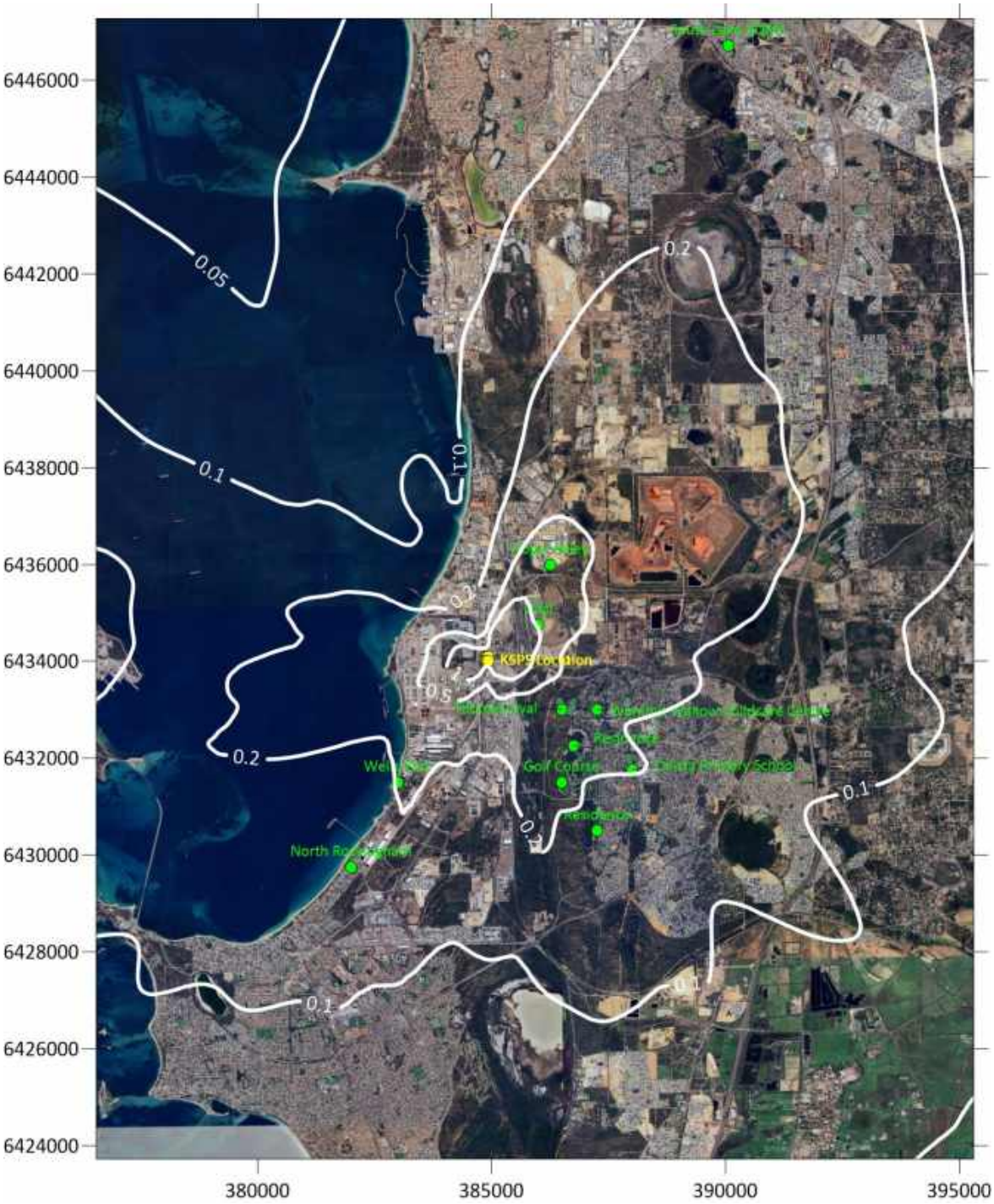


Figure 24: Predicted Annual Average GLCs of NO_2 (Across Modelled Domain) – Scenario 3a: Normal Operations in Isolation

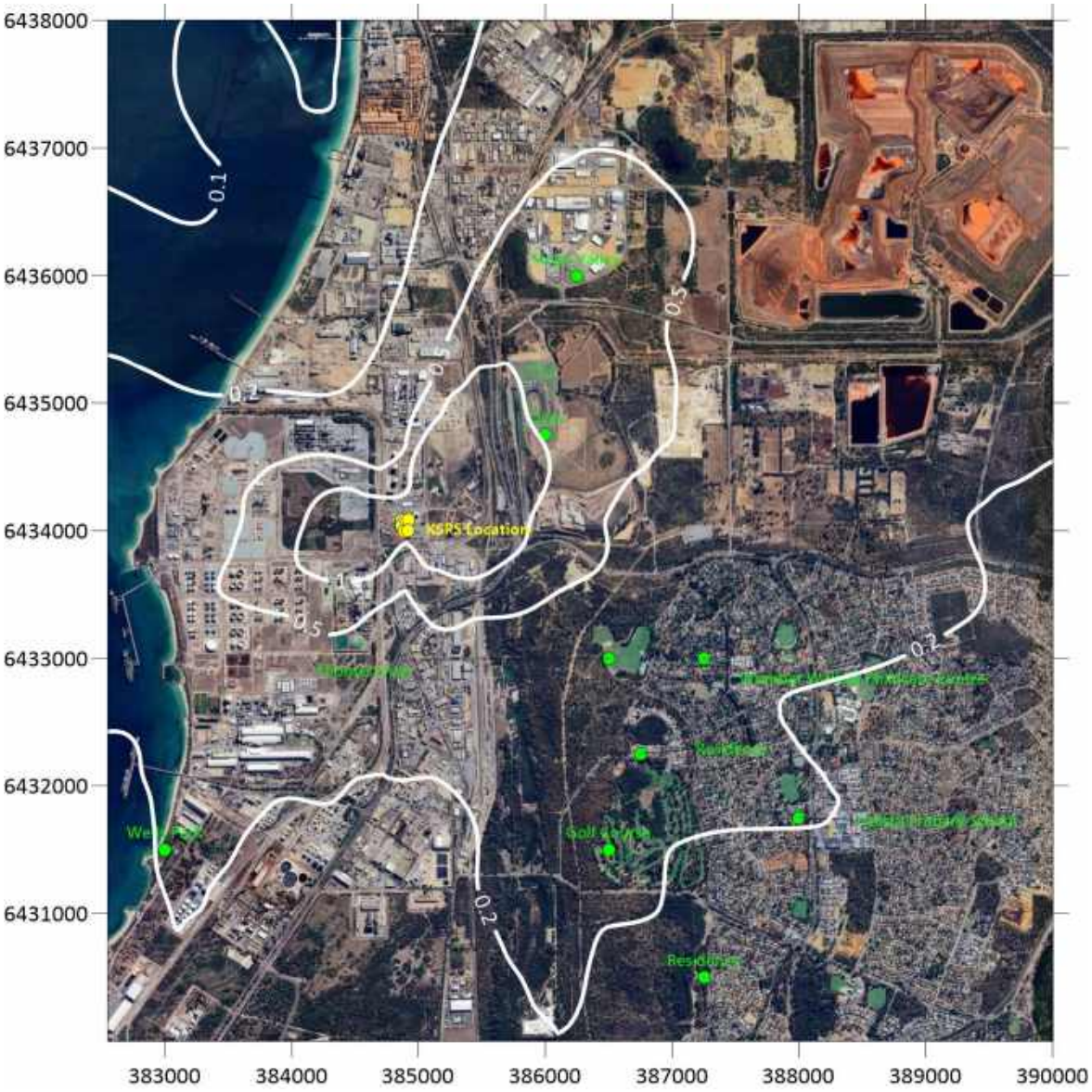


Figure 25: Predicted Annual Average GLCs of NO_2 (Zoomed In) – Scenario 3a: Normal Operations in Isolation

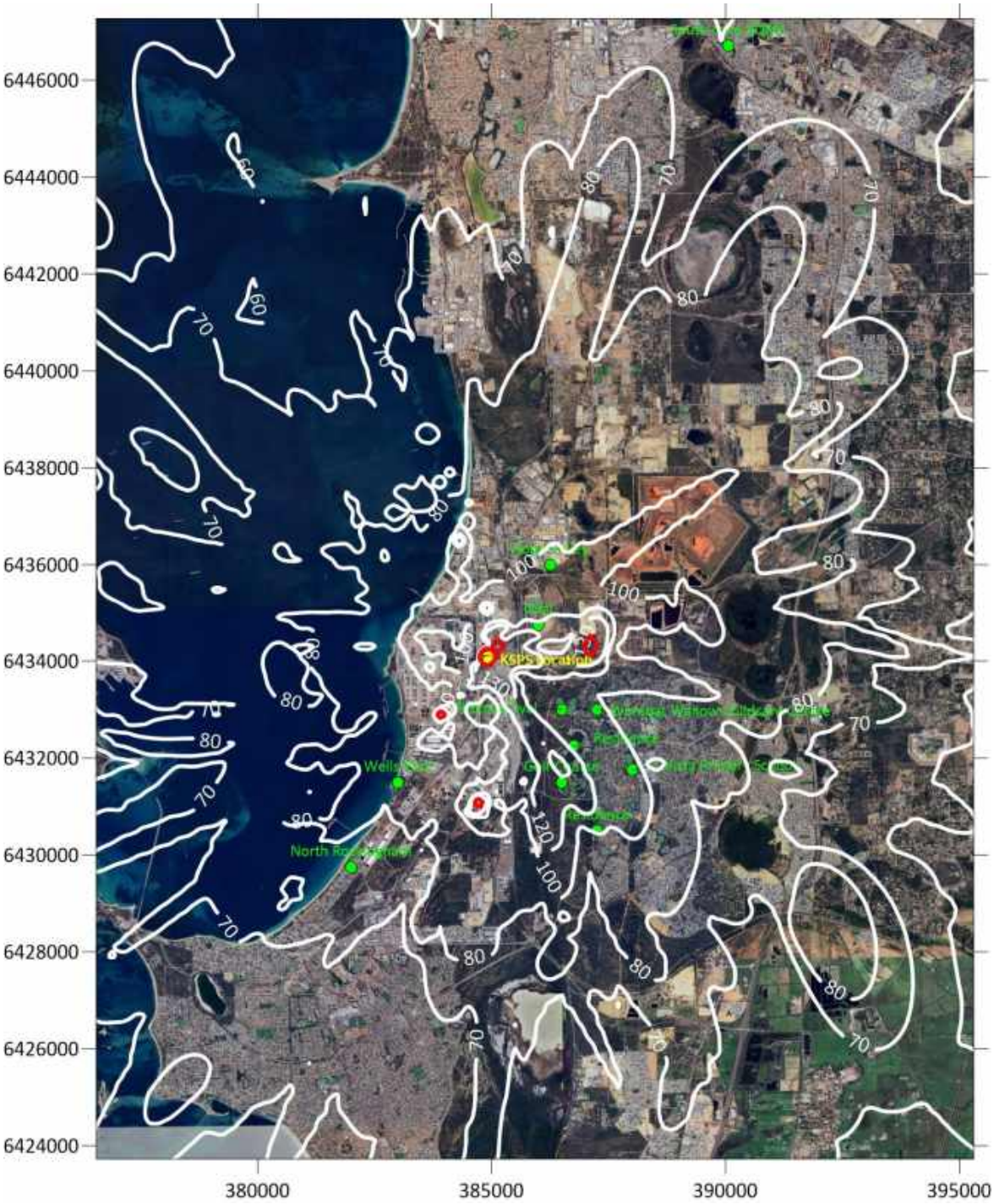


Figure 26: Predicted Maximum 1-hour Average GLCs of NO_2 (Across Modelled Domain) – Scenario 3b: Normal Operations - Cumulative

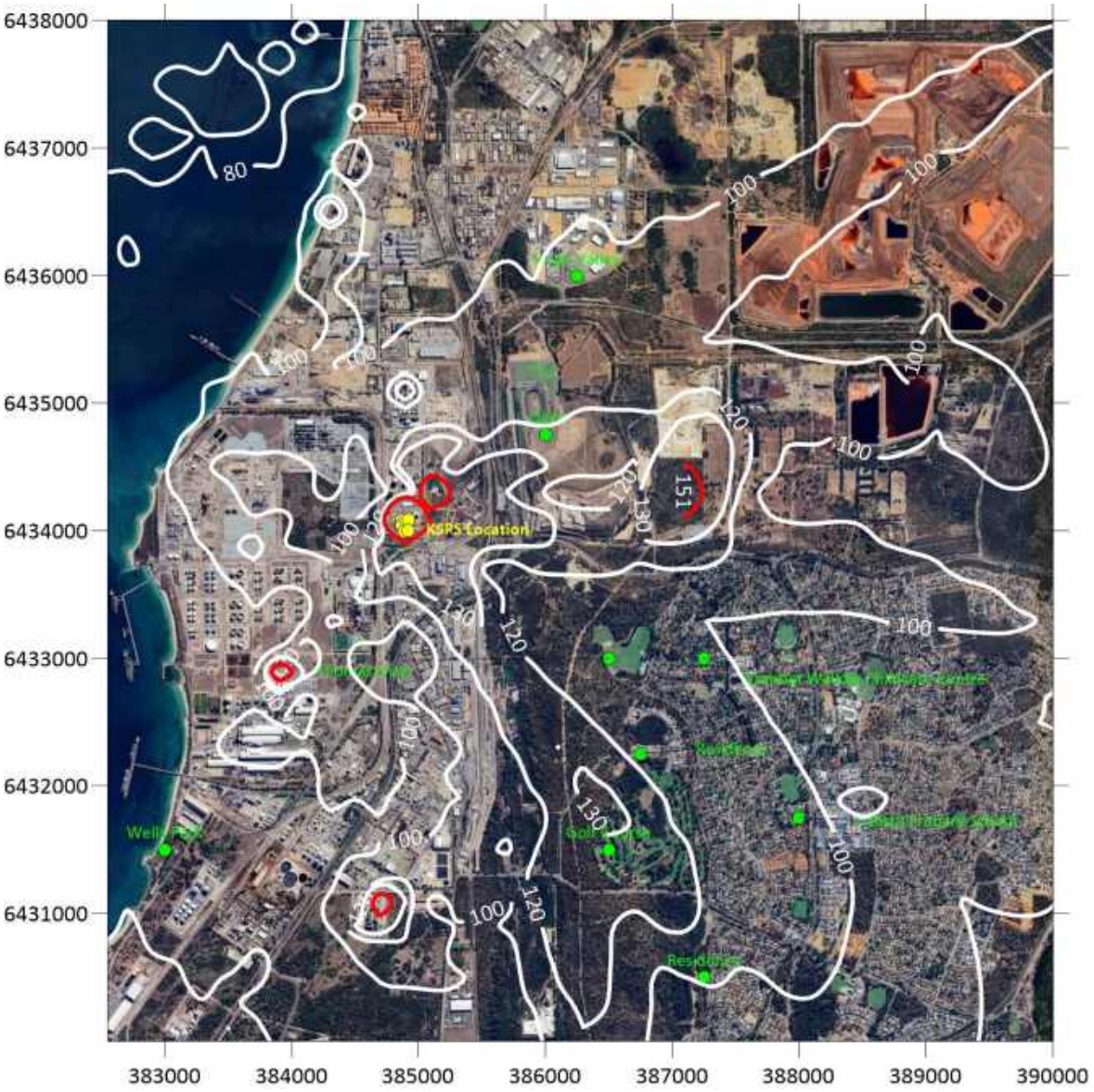


Figure 27: Predicted Maximum 1-hour Average GLCs of NO_2 (Zoomed In) – Scenario 3b: Normal Operations - Cumulative

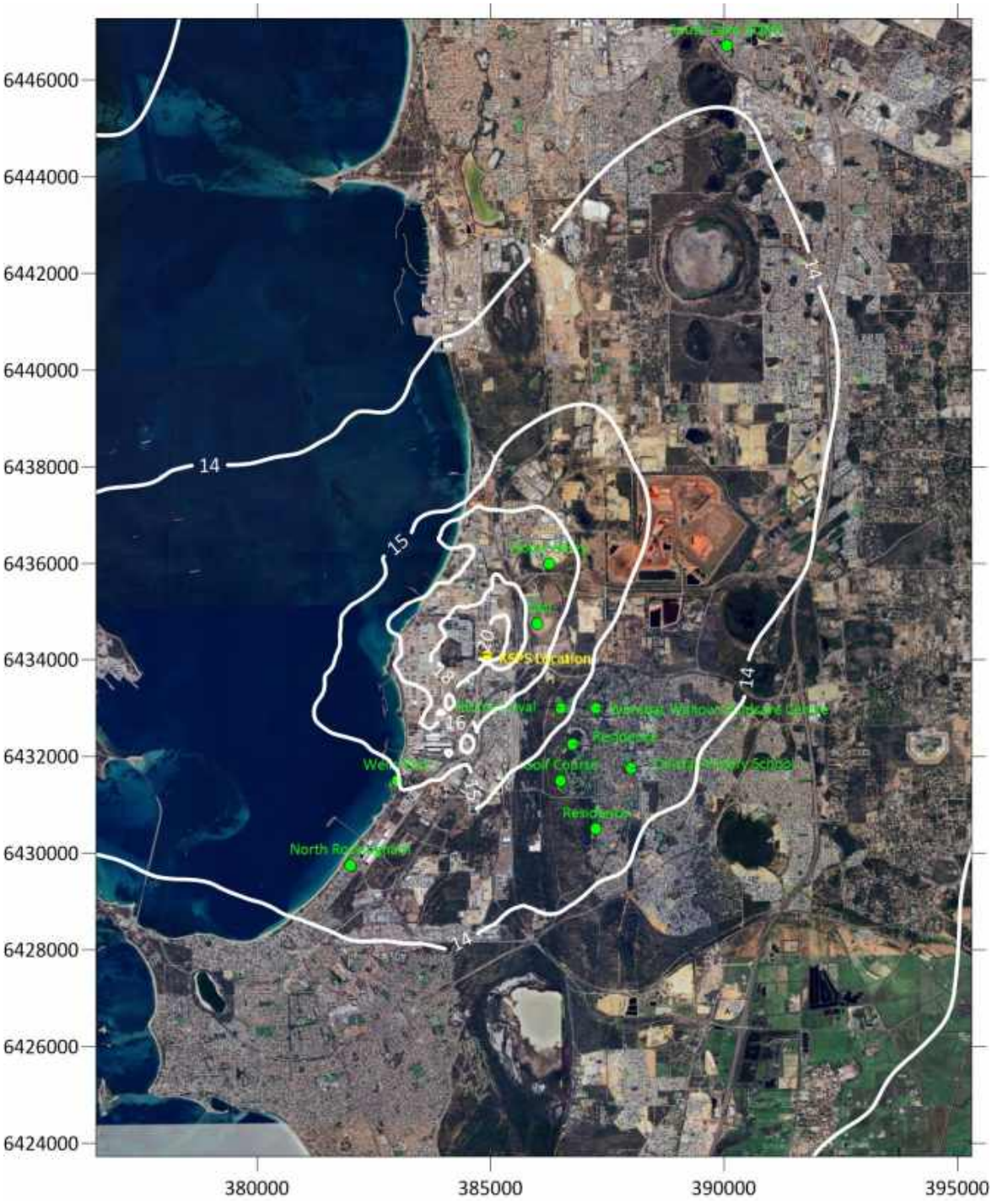


Figure 28: Predicted Annual Average GLCs of NO_2 (Across Modelled Domain) – Scenario 3b: Normal Operations - Cumulative

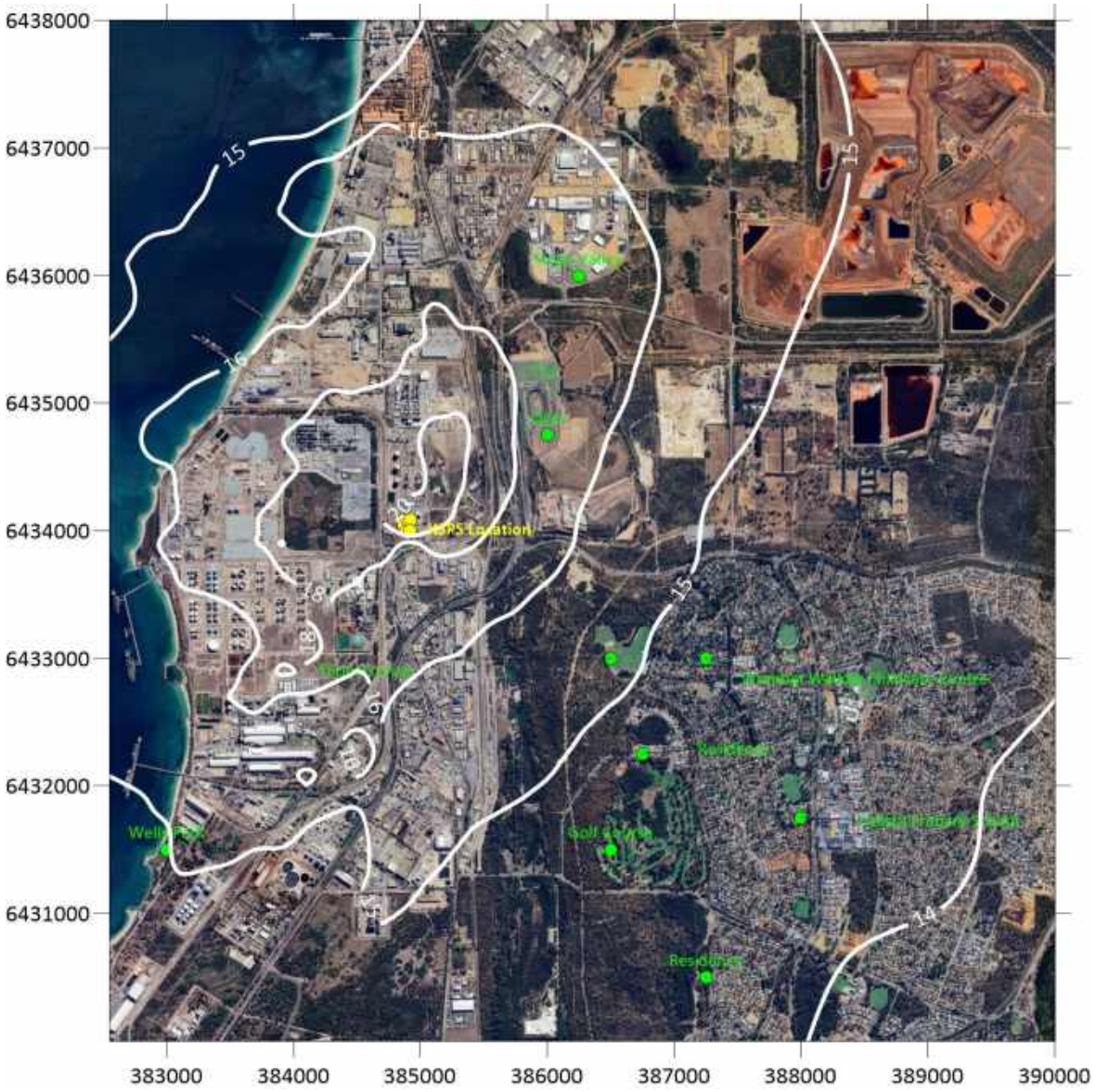


Figure 29: Predicted Annual Average GLCs of NO_2 (Zoomed In) – Scenario 3b: Normal Operations - Cumulative

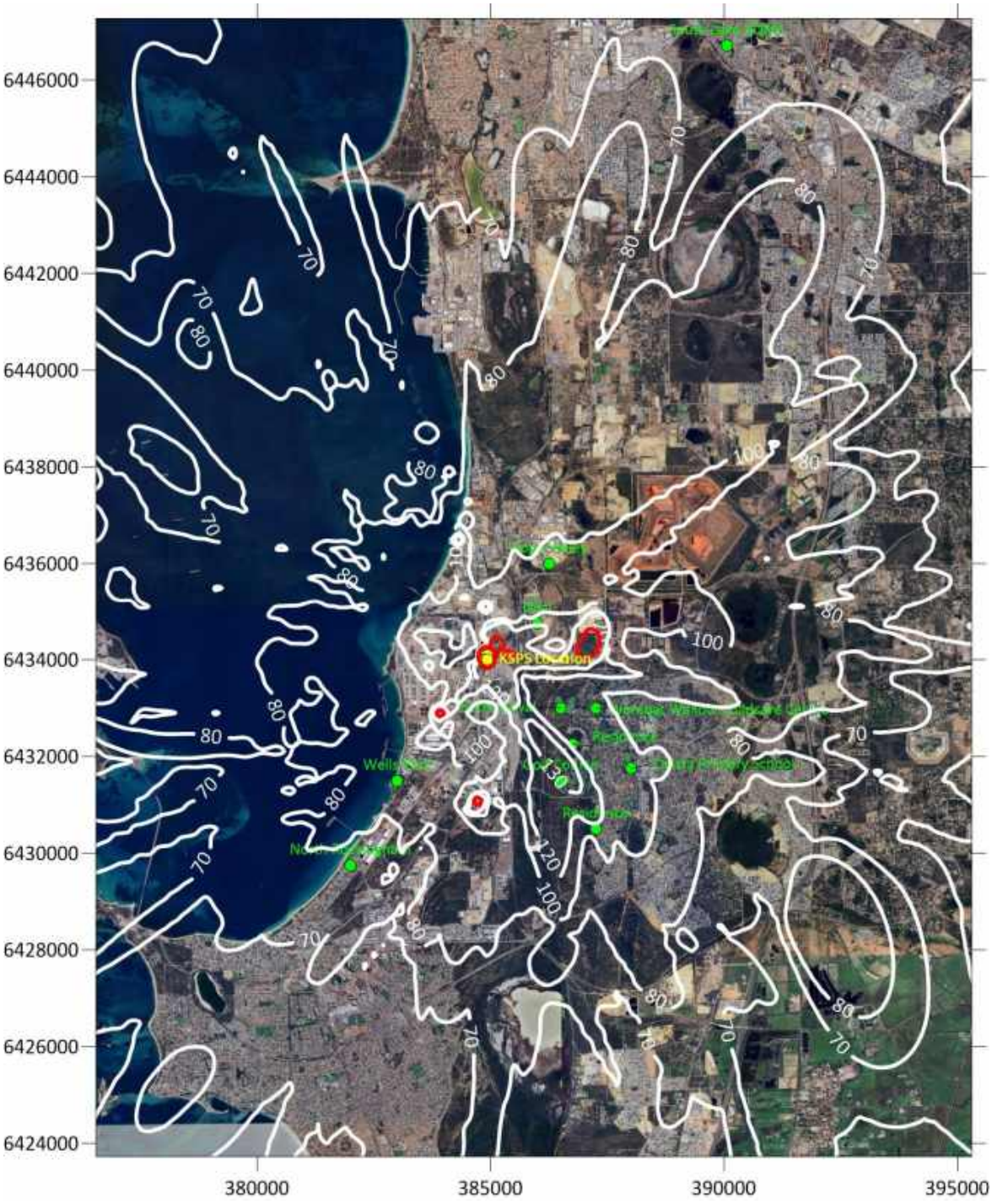


Figure 30: Predicted Maximum 1-hour Average GLCs of NO_2 (Across Modelled Domain) – Scenario 4: Start Up Operations

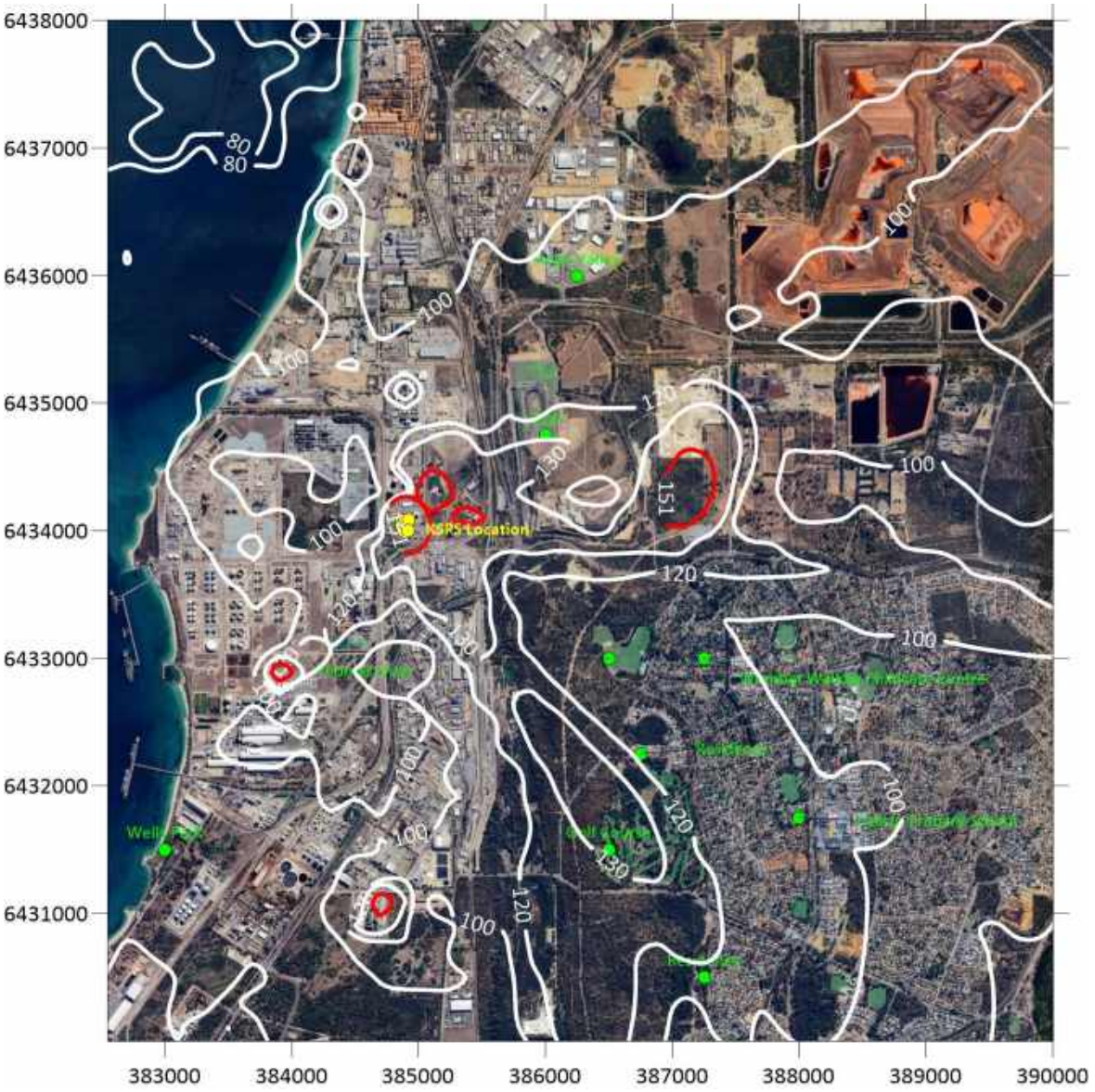


Figure 31: Predicted Maximum 1-hour Average GLCs of NO_2 (Zoomed In) – Scenario 4: Start Up Operations

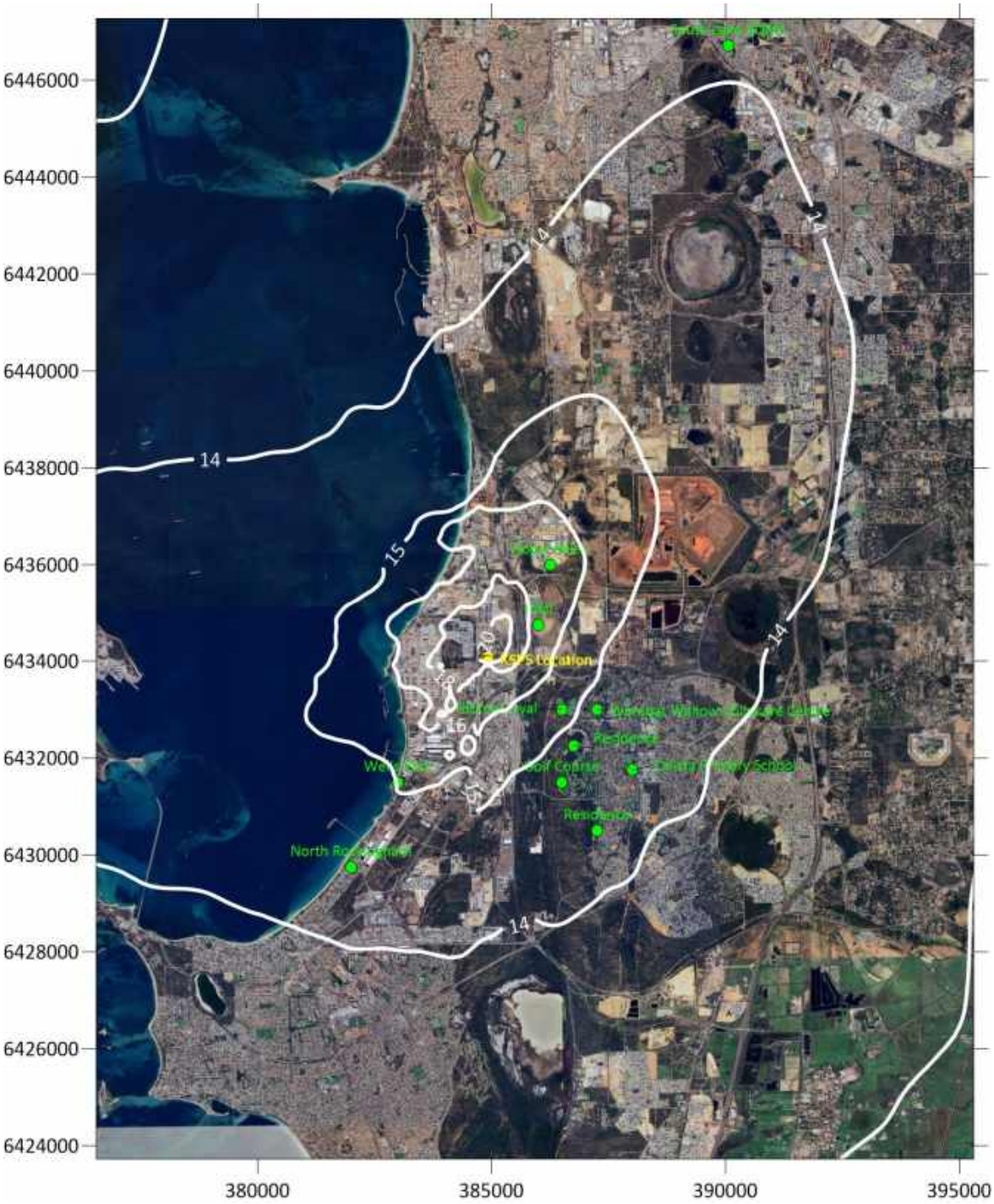


Figure 32: Predicted Annual Average GLCs of NO_2 (Across Modelled Domain) – Scenario 4: Start Up Operations

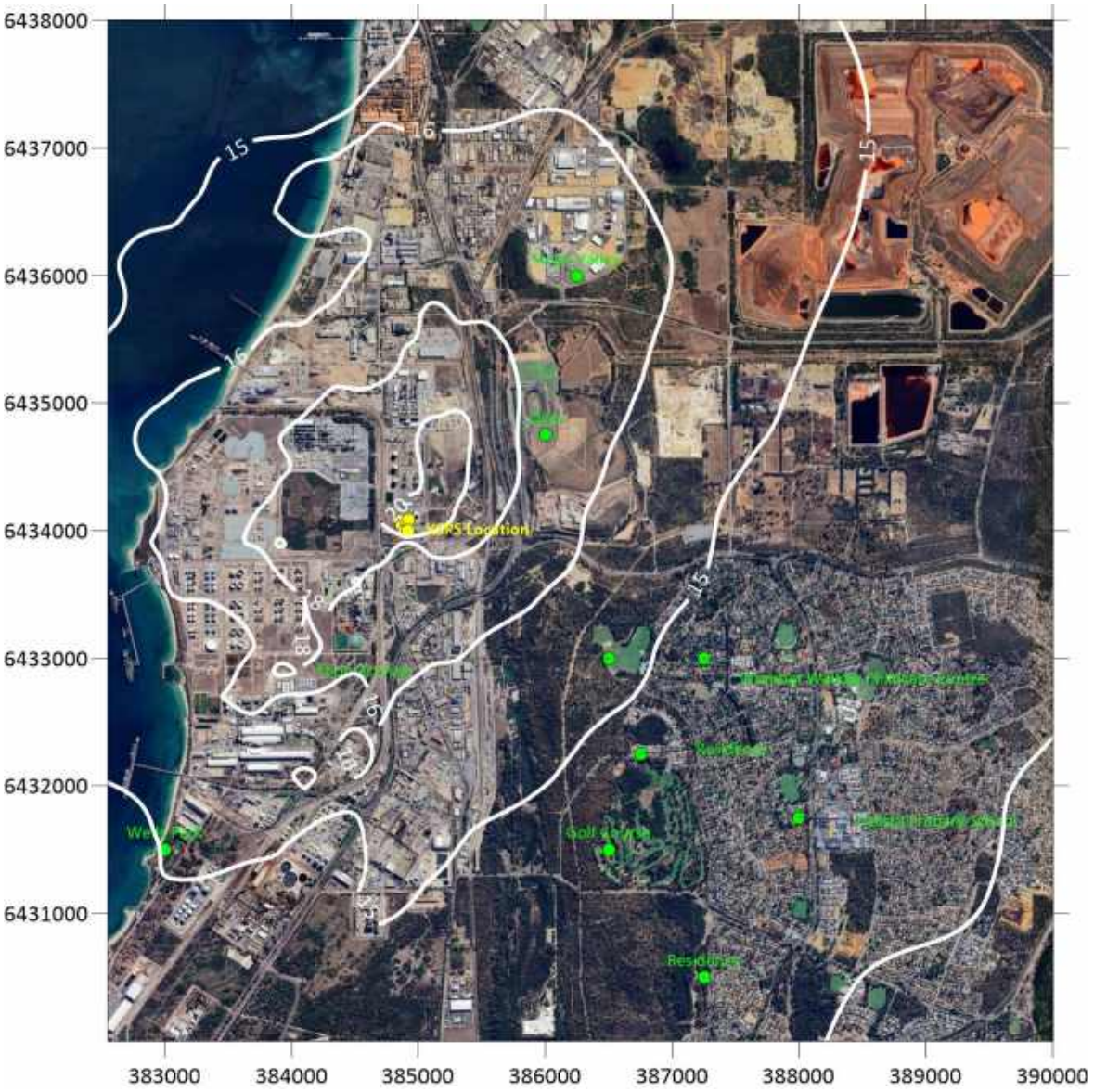


Figure 33: Predicted Annual Average GLCs of NO_2 (Zoomed In) – Scenario 4: Start Up Operations

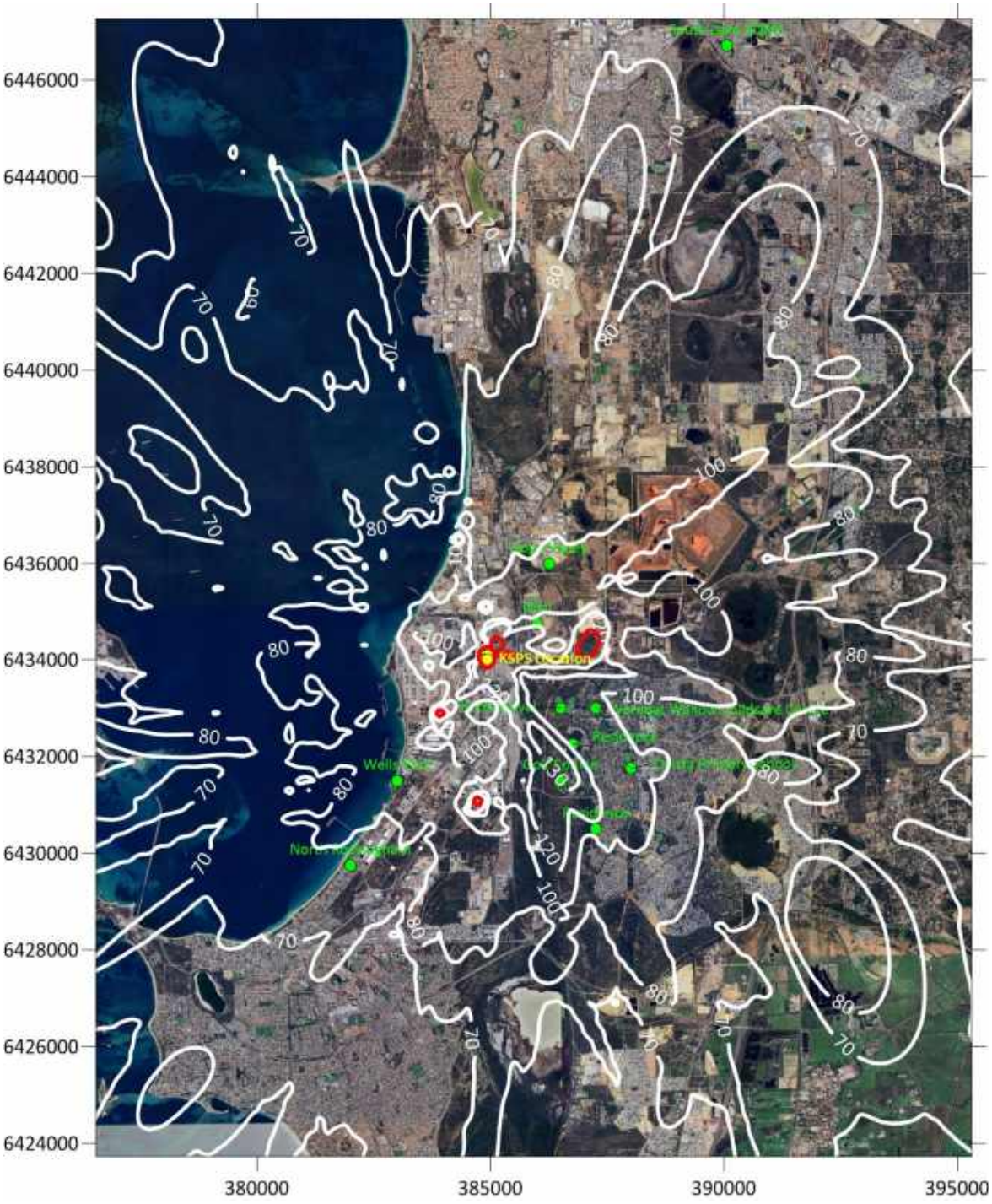


Figure 34: Predicted Maximum 1-hour Average GLCs of NO_2 (Across Modelled Domain) – Scenario 5: Shut Down Operations

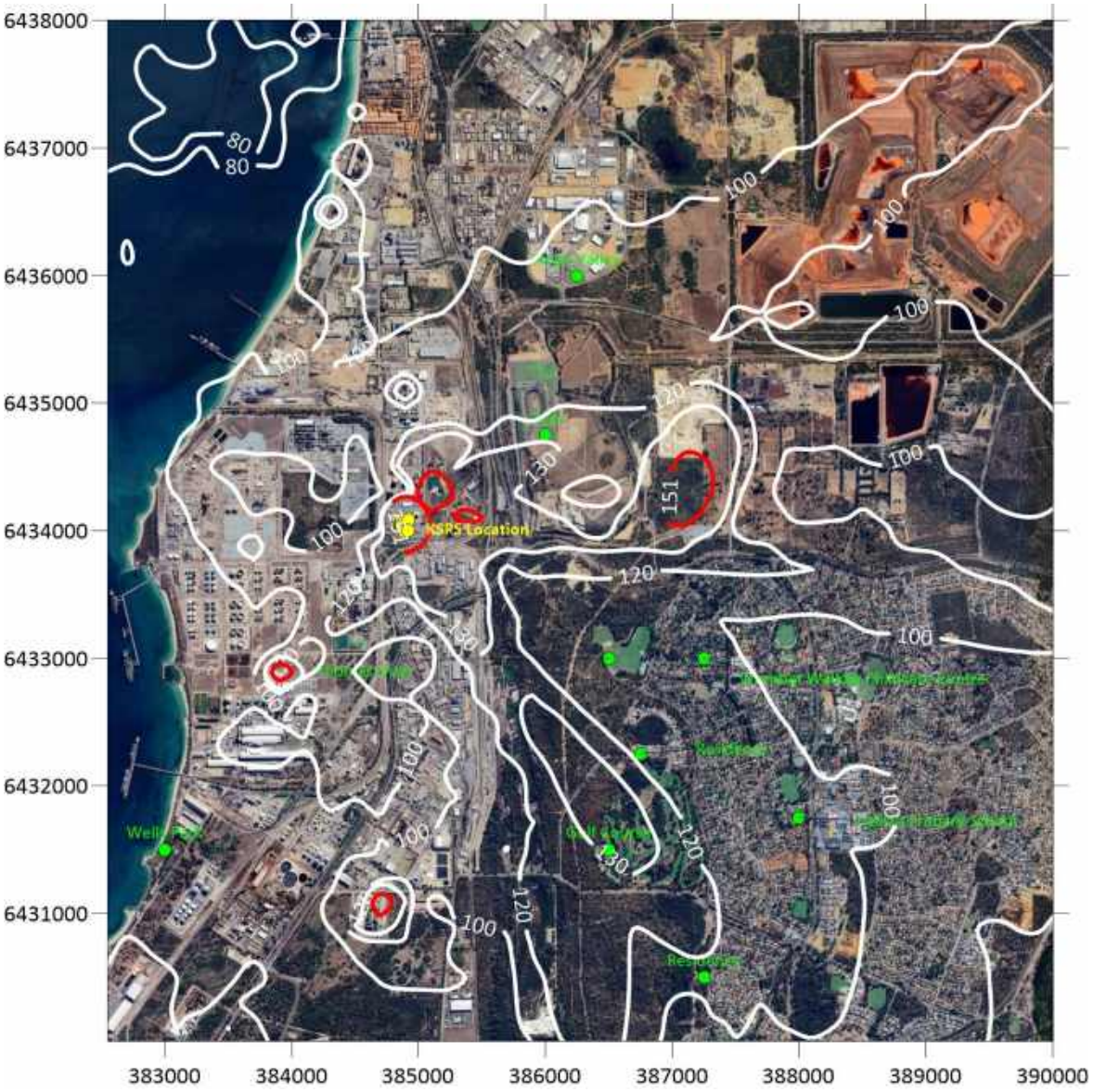


Figure 35: Predicted Maximum 1-hour Average GLCs of NO_2 (Zoomed In) – Scenario 5: Shut Down Operations

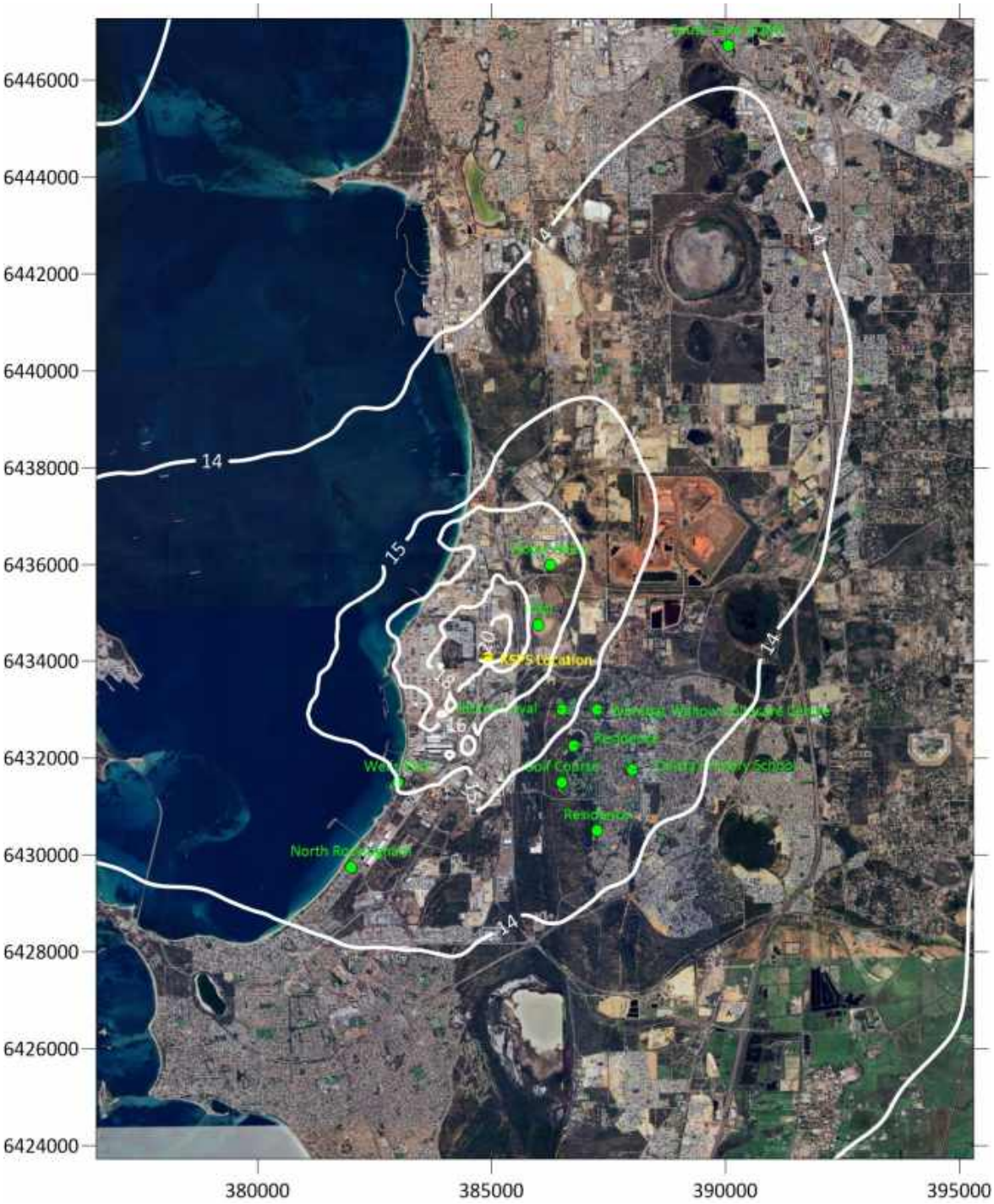


Figure 36: Predicted Annual Average GLCs of NO_2 (Across Modelled Domain) – Scenario 5: Shut Down Operations

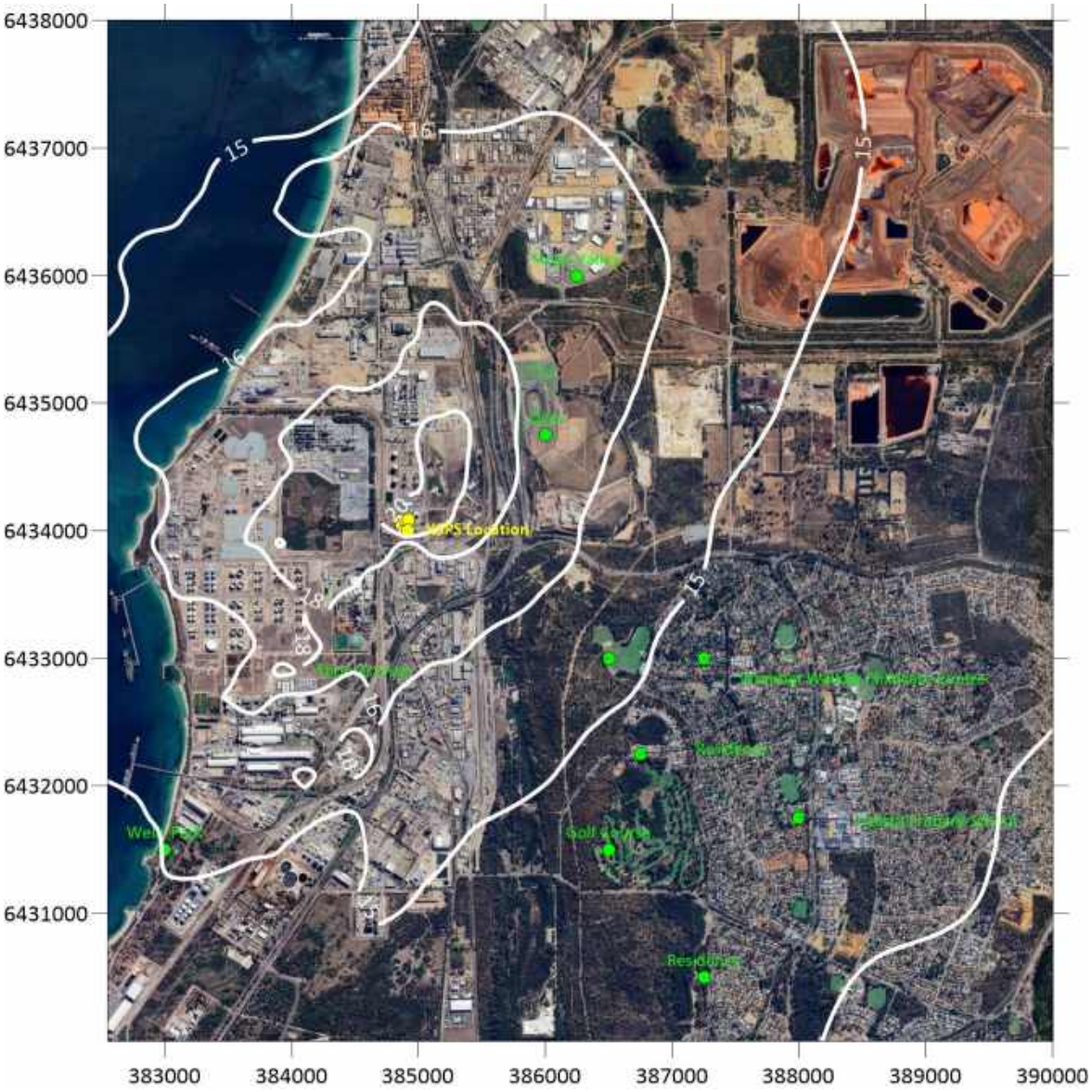


Figure 37: Predicted Annual Average GLCs of NO_2 (Zoomed In) – Scenario 5: Shut Down Operations

6. SUMMARY

As part of the regulatory approval process, AGL requested Ramboll to undertake an assessment of the air quality impacts associated with the proposed expansion of the KSPS. The assessment has considered the potential air quality impacts arising from emissions of NOx\NO_2, associated with several scenarios.

The results of air dispersion modelling predicted maximum 1-hour average and annual average concentrations at all sensitive receptor locations in the region below the relevant ambient air quality criteria for all modelled scenarios. No exceedances of the annual average criteria were predicted at any location within the modelled domain. Exceedances of the 1-hour average criteria were recorded near the KSPS, and a single 1-hour average exceedance was predicted in an industrial area 3 km to the east of the KSPS facility for normal operations as well as the startup and shutdown scenarios.

The assessment has incorporated several conservative assumptions including the following which indicate that the results of the modelling could be considered a conservative estimate of worst case GLCs in the region:

- Emissions from the plant assumed worst case NOx concentrations as guaranteed by vendors. Emissions concentrations of NOx from the proposed turbines are expected to be significantly lower than those that were modelled.
- Modelling was undertaken assuming continuous operation of the KSPS when it is expected to operate for approximately 25% of the year.
- Emissions from shutdown and startup operations are expected to be sporadic and despite these operations only occurring for 10 minutes on each occasion it has been assumed that emissions from the plant continued for an additional 50 minutes.
- Background concentrations from non-industrial sources were based on a worst-case year.
- The model validation showed that when using an assumed background concentration of NO_2, the model was slightly overpredicting the highest predicted concentrations of NO_2 when compared to the monitored data at the North Rockingham.

Based on the outcomes of the air dispersion modelling and considering the inherent conservativity incorporated into the assessment, the expansion of the KSPS likely presents a low risk of impacting health at sensitive receptors in the region.

Ramboll would recommend that ambient air quality monitoring for NO_2 be established at or near the closest sensitive receptors (Medina) to the east of the facility to confirm that concentrations remain below ambient air guidelines once the facility is operational.

7. LIMITATIONS

Ramboll prepared this report in accordance with the scope of work as outlined in our proposal to AGL and in accordance with our understanding and interpretation of current regulatory standards.

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

Ramboll did not independently verify all the written or oral information provided during the course of this investigation. While Ramboll 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 Ramboll was itself complete and accurate.

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

7.1 User Reliance

This report has been prepared for AGL and may not be relied upon by any other person or entity without Ramboll's express written permission.

8. REFERENCES

Brashers and Emery, 2013. Draft User's Manual, The Mesoscale Model Interface Program (MMIF), Version 3.0, 2013-09-30, September 2013.

Department of Environment Regulation (DER), 2017. 'Guidance Statement: Risk Assessments.' February 2017.

Department of Water and Environmental Regulation (DWER), 2019. 'Redetermination of maximum permissible sulfur dioxide quantities under the Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999.' April 2019.

Department of Water and Environmental Regulation (DWER), 2020. '2019 Western Australian Air Monitoring Report', October 2020.

Emery, Tai (Emery et al.), 2001. Enhanced Meteorological Modeling and Performance Evaluation for Two Texas Ozone Episodes Published 2001 Environmental Science

EPA Victoria, 2001. '*State Environment Protection Policy (Air Quality Management).*' Published in the Victoria Government Gazette No. S 240, 21 December 2001.

Hersbach, Bell, Berrisford, Biavati, Horányi, Muñoz Sabater, Nicolas, Peubey, Radu, Rozum, Schepers, Simmons, Soci, Dee and Thépaut, 2023. ERA5 hourly data on single levels from 1940 to present. Copernicus Climate Change Service (C3S) Climate Data Store (CDS), DOI: 10.24381/cds.adbb2d47

Michalakes, Chen, Dudhia, Hart, Klemp, Middlecoff, and Skamarock, 2001. Development of a Next Generation Regional Weather Research and Forecast Model. Developments in Teracomputing: Proceedings of the Ninth ECMWF Workshop on the Use of High Performance Computing in Meteorology. Eds. Walter Zwieflhofer and Norbert Kreitz. World Scientific, Singapore. pp. 269-276.

NEPC, 2021. 'National Environmental Protection (Ambient Air Quality Measure)'. National Environmental Protection Council, December 2021.

NSW EPA, 2016. 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales'. State of New South Wales and the Environment Protection Authority, November 2016.

Western Air Sciences, 2024. Meteorological Modelling for Kwinana Industrial Area. July 2024

Appendix 2

Contamination Desktop Assessment prepared by Ramboll (2024a)

Introduction, Background and Scope

A desktop contamination assessment was undertaken to assess the suitability of the site (Lot 13 on DP 39572 in CT Vol 2230 Folio 46) for the development. The site is currently leased by Western Energy Pty Ltd (Perth Energy) from Development WA and in use for power generation. The site is licensed as a prescribed premises for Electric power generation (L8471/2010/2). The license includes requirements for six monthly groundwater quality monitoring at six monitoring bores and the preparation of Annual Environmental Reports (AER).

The existing power plant includes:

- Four, 30 megawatt (MW) dual fuel fired turbines.
- Transmission yard.
- Six, 145.5 kL tanks containing low-sulphur diesel fuel.
- An administration building.

The power plant occupies approximately half of the 3.6 ha area of the site. Potentially polluting areas such as the turbine areas, fuel storage and unloading areas and transformers are bunded and drain to an oil/water separator. Wastewater from the separator is directed to the evaporation pond which is lined with High Density Polyethylene (HDPE). The oil/water separator is inspected daily, and waste oil (sludge) is pumped out by a licensed contractor (as required) and is sent off-site for recycling.

Wastewater from the water treatment plant is disposed of to the Water Corporation's Kwinana Water Recycling Plant (KWRP) which discharges via the Water Corporation Sepia Depression Ocean Outlet Line (SDOOL). Clean stormwater runoff from across the site drains to a retention basin located to the west of the property. Blue metal has been used to cover the previously exposed surface area to the east of the turbines housing to mitigate fugitive dust emissions generated because of wind erosion.

The scope for the desktop site contamination assessment included the following tasks:

- A review of previous reports for the site.
- Conclusions on suitability of the site for development.

Desktop Review

A desktop review was undertaken of the following documents:

- Golder Associates (2007) Report on Baseline Environmental Site Assessment Corner Donaldson Road and Burton Road, Kwinana, dated October 2007
- Kwinana Swift Power Station, Annual Environmental Report, Licence 8471/2010/2, 1 September 2019 to 31 August 2020
- AGL Energy Limited, Lot 13 Burton Place, Kwinana Beach WA, Biannual Groundwater Monitoring Event - August 2022
- AGL Energy Limited, Lot 13 Burton Place, Kwinana Beach WA, Biannual Groundwater Monitoring Event - January 2023
- AGL Energy Limited, Lot 13 Burton Place, Kwinana Beach WA, Biannual Groundwater Monitoring Event - August 2023
- Worley Group, Lot 13 Burton Place, Kwinana Beach WA, Biannual Groundwater Monitoring Event - February 2024
- A Basic Summary of Records (BSR) report for the site which was lodged by Perth Energy with the Department of Water and Environmental Regulation (DWER).

Details of the desktop review are provided below.

<u>Golder Associates (2007)</u>

A baseline Environmental Site Assessment (ESA) (Golder 2007) was completed by Golder Associates Pty Ltd (Golder) prior to development of the site in 2007. The Golder baseline ESA included:

- Identification and description of environmental conditions at the site
- Historical review
- Site visit and soil sampling at 21 locations
- Submission of 12 primary soil samples for laboratory testing

- Installation and sampling of three groundwater monitoring wells
- Analysis and reporting.

The results from the investigation are summarized below:

- Analytical results from soil samples did not exceed the adopted criteria protective of human health, indicating there was not widespread contamination at the site.
- One soil sample exceeded ecological screening criteria for PAH.
- Copper concentrations exceeded marine screening criteria from one groundwater sample collected from the site.
- Rubbish (including whitegoods, tyres, plastics, glass, wood, roadwork barriers and building rubble) was observed at several location across the site.

It was concluded that the site was suitable for use for industrial purposes. However, due to the exceedance of the ecological screening criteria for PAH in soils, it was recommended that Perth Energy contact the DWER to confirm whether the site had been reported or classified under *the CS Act*.

Annual Environmental Reports 2017 to 2024

Ramboll has been engaged to prepare Annual Environmental Reports (AER) for the site since 2017. The AERs include:

- Summary of site operations.
- Summary of annual environmental performance including review of groundwater sampling and analysis by Golder each year.
- Conclusions and recommendations.

The AERs conclude that the site is well maintained, and good on-site practices were being employed to minimise the risk of pollution of the environment. Groundwater quality was generally consistent with previous monitoring events and historic data.

The presence of bunded hydrocarbons and chemicals storage areas, a lined evaporation pond, and historic and current audits indicating the absence of significant spills, suggested that operations at the site were not the source of elevated levels of contaminants recorded in groundwater.

Biannual Groundwater Monitoring Events 2023-2024

Recent biannual groundwater monitoring events (GME) were completed by Environmental Site Services Pty Ltd (ENVSS). Reports from August & January 2023, August 2023 and February 2024 were reviewed. The GME included:

- Monitoring of seven on-site groundwater monitoring wells (monitoring wells) and three off-site monitoring wells
- Analysis of groundwater samples including (total nitrogen (TN), total phosphorus (TP), pH, total dissolved solids (TDS), total suspended solids (TSS), Metals: arsenic (As), cadmium (Cd), copper (Cu), chromium (Cr), nickel (Ni), mercury (Hg), lead (Pb), zinc (Zn), Total recoverable hydrocarbons (TRH))
- Compliance reporting to the Department of Water and Environment Regulation (DWER).

The results from the investigations are summarized below:

- TRH and BTEXN concentrations were below the LOR and adopted assessment criteria in all events.
- Heavy metals (Cr, As, Ni, Zn, Cu) exceed one or more of the adopted screening criteria.
- Elevated nutrients (Nitrate, total Nitrogen, total Phosphorus) were identified in groundwater. These have not been attributed to any potential on-site sources and are consistent with previous findings. They are reflective of an off-site source or regionally elevated background concentrations. On a site-specific basis, they are not considered to represent a risk to ecological receptors given the distance to the identified surface water bodies.

The investigation concluded that the sources of these elevated concentrations were unlikely to be attributable to on-site activities and were more likely to be reflective of regional conditions in the broader area associated with industrial land use.

DWER Basic Summary of Records

A Basic Summary of Records (BSR) request for the site was lodged by Perth Energy with the Department of Water and Environmental Regulation (DWER) on 17 July 2024. The BSR identified that the site was classified on 21 December 2007 as 'Possibly Contaminated – Investigation Required' under the Contaminated Sites Act 2003 (WA) (CS Act). This classification was based on the presence of nitrate and heavy metal contamination in groundwater recorded at the site in 2021. In addition, the site forms part of a larger area of land that was used for a variety of industrial uses since 1954, including blast furnace, steel production and production of waste deposits including slag, dust, demolition waste and putrescible waste.

PFAS

The situation in relation to PFAS at Lot 13 is summarized below:

- In Feb 2024 AGL identified PFAS contamination in the bio pond. Anecdotally, this trace of PFAS has been attributed to a firefighting event at the Cleanaway site to the southwest of Lot 13.
- Testing was subsequently undertaken to identify how the water should be disposed of or otherwise reused if safe to do so. In total, the testing identified that PFAS was up to 14 ug/kg.
- The pond water/sludge was subsequently disposed of as hazardous waste and the pond cleaned. Some minor tears were also repaired in the pond liner.
- In May 2024 AGL undertook ground water testing to see if there had been any seepage of the PFAS into the ground water. Total PFAS was below the limit of reporting except for one sample which was 0.05 ug/L. This was not a notifiable contamination event as recorded concentrations were below drinking water guidelines (0.07ug/L PFOS). Drinking water guidelines are considered a conservative threshold for a registered contaminated site in the Kwinana Industrial area where groundwater is known to be impacted from current and historical industrial land uses.
- Repeat testing in September 2024 indicated total PFAS had increased in concentration at one monitoring location (MW05/GW05), but this did not exceed the respective thresholds (levels not above the 0.07ug/L PFOS drinking water guidelines). These levels do not pose a risk to human health and again was not a notifiable contamination event.
- There are approximately 40 litres of Fire Fighting Foam solution on site (Ansulite) which is an alternative to PFOS and PFOA-containing fire-fighting foams. This solution contains trace elements of PFOS/PFOA and is only used in emergency situations.
- There are no known sources of PFAS chemicals on Lot 13. There is nothing in operation processes (water treatment, gas, and diesel combustion) that would produce PFAS. It is reported that there are adjacent land parcels with known ground and groundwater contamination (As per DWER Contaminated Sites Database).

Conclusions on Suitability of the Site for Development

The site has been classified by the DWER as 'Possibly Contaminated – Investigation Required' under *the CS Act* due to groundwater and soil contamination associated with historical use of a larger parcel of land that included the site. Memorial K718986 under the CS Act has been placed on the Certificate of Title (CoT) acknowledging that the Project Site is classified as 'Possibly Contaminated – Investigation Required'. The DA will be referred to the DWER Contaminated Sites Branch for advice on whether the land is 'suitable' for the proposed development considering its contamination status.

It is considered that Memorial K718986 on the CoT and the site classification as 'Possibly Contaminated – Investigation Required' under *the CS Act* does not restrict development of the site. Rather, further assessment is required to support a reclassification to either 'contaminated – remediation required', 'contaminated – restricted use', or 'remediated for restricted use'. The DWER will be working with Development WA as owners of the site to manage this reclassification.

A baseline ESA was prepared in 2007 prior to development of the site (Golder 2007), which concluded that the site was suitable for industrial purposes. Since development as a power station has occurred, Perth Energy have completed bi-annual groundwater monitoring, which has concluded that groundwater quality at the site is reflective of regional conditions and unlikely to be impacted by on-site conditions.

Annual Environmental Reporting prepared for the site since 2017 conclude that the site is well maintained, and good on-site practices were being employed to minimise the risk of pollution of the environment.

Recent biannual groundwater monitoring at the site (ENVSS 2023a, 2023b, 2023c) and Worley Group (2024) were reviewed and in general it was concluded groundwater quality at the site has remained consistent with historical monitoring events, with some minor increases identified. Groundwater was concluded not to represent a risk to current for future site users, and the site is considered suitable for ongoing commercial/industrial use.

Based on the results of the desktop review it is considered that site is suitable for the proposed development.

Appendix 3
Noise Impact Assessment prepared by Herring Storer Acoustic (2024)

HERRING STORER ACOUSTICS

RAMBOLL AUSTRALIA

KWINANA POWER STATION 2 PROJECT
LOT 13 BURTON PLACE
KWINANA

ENVIRONMENTAL ACOUSTIC ASSESSMENT

NOVEMBER 2024

OUR REFERENCE: 33801-3-24360

Rochdale Holdings Pty Ltd A.B.N. 85 009 049 067 trading as:
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DOCUMENT CONTROL PAGE

ENVIRONMENTAL ACOUSTIC ASSESSMENT
KWINANA POWER STATION 2 PROJECT

Job No: 24360

Document Reference: 33801-3-24360

FOR

RAMBOLL AUSTRALIA

DOCUMENT INFORMATION			
Author:	Tim Reynolds	**Checked By:**	Paul Daly
Date of Issue:	28 November 2024		

REVISION HISTORY

Revision	Description	Date	Author	Checked
1	Minor correction	02/12/2024	TR	N/A
2	Client Comments	09/12/2024	TR	N/A

DOCUMENT DISTRIBUTION

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CONTENTS

APPENDICES

EXECUTIVE SUMMARY

Herring Storer Acoustics was commissioned to undertake a noise assessment of noise emissions associated with the proposed Kwinana Power Starion 2 Project, located at Lot 13 Burton Place, Kwinana.

The assessment was undertaken for the expected final capacity of 350MW.

Based on the conservative assessment, noise received at a limited number of residences could exceed the Regulatory requirements (ie to be considered as NOT “significantly contributing”) by 2 dB(A).

However, we understand that during the night period, there would be a reduction in noise emissions, not only due to demand on the power station, but the lower ambient temperature resulting in less air required for cooling.

As part of the design process noise mitigation options will be assessed and incorporated as required to ensure compliance with the Regulatory requirements are achieved.

1. INTRODUCTION

Herring Storer Acoustics were commissioned to undertake an acoustic assessment of noise emissions associated with the proposed Kwinana Power Starion 2 Project, located at Lot 13 Burton Place, Kwinana.

It is understood that the power station is a peak load power station, using gas turbines to generate up to 350MW during peak load conditions. Thus, the power station rarely operates at full capacity. The proposed layout is shown on Figure 1.1.

FIGURE 1.1 – INDICATIVE POWER STATION LAYOUT

The objectives of the study were to model and assess noise emissions from the final overall capacity of the power station for compliance with the requirements of the Environmental Protection (Noise) regulations 1997.

2. CRITERIA

The allowable noise level at the surrounding locales is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 & 8 stipulate maximum allowable external noise levels. For the neighbouring residences this is determined by the calculation of an influencing factor, which is then added to the base levels. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern.

The base noise levels for the times of day being considered as part of this application are shown below in Table 2.1.

TABLE 2.1 – ASSIGNED OUTDOOR NOISE LEVELS

Type of premises receiving noise	Time of day	Assigned level (dB)		
		$L_{A\,10}$	$L_{A\,1}$	$L_{A\,max}$
Noise sensitive premises: highly sensitive area (i.e within 15m of a dwelling)	0700 to 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF
	0900 to 1900 hours Sunday and public holidays	40 + IF	50 + IF	65 + IF
	1900 to 2200 hours all days	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + IF	45 + IF	55 + IF
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90
Industrial and utility premises in the Kwinana Industrial Area	All hours	75	85	90

Note: The L_{A10} noise level is the noise that is exceeded for 10% of the time.
The L_{A1} noise level is the noise that is exceeded for 1% of the time.
The L_{Amax} noise level is the maximum noise level recorded.
IF = Influencing Factor

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

"impulsiveness" means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax(Slow)}$ is more than 15 dB when determined for a single representative event;

"modulation" means a variation in the emission of noise that –

(a) is more than 3 dB L_{AFast} or is more than 3 dB L_{AFast} in any one-third octave band;

(b) is present for more at least 10% of the representative assessment period; and

(c) is regular, cyclic and audible;

"tonality" means the presence in the noise emission of tonal characteristics where the difference between –

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as L_{ASlow} levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 2.2 below.

TABLE 2.2 - ADJUSTMENTS TO MEASURED LEVELS

Where **tonality** is present	Where **modulation** is present	Where **impulsiveness** is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

For this development, the closest residential premises are located, as shown on Figure 2.1 below.

FIGURE 2.1 – RECEIVER POINTS

It is noted that Residence R1 is within 100 metres of the Kwinana United Soccer Club. Thus for these residences within 100 metres of the lot / land on which the club is located, the Influencing Factor would be increased by an addition to the influencing Factor of +2 dB.

Given the location of the Kwinana Policy Area, those residences within approximately 220 metres of the boundary of Area B, the Influence Factor for this land being considered as commercial would be +1 dB. Outside that distance the Influencing Factor would be rounded down to 0 dB.

A plan of the Kwinana Policy Air Buffer Zone is attached in Appendix B. Based on the above,

the Influencing Factors would be :

R1 - +3 dB(A).

R2 - +1 dB(A).

R3 - 0 dB(A).

Based on the above, the assigned noise levels for the periods of concern relating to this report would as listed in Tables 2.3 to 2.6.

TABLE 2.3 - ASSIGNED OUTDOOR NOISE LEVEL
RESIDENTIAL LOCATION R1

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises : Highly sensitive area	0700 - 1900 hours Monday to Saturday	48	58	68
	0900 - 1900 hours Sunday and Public Holidays	43	53	68
	1900 - 2200 hours all days	43	53	58
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	38	48	58

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

TABLE 2.4 - ASSIGNED OUTDOOR NOISE LEVEL
RESIDENTIAL LOCATION R2

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises : Highly sensitive area	0700 - 1900 hours Monday to Saturday	46	56	66
	0900 - 1900 hours Sunday and Public Holidays	41	51	66
	1900 - 2200 hours all days	41	51	56
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	36	46	56

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

TABLE 2.5 - ASSIGNED OUTDOOR NOISE LEVEL
RESIDENTIAL LOCATION R3

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises : Highly sensitive area	0700 - 1900 hours Monday to Saturday	45	55	65
	0900 - 1900 hours Sunday and Public Holidays	40	50	65
	1900 - 2200 hours all days	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35	45	55

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

Finally, the Regulations also stipulate that noise emitted from a site must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at any premises.

The noise emissions from the site are considered not to significantly contribute to the overall noise level at the nearest noise sensitive premises provided noise received at the premiese are 5dB(A) less than the Assigned Noise Levels. The proposed power station will be one of many noise sources in the “Kwinana Strip” and could contribute to exceedances. As such, 5 dB(A) should be deducted from the determined assigned levels.

3. PROPOSAL

This report assesses noise received at the neighbouring residences for the proposed expansion of the power station, with the assessment being undertaken for the final expected overall capacity (350MW) of the power station.

The indicative preliminary layout of the proposed turbines are shown below in Figure 3.1.

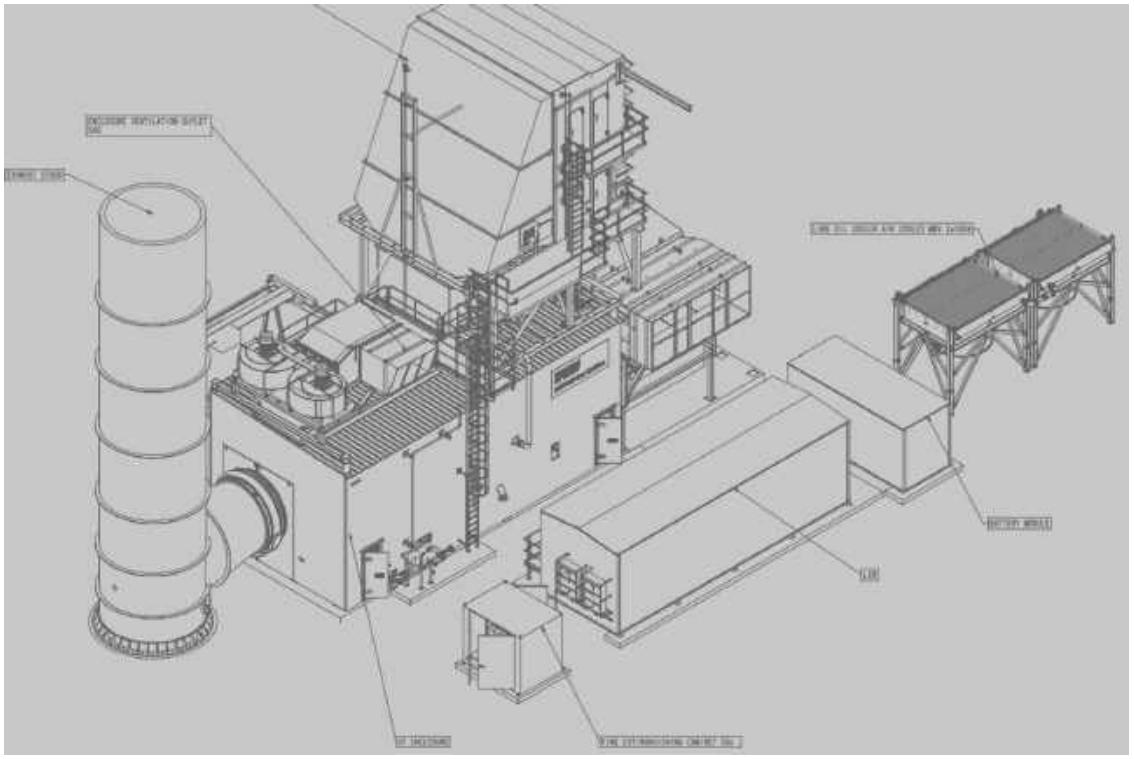


FIGURE 3.1 – TYPICAL GAS TURBINE

To achieve the overall capacity of the power station, 4 units, as shown above would be installed.

4. MEASUREMENTS

To determine the noise emission from the existing power station, noise level measurements of the existing turbines was undertaken on 13th November 2024, when the power station was operating at 100% capacity.

The measurements are summarised below in Figure 4.1.

FIGURE 4.1 – EXISTING POWER STATION NOISE LEVELS

For information, the 1/3rd octave band noise levels recorded at the eastern boundary are shown in Figure 4.2.

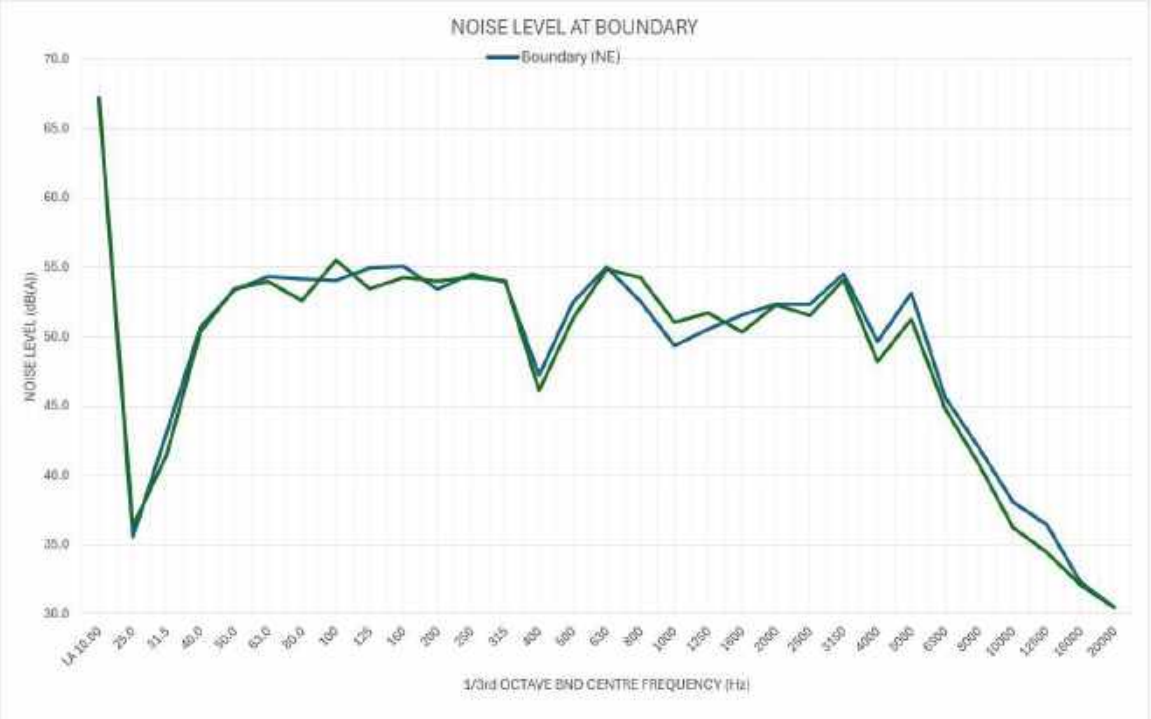


FIGURE 4.2 – BOUNDARY NOISE LEVELS

5. MODELLING

To assess the noise received at the neighbouring premises, noise modelling was undertaken using the noise modelling program SoundPlan.

Calculations were carried out using the Department of Water and Environmental Regulation's standard weather conditions for the night period, which relate to worst case noise propagation, as stated in Table 4 of the Department of Environment Regulation Draft Guidance for the "Assessment of Environmental Noise Emissions". These conditions include winds blowing from sources to the receiver(s). For information, the weather conditions, as stated in Table 4, are shown in the following Table 5.1.

TABLE 5.1 – WEATHER CONDITIONS

Condition	Night	Day
Temperature	15°C	20°C
Relative humidity	50%	50%
Pasquill Stability Class	F	E
Wind speed	3 m/s*	4 m/s*

* From sources, towards receivers.

From data supplied by the client and the above measurements the sound power levels used in the noise model were as outlined in Table 5.2.

TABLE 5.2 – SOUND POWER LEVEL - NOISE SOURCES dB(A)

Noise Sources	Sound Power Level dB(A)
EXISTING TURBINES	
Turbine	108
Enclosure Outlet	102
FUTURE TURBINES	
Turbine Enclosure	103
Generator Cooling Inlet	105
Gas Turbine Inlet	93
Gas Turbine Outlet	106
Stack	102
Lube Air Cooler	93

6. RESULTS

A summary of the calculated noise levels for scenarios are shown in Table 6.1.

TABLE 6.1 – CALCULATED NOISE LEVELS, L_{A10} dB(A)

Receiver Name	Calculated Noise Level (dB(A))
R1	30
R2	20
R3	32
Eastern Boundary of Premises	76

The noise contour plot is attached in Appendix A.

7. ASSESSMENT

As outline above in Section 2 – Criteria, under the Regulations, noise received at the noise sensitive premises must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at any premises.

The noise emissions from the site are considered not to significantly contribute to the overall noise level at the nearest noise sensitive premises provided noise received at the premises are 5dB(A) less than the Assigned Noise Levels. The proposed power station will be one of many noise sources in the "Kwinana Strip" and could to contribute to exceedances. As such, 5 dB(A) should be deducted from the determined assigned levels.

As the noise received from the power station would occur for more than 10% of the time, noise received at residential premises would need to comply with the assigned L_{A10} noise level. Table 7.1 lists the adjusted noise level (ie adjusting 5 dB(A) for the "significantly contributing" provision of the Regulations), for which noise received at the residences would be deemed compliant.

TABLE 7.1 - ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Location / Adjusted L_{A10} Level (dB)		
		R1	R2	R3
Noise sensitive premises : Highly sensitive area	0700 - 1900 hours Monday to Saturday	42	41	40
	0900 - 1900 hours Sunday and Public Holidays	38	36	35
	1900 - 2200 hours all days	38	36	35
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	33	31	30

Note: L_{A10} is the noise level exceeded for 10% of the time.

Table 7.2 compares the noise level received at the residences with the adjusted noise level for which compliance would be achieved.

TABLE 7.2 – ASSESSMENT OF NOISE LEVELS

Receiver	Assessable Noise Level, dB(A)	Applicable Times of Day	L_{A10} Compliance Noise Level (dB)	Exceedance to Assigned Noise Level L_{A01} (dB)
R1	31	0700 - 1900 hours Monday to Saturday	42	Complies
		0900 - 1900 hours Sunday and Public Holidays	38	Complies
		1900 - 2200 hours all days	38	Complies
		2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	33	Complies
R2	20	0700 - 1900 hours Monday to Saturday	41	Complies
		0900 - 1900 hours Sunday and Public Holidays	36	Complies
		1900 - 2200 hours all days	36	Complies
		2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	31	Complies
R3	32	0700 - 1900 hours Monday to Saturday	40	Complies
		0900 - 1900 hours Sunday and Public Holidays	35	Complies
		1900 - 2200 hours all days	35	Complies
		2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	30	+2
Western Boundary	76	All hours	75	76

8. CONCLUSION

A noise assessment has been undertaken with regards noise received at the residential premises from the proposed final expected capacity 350MW capacity of the power station located at Lot 13 Burton Place, Kwinana.

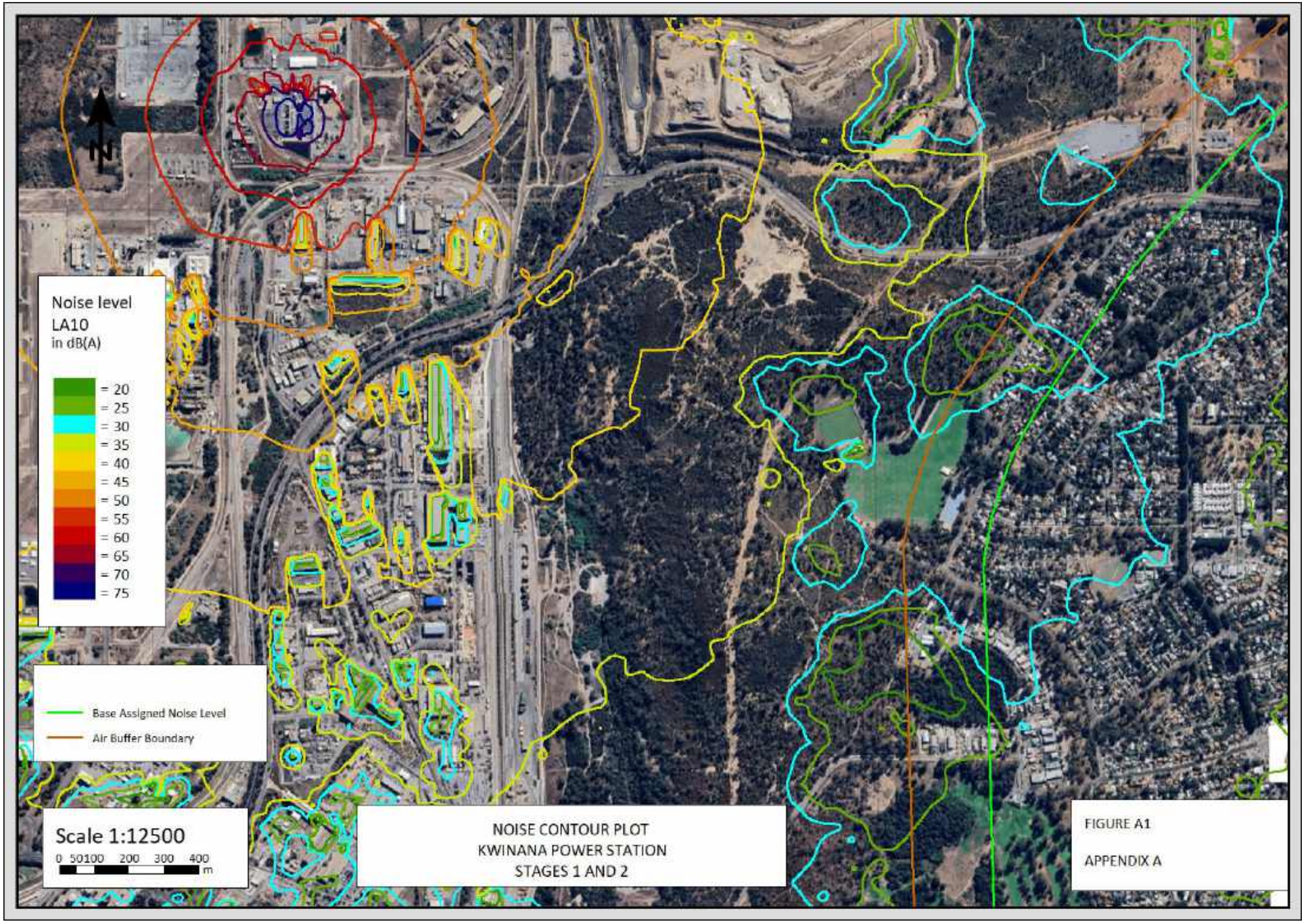
We note that the assessment has been based on the power station operating at full capacity. Under this scenario, noise received at the residences could comply with the Regulatory requirements during the day and evening periods, but could exceed these requirements during the night period by +2 dB(A). However, we understand that during the night period, there would be a reduction in noise emissions, not only due to demand on the power station, but the lower ambient temperature resulting in less air required for cooling.

Noise received at the boundary of the premises, could exceed the assigned noise level by 1 dB(A).

As part of the design process noise mitigation options will be assessed and incorporated as required to ensure compliance at the Regulator requirements are achieved.

APPENDIX A

NOISE CONTOUR PLOT


N
Noise level
LA10
in dB(A)
= 20
= 25
= 30
= 35
= 40
= 45
= 50
= 55
= 60
= 65
= 70
= 75
Base Assigned Noise Level
Air Buffer Boundary
Scale 1:12500
0 50100 200 300 400
m
NOISE CONTOUR PLOT
KWINANA POWER STATION
STAGES 1 AND 2
FIGURE A1
APPENDIX A

APPENDIX B

KWINANA AIR BUFFER ZONE

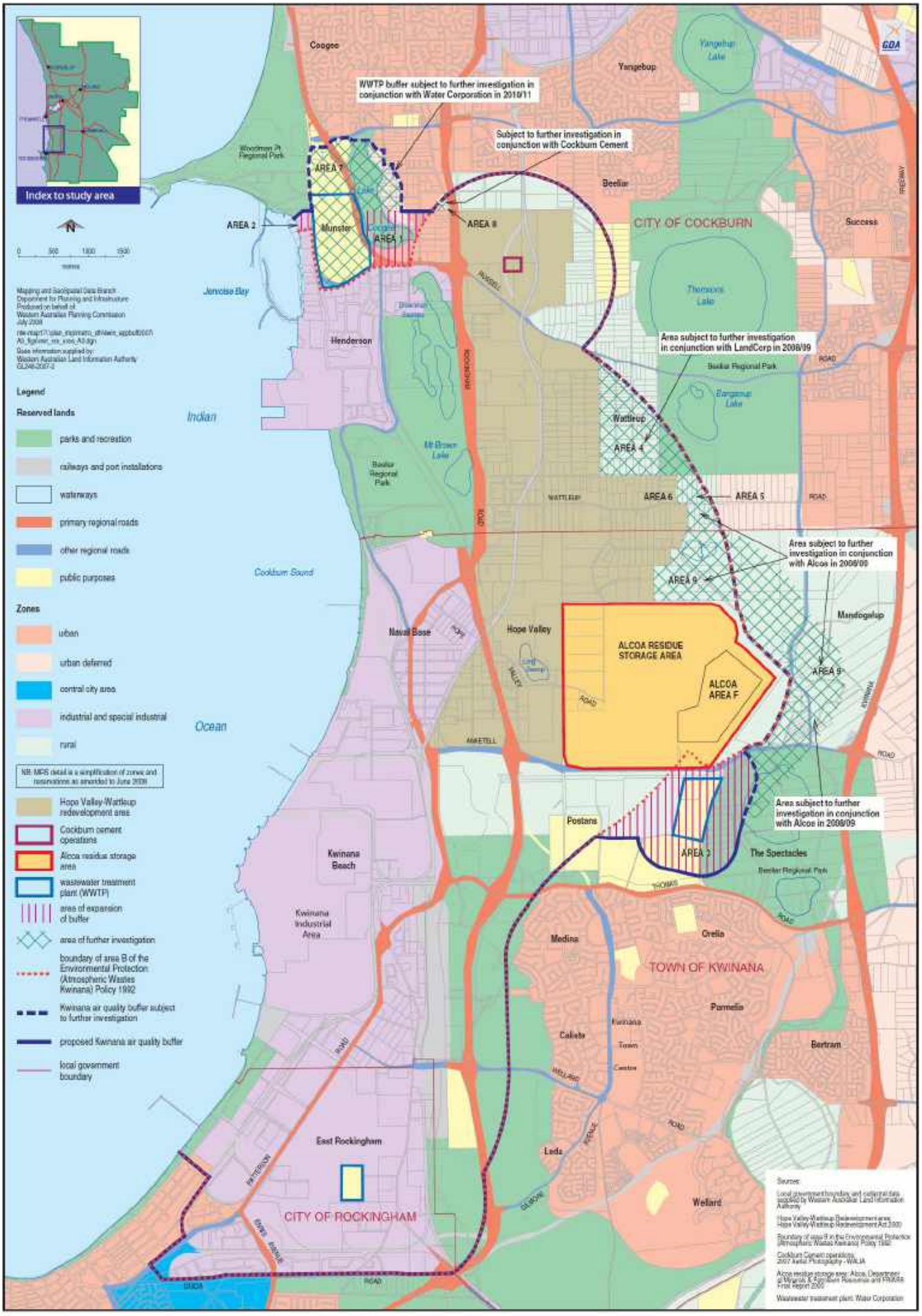


Figure 1: Areas comprising the *Review of the Kwinana Air Quality Buffer* and recommended Kwinana air quality buffer for 2006 – 2009

Appendix 4

Hazardous Emissions Annual Compliance report prepared by Ektimo (2023)

Ektimo

Kwinana Swift Power Station
Annual Compliance 2023
Report Number R013743

Document Information

Template Version 130223

Client Name:	Kwinana Swift Power Station
Report Number:	R013743
Date of Issue:	20 July 2023
Attention:	Karolina McLaughlin
Address:	Corner Burton and Donaldson Road Kwinana Beach WA 6167
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Paul Cimbaly **Air Monitoring Project Manager**	NATA Accredited Laboratory No. 14601	**Greg Sceneay** **Ektimo Signatory**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo's terms of NATA accreditation as described in the Test Methods table. This does not include calculations that use data supplied by third-parties, comments, conclusions, or recommendations based upon the results. Refer to 'Test Methods' for full details of testing covered by NATA accreditation.

Table of Contents

1 Executive Summary

1.1 Background

Ektimo was engaged by AGL to perform emission testing at their Kwinana Power Station plant. Testing was carried out in accordance with Environmental Licence L8471/2010/2.

1.2 Project Objective & Overview

The objective of the project was to quantify emissions from four discharge points to determine compliance with Kwinana Swift Power Station 's Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
A1 – 100A	10 July 2023	Nitrogen oxides (as NO_2) Carbon monoxide (CO) Carbon dioxide (CO_2) Oxygen (O_2)
A2 – 100B		
A3 – 200A		
A4 – 200B		

* Flow rate, velocity, temperature and moisture were also determined.

All results are reported on a dry basis at STP.

Plant operating conditions have been noted in the report.

1.3 Licence Comparison

The following licence comparison table shows that all analytes highlighted in green are below the licence limit set by the WA Department of Water and Environmental Regulation (DWER) as per licence L8471/2010/2.

Location Description	Fuel	Parameter	Units	Licence Limit	Detected Values (corrected to 15% O_2)
A1	Natural Gas	Carbon monoxide	mg/m^3	*monitor only*	200
		Nitrogen oxides (as NO_2)	mg/m^3	*70*	39
A2	Natural Gas	Carbon monoxide	mg/m^3	*monitor only*	220
		Nitrogen oxides (as NO_2)	mg/m^3	*70*	43
A3	Natural Gas	Carbon monoxide	mg/m^3	*monitor only*	270
		Nitrogen oxides (as NO_2)	mg/m^3	*70*	37
A4	Natural Gas	Carbon monoxide	mg/m^3	*monitor only*	200
		Nitrogen oxides (as NO_2)	mg/m^3	70	43

Please note that the measurement uncertainty associated with the test results was not considered when determining whether the results were compliant or non-compliant.

Refer to the Test Methods table for the measurement uncertainties.

2 Results

2.1 A1 – 100A

Date	10/07/2023	**Client**	AGL Kwinana
Report	R013743	**Stack ID**	GTG 100A
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Allison Largeaud / Zach Marcus	**State**	WA
Process Conditions	Please refer to client records.		230622

Sampling Plane Details		
Sampling plane dimensions	3300 x 2400 mm	
Sampling plane area	7.92 m²	
Sampling port size, number & depth	4" Flange (x4), 110 mm	
Duct orientation & shape	Vertical Rectangular	
Downstream disturbance	Exit 0.5 D	
Upstream disturbance	Change in diameter 1.8 D	
No. traverses & points sampled	4 28	
Sample plane conformance to AS 4323.1	Non-conforming	

Comments

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

Stack Parameters		
Moisture content, %v/v	5.2	
Gas molecular weight, g/g mole	28.6 (wet)	29.2 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.50	
% Oxygen correction & Factor	15 %	1.12
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0710	
Temperature, °C	426	
Velocity at sampling plane, m/s	49	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	9200	
Volumetric flow rate (dry STP), m³/min	8700	
Mass flow rate (wet basis), kg/h	710000	

Gas Analyser Results	Average		
Sampling time	0718 - 0818		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	35	39	5.1
Carbon monoxide	180	200	26
	Concentration %v/v		
Carbon dioxide	2.9		
Oxygen	15.6		

2.2 A2 – 100B

Date	10/07/2023	**Client**	AGL Kwinana
Report	R013743	**Stack ID**	GTG 100B
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Allison Largeaud / Zach Marcus	**State**	WA
Process Conditions	Please refer to client records.		230622

Sampling Plane Details		
Sampling plane dimensions	3300 x 2400 mm	
Sampling plane area	7.92 m²	
Sampling port size, number & depth	4" Flange (x4), 110 mm	
Duct orientation & shape	Vertical	Rectangular
Downstream disturbance	Exit	0.5 D
Upstream disturbance	Change in diameter	1.8 D
No. traverses & points sampled	4	28
Sample plane conformance to AS 4323.1	Non-conforming	

Comments

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

Stack Parameters		
Moisture content, %v/v	6.4	
Gas molecular weight, g/g mole	28.5 (wet)	29.2 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.50	
% Oxygen correction & Factor	15 %	1.16
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0710	
Temperature, °C	428	
Velocity at sampling plane, m/s	49	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	9100	
Volumetric flow rate (dry STP), m³/min	8600	
Mass flow rate (wet basis), kg/h	700000	

Gas Analyser Results	Average		
Sampling time	0720 - 0820		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	37	43	5.4
Carbon monoxide	190	220	27
	Concentration %v/v		
Carbon dioxide	2.8		
Oxygen	15.8		

2.3 A3 – 200A

Date	10/07/2023	**Client**	AGL Kwinana
Report	R013743	**Stack ID**	GTG 200A
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Allison Largeaud / Zach Marcus	**State**	WA
Process Conditions	Please refer to client records.		230622

Sampling Plane Details		
Sampling plane dimensions	3300 x 2400 mm	
Sampling plane area	7.92 m²	
Sampling port size, number & depth	4" Flange (x4), 110 mm	
Duct orientation & shape	Vertical	Rectangular
Downstream disturbance	Exit	0.5 D
Upstream disturbance	Change in diameter	1.8 D
No. traverses & points sampled	4	28
Sample plane conformance to AS 4323.1	Non-conforming	

Comments

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

Stack Parameters		
Moisture content, %v/v	6.3	
Gas molecular weight, g/g mole	28.5 (wet)	29.2 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.53	
% Oxygen correction & Factor	15 %	1.22
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0850	
Temperature, °C	391	
Velocity at sampling plane, m/s	49	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	9600	
Volumetric flow rate (dry STP), m³/min	9000	
Mass flow rate (wet basis), kg/h	730000	

Gas Analyser Results	Average		
Sampling time	0907 - 1006		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	30	37	4.5
Carbon monoxide	220	270	32
	Concentration %v/v		
Carbon dioxide	2.6		
Oxygen	16.1		

2.4 A4 – 200B

Date	10/07/2023	**Client**	AGL Kwinana
Report	R013743	**Stack ID**	GTG 200B
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Allison Largeaud / Zach Marcus	**State**	WA
Process Conditions	Please refer to client records.		230622

Sampling Plane Details		
Sampling plane dimensions	3300 x 2400 mm	
Sampling plane area	7.92 m²	
Sampling port size, number & depth	4" Flange (x4), 110 mm	
Duct orientation & shape	Vertical	Rectangular
Downstream disturbance	Exit	0.5 D
Upstream disturbance	Change in diameter	1.8 D
No. traverses & points sampled	4	28
Sample plane conformance to AS 4323.1	Non-conforming	

Comments

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

Stack Parameters		
Moisture content, %v/v	6.2	
Gas molecular weight, g/g mole	28.5 (wet)	29.2 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.50	
% Oxygen correction & Factor	15 %	1.37
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0850	
Temperature, °C	419	
Velocity at sampling plane, m/s	50	
Volumetric flow rate, actual, m³/min	24000	
Volumetric flow rate (wet STP), m³/min	9300	
Volumetric flow rate (dry STP), m³/min	8800	
Mass flow rate (wet basis), kg/h	710000	

Gas Analyser Results	Average		
Sampling time	0909 - 1008		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	31	43	4.6
Carbon monoxide	150	200	22
	Concentration %v/v		
Carbon dioxide	2.3		
Oxygen	16.6		

3 Plant Operating Conditions

Units 100A, 100B, 200A, 200B were operating at 27.5 MW.

See Kwinana Swift Power Station records for complete process conditions.

4 Test Methods

All sampling and analysis performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	AS 4323.1	NA	NA	✓	NA
Flow rate, temperature & velocity	USEPA Method 2	USEPA Method 2	8%, 2%, 7%	NA	✓
Moisture	USEPA Alt-Method 008	USEPA Alt-Method 008	19%	✓	✓
Molecular weight	NA	USEPA Method 3	not specified	NA	✓
Carbon dioxide & oxygen	USEPA Method 3A	USEPA Method 3A	13%	✓	✓
Carbon monoxide	USEPA Method 10	USEPA Method 10	12%	✓	✓
Nitrogen oxides	USEPA Method 7E	USEPA Method 7E	12%	✓	✓

030723

* Uncertainties cited in this table are estimated using typical values and are calculated at the 95% confidence level (coverage factor = 2).

5 Quality Assurance/Quality Control Information

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director.

NATA is a member of APAC (Asia Pacific Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through mutual recognition arrangements with these organisations, NATA accreditation is recognised worldwide.

6 Definitions

The following symbols and abbreviations may be used in this test report:

% v/v	Volume to volume ratio, dry or wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
AS	Australian Standard
D	Duct diameter or equivalent duct diameter for rectangular ducts
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
DWER	Department of Water and Environmental Regulation (WA)
EPA	Environment Protection Authority
NATA	National Association of Testing Authorities
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
USEPA	United States Environmental Protection Agency
95% confidence interval	Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.

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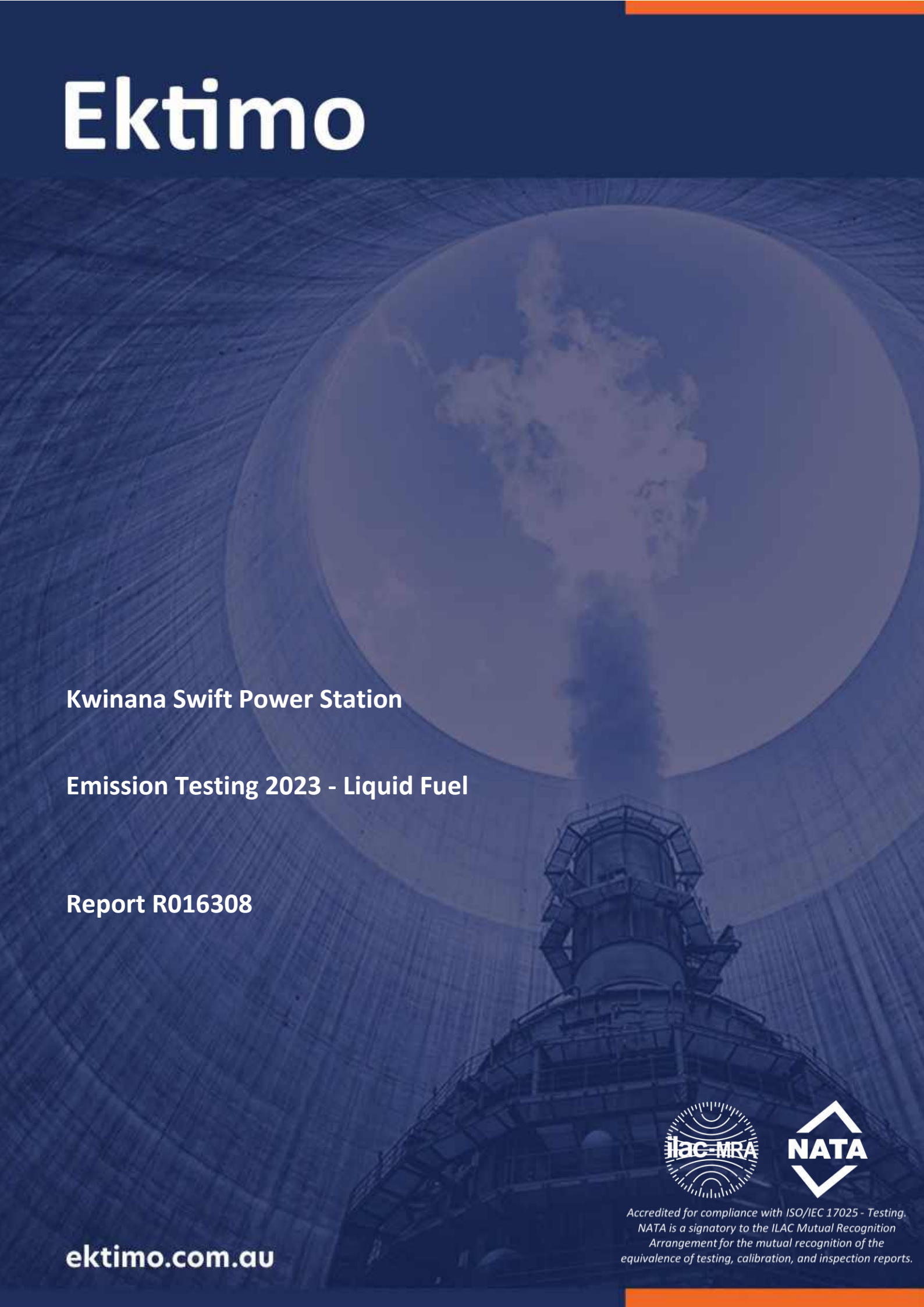

Kwinana Swift Power Station

Emission Testing 2023 - Liquid Fuel

Report R016308

Document Information

Client Name:	Kwinana Swift Power Station
Report Number:	R016308
Date of Issue:	10 January 2024
Attention:	Marty Williams
Address:	Level 24 221 St Georges Tce PERTH WA 6000
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Paul Cimbaly
Air Monitoring Project Manager

NATA Accredited Laboratory
No. 14601

Ashley Hart
Ektimo Signatory

Table of Contents

1 Executive Summary

1.1 Background

Ektimo was engaged by AGL to perform emission testing at their Kwinana Power Station plant. Testing was carried out in accordance with Environmental Licence L8471/2010/2.

1.2 Project Objective & Overview

The objective of the project was to quantify emissions from four discharge points to determine compliance with Kwinana Swift Power Station 's Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
A1 – 100A	21 December 2023	Total particulate matter Nitrogen oxides (as NO_2) Sulfur dioxide (SO_2) Carbon monoxide (CO) Carbon dioxide (CO_2) Oxygen (O_2)
A2 – 100B		
A3 – 200A		
A4 – 200B		

* Flow rate, velocity, temperature, and moisture were also determined.

All results are reported on a dry basis at STP.

Plant operating conditions have been noted in this report.

1.3 Licence Comparison

The following licence comparison table shows any analytes highlighted in orange are outside the licence limit set by the WA Department of Water and Environmental Regulation (DWER) as per licence L8471/2010/2.

Location Description	Fuel	Parameter	Units	Licence Limit	Detected Values
A1	Ultra Low Sulphur Diesel	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	20
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O2 STP dry	*150*	**69**
A2	Ultra Low Sulphur Diesel	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	14
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O2 STP dry	*150*	**61**
A3	Ultra Low Sulphur Diesel	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	8.4
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O2 STP dry	*150*	**64**
A4	Ultra Low Sulphur Diesel	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	14
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O2 STP dry	150	**63**

Please note that the measurement uncertainty associated with the test results was not considered when determining whether the results were compliant or non-compliant.

2 Results

2.1 A1 – 100A

Date	21/12/2023	**Client**	AGL Kwinana
Report	R016308	**Stack ID**	GTG 100A
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Ashley Hart / Tom Manton / Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 100A - Operating on liquid fuel at full load.		231213

Stack Parameters		
Moisture content, %v/v	6.1	
Gas molecular weight, g/g mole	28.6 (wet)	29.3 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.49	
% Oxygen correction & Factor	15 %	1.05
Gas Flow Parameters		
Temperature, °C	432	
Velocity at sampling plane, m/s	48	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	8700	
Volumetric flow rate (dry STP), m³/min	8200	
Mass flow rate (wet basis), kg/h	670000	

Gas Analyser Results	Average		
Sampling time	0540 - 0640		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	66	69	9
Sulfur dioxide	<3	<3	<0.4
Carbon monoxide	19	20	2.6
	Concentration %v/v		
Carbon dioxide	3.7		
Oxygen	15.3		

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				0540-0643			0645-0748		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	≤3.6	≤3.8	≤0.5	4.8	5	0.65	<3	<3	<0.3
Isokinetic Sampling Parameters									
Sampling time, min				60			60		
Isokinetic rate, %				98			109		
Gravimetric analysis date (total particulate)					22-12-2023			22-12-2023	

2.2 A2 – 100B

Date	21/12/2023	**Client**	AGL Kwinana
Report	R016308	**Stack ID**	GTG 100B
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Ashley Hart / Tom Manton / Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 100B - Operating on liquid fuel at full load.		231213

Stack Parameters		
Moisture content, %v/v	7.2	
Gas molecular weight, g/g mole	28.5 (wet)	29.4 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.49	
% Oxygen correction & Factor	15 %	1.02
Gas Flow Parameters		
Temperature, °C	422	
Velocity at sampling plane, m/s	50	
Volumetric flow rate, actual, m³/min	24000	
Volumetric flow rate (wet STP), m³/min	9100	
Volumetric flow rate (dry STP), m³/min	8500	
Mass flow rate (wet basis), kg/h	700000	

Gas Analyser Results	Average		
Sampling time	0647 - 0747		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	60	61	8.5
Sulfur dioxide	<3	<3	<0.4
Carbon monoxide	14	14	2
	Concentration %v/v		
Carbon dioxide	3.9		
Oxygen	15.1		

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				0540-0643			0645-0748		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	120	120	17	140	150	20	99	100	14
Isokinetic Sampling Parameters									
Sampling time, min				60			60		
Isokinetic rate, %				104			106		
Gravimetric analysis date (total particulate)				22-12-2023			22-12-2023		

2.3 A3 – 200A

Date	21/12/2023	**Client**	AGL Kwinana
Report	R016308	**Stack ID**	GTG 200A
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Ashley Hart / Tom Manton / Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 200A - Operating on liquid fuel at full load.		231213

Stack Parameters		
Moisture content, %v/v	7.3	
Gas molecular weight, g/g mole	28.5 (wet)	29.4 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.50	
% Oxygen correction & Factor	15 %	1.08
Gas Flow Parameters		
Temperature, °C	412	
Velocity at sampling plane, m/s	45	
Volumetric flow rate, actual, m³/min	21000	
Volumetric flow rate (wet STP), m³/min	8400	
Volumetric flow rate (dry STP), m³/min	7800	
Mass flow rate (wet basis), kg/h	640000	

Gas Analyser Results	Average		
Sampling time	0600 - 0700		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	59	64	7.7
Sulfur dioxide	<3	<3	<0.4
Carbon monoxide	7.8	8.4	1
	Concentration %v/v		
Carbon dioxide	3.8		
Oxygen	15.5		

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				0557-0700			0702-0805		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	4	4.4	0.52	6.1	6.6	0.79	2	2.2	0.26
Isokinetic Sampling Parameters									
Sampling time, min				60			60		
Isokinetic rate, %				102			102		
Gravimetric analysis date (total particulate)				21-12-2023			22-12-2023		

2.4 A4 – 200B

Date	21/12/2023	**Client**	AGL Kwinana
Report	R016308	**Stack ID**	GTG 200B
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Ashley Hart / Tom Manton / Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 200B - Operating on liquid fuel at full load.		231213

Stack Parameters		
Moisture content, %v/v	5.7	
Gas molecular weight, g/g mole	28.7 (wet)	29.4 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.49	
% Oxygen correction & Factor	15 %	1.09
Gas Flow Parameters		
Temperature, °C	432	
Velocity at sampling plane, m/s	50	
Volumetric flow rate, actual, m³/min	24000	
Volumetric flow rate (wet STP), m³/min	9000	
Volumetric flow rate (dry STP), m³/min	8500	
Mass flow rate (wet basis), kg/h	700000	

Gas Analyser Results	Average		
Sampling time	0705 - 0805		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	58	63	8.2
Sulfur dioxide	<3	<3	<0.4
Carbon monoxide	12	14	1.8
	Concentration %v/v		
Carbon dioxide	3.9		
Oxygen	15.5		

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				0557-0700			0702-0805		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	≤2.1	≤2.3	≤0.3	<2	<2	<0.3	2	2.2	0.29
Isokinetic Sampling Parameters									
Sampling time, min				60			60		
Isokinetic rate, %				109			103		
Gravimetric analysis date (total particulate)				22-12-2023			22-12-2023		

3 Sample Plane Compliance

3.1 A1 – 100A

Sampling Plane Details	
Sampling plane dimensions	3300 x 2400 mm
Sampling plane area	7.92 m²
Sampling port size, number & depth	4" Flange (x4), 110 mm
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0.5 D
Upstream disturbance	Change in diameter 1.8 D
No. traverses & points sampled	4 28
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

3.2 A2 – 100B

Sampling Plane Details	
Sampling plane dimensions	3300 x 2400 mm
Sampling plane area	7.92 m²
Sampling port size, number & depth	4" Flange (x4), 110 mm
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0.5 D
Upstream disturbance	Change in diameter 1.8 D
No. traverses & points sampled	4 28
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

3.3 A3 – 200A

Sampling Plane Details	
Sampling plane dimensions	3300 x 2400 mm
Sampling plane area	7.92 m²
Sampling port size, number & depth	4" Flange (x4), 110 mm
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0.5 D
Upstream disturbance	Change in diameter 1.8 D
No. traverses & points sampled	4 28
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

3.4 A4 – 200B

Sampling Plane Details	
Sampling plane dimensions	3300 x 2400 mm
Sampling plane area	7.92 m²
Sampling port size, number & depth	4" Flange (x4), 110 mm
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0.5 D
Upstream disturbance	Change in diameter 1.8 D
No. traverses & points sampled	4 28
Sample plane conformance to AS 4323.1	Non-conforming
The sampling plane is deemed to be non-conforming due to the following reasons:	
The downstream disturbance is <1D from the sampling plane	
The upstream disturbance is <2D from the sampling plane	

4 Plant Operating Conditions

See Kwinana Swift Power Station records for complete process conditions.

5 Test Methods

All sampling and analysis was performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	AS 4323.1	NA	NA	✓	NA
Flow rate & velocity	AS 4323.1	AS 4323.1	8%, 7%	✓	✓
Moisture	USEPA Method 4	USEPA Method 4	8%	✓	✓
Carbon dioxide & oxygen	USEPA Method 3A	USEPA Method 3A	13%	✓	✓
Carbon monoxide	USEPA Method 10	USEPA Method 10	12%	✓	✓
Nitrogen oxides	USEPA Method 7E	USEPA Method 7E	12%	✓	✓
Sulfur dioxide	USEPA Method 6C	USEPA Method 6C	12%	✓	✓
Total particulate matter	USEPA Method 17	USEPA Method 17	7%	✓	✓††

271123

* Uncertainties cited in this table are estimated using typical values and are calculated at the 95% confidence level (coverage factor = 2).
†† Gravimetric analysis conducted at the Ektimo WA laboratory.

6 Quality Assurance/Quality Control Information

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director.

NATA is a member of APAC (Asia Pacific Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through mutual recognition arrangements with these organisations, NATA accreditation is recognised worldwide.

Unless specifically noted, all samples were collected and handled in accordance with Ektimo's QA/QC standards.

7 Definitions

The following symbols and abbreviations may be used in this test report:

% v/v	Volume to volume ratio, dry basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
APHA	American Public Health Association, Standard Methods for the Examination of Water and Waste Water
AS	Australian Standard
BaP-TEQ	Benzo(a)pyrene toxic equivalents
BSP	British standard pipe
CEM/CEMS	Continuous emission monitoring/Continuous emission monitoring system
CTM	Conditional test method
D	Duct diameter or equivalent duct diameter for rectangular ducts
D_{50}	'Cut size' of a cyclone is defined as the particle diameter at which the cyclone achieves a 50% collection efficiency i.e. half of the particles are retained by the cyclone and half pass through it. The D_{50} method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D_{50} of that cyclone and less than the D_{50} of the preceding cyclone.
DECC	Department of Environment & Climate Change (NSW)
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
DWER	Department of Water and Environmental Regulation (WA)
DEHP	Department of Environment and Heritage Protection (QLD)
EPA	Environment Protection Authority
FTIR	Fourier transform infra-red
ISC	Intersociety Committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
ITE	Individual threshold estimate
I-TEQ	International toxic equivalents
Lower bound	When an analyte is not present above the detection limit, the result is assumed to be equal to zero.
Medium bound	When an analyte is not present above the detection limit, the result is assumed to be equal to half of the detection limit.
NA	Not applicable
NATA	National Association of Testing Authorities
NIOSH	National Institute of Occupational Safety and Health
NT	Not tested or results not required
OM	Other approved method
OU	Odour unit. One OU is that concentration of odorant(s) at standard conditions that elicits a physiological response from a panel equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
PM_{10}	Particulate matter having an equivalent aerodynamic diameter less than or equal to 10 microns (µm).
$PM_{2.5}$	Particulate matter having an equivalent aerodynamic diameter less than or equal to 2.5 microns (µm).
PSA	Particle size analysis. PSA provides a distribution of geometric diameters, for a given sample, determined using laser diffraction.
RATA	Relative accuracy test audit
Semi-quantified VOCs	Unknown VOCs (those for which an analytical standard is not available), are identified by matching the mass spectrum of the chromatographic peak to the NIST Standard Reference Database (version 14.0), with a match quality exceeding 70%. An estimated concentration is determined by matching the area of the peak with the nearest suitable compound in the analytical calibration standard mixture.
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0 °C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa.
TM	Test method
TOC	Total organic carbon. This is the sum of all compounds of carbon which contain at least one carbon-to-carbon bond, plus methane and its derivatives.
USEPA	United States Environmental Protection Agency
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
Velocity difference	The percentage difference between the average of initial flows and after flows.
Vic EPA	Victorian Environment Protection Authority
VOC	Volatile organic compound. A carbon-based chemical compound with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the given conditions of use. VOCs may contain oxygen, nitrogen and other elements. VOCs do not include carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
WHO05-TEQ	World Health Organisation toxic equivalents
XRD	X-ray diffractometry
Upper bound	When an analyte is not present above the detection limit, the result is assumed to be equal to the detection limit.
95% confidence interval	Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.

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Western Energy Pty Ltd
Kwinana Swift Power Station

Emission Testing - July 2024

Report R017351

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, calibration, and inspection reports.

ektimo.com.au

Document Information

Client Name:	Western Energy Pty Ltd (Kwinana Swift Power Station)
Report Number:	R017351
Date of Issue:	7 August 2024
Attention:	Marty Williams
Address:	Level 24 221 St Georges Tce PERTH WA 6000
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Paul Cimbaly
Air Monitoring Project Manager

NATA Accredited Laboratory
No. 14601

Greg Sceneay
Ektimo Signatory

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo terms of NATA accreditation as described in the Test Methods table. This does not include calculations that use data supplied by third-parties, comments, conclusions, or recommendations based upon the results. Refer to Test Methods section for full details of testing covered by NATA accreditation.

Table of Contents

1 Executive Summary

1.1 Background

Ektimo was engaged by AGL to perform emission testing at their Kwinana Power Station plant. Testing was carried out in accordance with Environmental Licence L8471/2010/2. Emission testing was performed on two different fuels – Natural Gas and Liquid.

1.2 Project Objective & Overview

The objective of the project was to quantify emissions from four discharge points to determine compliance with Kwinana Swift Power Station 's Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
GTG 100A	25 – 26 July 2024	Nitrogen oxides (as NO_2) Carbon monoxide (CO) Carbon dioxide (CO_2) Oxygen (O_2) Total particulate matter (TPM) (Liquid Fuel Only)
GTG 100B		
GTG 200A		
GTG 200B		

* Flow rate, velocity, temperature, and moisture were also determined.

All results are reported on a dry basis at STP.

Plant operating conditions have been noted in this report.

1.3 Licence Comparison

The following licence comparison table shows that all analytes are within the licence limit set by the WA Department of Water and Environmental Regulation (DWER) as per licence L8471/2010/2.

Location Description	Fuel	Parameter	Units	Licence Limit	Detected Values
A1	Natural Gas	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	350
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O_2 STP dry	*70*	**34**
A2	Natural Gas	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	160
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O_2 STP dry	*70*	**41**
A3	Natural Gas	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	220
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O_2 STP dry	*70*	**41**
A4	Natural Gas	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	230
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O_2 STP dry	70	**40**

Location Description	Fuel	Parameter	Units	Licence Limit	Detected Values
A1	Ultra Low Sulphur Diesel	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	27
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O_2 STP dry	*150*	**70**
A2	Ultra Low Sulphur Diesel	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	29
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O_2 STP dry	*150*	**63**
A3	Ultra Low Sulphur Diesel	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	8.7
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O_2 STP dry	*150*	**81**
A4	Ultra Low Sulphur Diesel	Carbon monoxide	mg/m^3 at 15% O_2 STP dry	*monitor only*	18
		Nitrogen oxides (as NO_2)	mg/m^3 at 15% O_2 STP dry	150	**68**

Please note that the measurement uncertainty associated with the test results was not considered when determining whether the results were compliant or non-compliant.

2 Results - GTG 100A

2.1 Natural Gas

Date	26/07/2024	**Client**	AGL Kwinana
Report	R017351	**Stack ID**	GTG 100A
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 100A - Operating on Gas		240531

Stack Parameters		
Moisture content, %v/v	6	
Gas molecular weight, g/g mole	28.5 (wet)	29.2 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.52	
% Oxygen correction & Factor	15 %	1.42
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0815	
Temperature, °C	399	
Velocity at sampling plane, m/s	46	
Volumetric flow rate, actual, m³/min	22000	
Volumetric flow rate (wet STP), m³/min	8900	
Volumetric flow rate (dry STP), m³/min	8400	
Mass flow rate (wet basis), kg/h	680000	

Gas Analyser Results	Average		
Sampling time	0649 - 0748		
		Corrected to	
	Concentration mg/m³	15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	24	34	3.3
Sulfur dioxide	<6	<8	<0.8
Carbon monoxide	250	350	35
	Concentration %v/v		
Carbon dioxide	2.5		
Oxygen	16.7		

2.2 Liquid Fuel

Date	25/07/2024	**Client**	AGL Kwinana
Report	R017351	**Stack ID**	GTG 100A
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Paul Cimbaly / Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 100A - Operating on Liquid Fuel - 53.8 MW		240715

Stack Parameters		
Moisture content, %v/v	6.2	
Gas molecular weight, g/g mole	28.7 (wet)	29.4 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.50	
% Oxygen correction & Factor	15 %	1.28
Gas Flow Parameters		
Temperature, °C	420	
Velocity at sampling plane, m/s	49	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	9200	
Volumetric flow rate (dry STP), m³/min	8600	
Mass flow rate (wet basis), kg/h	700000	

Gas Analyser Results	Average		
Sampling time	0656 - 0756		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	55	70	7.9
Sulfur dioxide	<6	<7	<0.8
Carbon monoxide	21	27	3
	Concentration %v/v		
Carbon dioxide	3.7		
Oxygen	16.3		

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				0656-0810			0815-0929		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	3.8	4.8	0.54	4	5.1	0.57	3.6	4.6	0.51
Isokinetic Sampling Parameters									
Sampling time, min				70			70		
Isokinetic rate, %				102			99		
Gravimetric analysis date (total particulate)				26-07-2024			26-07-2024		

3 Results - GTG 100B

3.1 Natural Gas

Date	26/07/2024	**Client**	AGL Kwinana
Report	R017351	**Stack ID**	GTG 100B
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 100B - Operating on Gas		240531

Stack Parameters		
Moisture content, %v/v	6	
Gas molecular weight, g/g mole	28.6 (wet)	29.3 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.51	
% Oxygen correction & Factor	15 %	1.19
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0815	
Temperature, °C	411	
Velocity at sampling plane, m/s	48	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	9200	
Volumetric flow rate (dry STP), m³/min	8600	
Mass flow rate (wet basis), kg/h	700000	

Gas Analyser Results	Average		
Sampling time	0815 - 0914		
		Corrected to	
	Concentration mg/m³	15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	35	41	5
Sulfur dioxide	<6	<7	<0.8
Carbon monoxide	140	160	20
	Concentration %v/v		
Carbon dioxide	3.1		
Oxygen	16		

3.2 Liquid Fuel

Date	25/07/2024	**Client**	AGL Kwinana
Report	R017351	**Stack ID**	GTG 100B
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Paul Cimbaly / Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 100B - Operating on Liquid Fuel - 53.8 MW		240715

Stack Parameters		
Moisture content, %v/v	5.6	
Gas molecular weight, g/g mole	28.7 (wet)	29.3 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.50	
% Oxygen correction & Factor	15 %	1.60
Gas Flow Parameters		
Temperature, °C	421	
Velocity at sampling plane, m/s	49	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	9200	
Volumetric flow rate (dry STP), m³/min	8700	
Mass flow rate (wet basis), kg/h	710000	

Gas Analyser Results	Average		
Sampling time	0815 - 0915		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	39	63	5.7
Sulfur dioxide	<6	<9	<0.8
Carbon monoxide	18	29	2.6
	Concentration %v/v		
Carbon dioxide	3		
Oxygen	17.2		

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				0656-0810			0815-0929		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	2.4	3.8	0.34	1.8	2.9	0.26	2.9	4.7	0.42
Isokinetic Sampling Parameters									
Sampling time, min				70			70		
Isokinetic rate, %				104			101		
Gravimetric analysis date (total particulate)				26-07-2024			26-07-2024		

4 Results - GTG 200A

4.1 Natural Gas

Date	26/07/2024	**Client**	AGL Kwinana
Report	R017351	**Stack ID**	GTG 200A
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 200A - Operating on Gas		*240531*

Stack Parameters		
Moisture content, %v/v	6	
Gas molecular weight, g/g mole	28.6 (wet)	29.3 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.54	
% Oxygen correction & Factor	15 %	1.15
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0646	
Temperature, °C	381	
Velocity at sampling plane, m/s	48	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	9600	
Volumetric flow rate (dry STP), m³/min	9000	
Mass flow rate (wet basis), kg/h	730000	

Gas Analyser Results	Average		
Sampling time	0815 - 0914		
		Corrected to	
	Concentration mg/m³	15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	36	41	5.4
Sulfur dioxide	<6	<7	<0.9
Carbon monoxide	190	220	28
	Concentration %v/v		
Carbon dioxide	3.1		
Oxygen	15.8		

4.2 Liquid Fuel

Date	25/07/2024	**Client**	AGL Kwinana
Report	R017351	**Stack ID**	GTG 200A
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Paul Cimbaly / Tim Blankley	**State**	WA
Process Conditions	GTG 200A - Operating on Liquid Fuel - 52 MW		240531

Stack Parameters		
Moisture content, %v/v	6.7	
Gas molecular weight, g/g mole	28.6 (wet)	29.3 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.50	
% Oxygen correction & Factor	15 %	1.33
Gas Flow Parameters		
Temperature, °C	422	
Velocity at sampling plane, m/s	51	
Volumetric flow rate, actual, m³/min	24000	
Volumetric flow rate (wet STP), m³/min	9500	
Volumetric flow rate (dry STP), m³/min	8900	
Mass flow rate (wet basis), kg/h	730000	

Gas Analyser Results	Average		
Sampling time	0700 - 0759		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	61	81	9
Sulfur dioxide	<6	<8	<0.8
Carbon monoxide	6.6	8.7	0.97
	Concentration %v/v		
Carbon dioxide	3.5		
Oxygen	16.5		

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				0656-0810			0815-0929		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	3.8	5	0.56	3	4	0.44	4.5	6	0.67
Isokinetic Sampling Parameters									
Sampling time, min				70			70		
Isokinetic rate, %				102			100		
Gravimetric analysis date (total particulate)					26-07-2024			26-07-2024	

5 Results - GTG 200B

5.1 Natural Gas

Date	26/07/2024	**Client**	AGL Kwinana
Report	R017351	**Stack ID**	GTG 200B
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Zach Marcus / Tim Blankley	**State**	WA
Process Conditions	GTG 200B - Operating on Gas		240531

Stack Parameters		
Moisture content, %v/v	6	
Gas molecular weight, g/g mole	28.6 (wet)	29.2 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.52	
% Oxygen correction & Factor	15 %	1.20
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0646	
Temperature, °C	404	
Velocity at sampling plane, m/s	48	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	9200	
Volumetric flow rate (dry STP), m³/min	8700	
Mass flow rate (wet basis), kg/h	710000	

Gas Analyser Results	Average		
Sampling time	0649 - 0749		
		Corrected to	
	Concentration mg/m³	15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	33	40	4.8
Sulfur dioxide	<6	<7	<0.8
Carbon monoxide	190	230	28
	Concentration %v/v		
Carbon dioxide	3		
Oxygen	16		

5.2 Liquid Fuel

Date	25/07/2024	**Client**	AGL Kwinana
Report	R017351	**Stack ID**	GTG 200B
Licence No.	L8471/2010/2	**Location**	Kwinana
Ektimo Staff	Paul Cimbaly / Tim Blankley	**State**	WA
Process Conditions	GTG 200B - Operating on Liquid Fuel - 52 MW		240531

Stack Parameters		
Moisture content, %v/v	7	
Gas molecular weight, g/g mole	28.6 (wet)	29.4 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.31 (dry)
Gas density at discharge conditions, kg/m³	0.50	
% Oxygen correction & Factor	15 %	1.22
Gas Flow Parameters		
Temperature, °C	420	
Velocity at sampling plane, m/s	47	
Volumetric flow rate, actual, m³/min	23000	
Volumetric flow rate (wet STP), m³/min	8800	
Volumetric flow rate (dry STP), m³/min	8200	
Mass flow rate (wet basis), kg/h	680000	

Gas Analyser Results	Average		
Sampling time	0820 - 0920		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Combustion Gases			
Nitrogen oxides (as NO_2)	56	68	7.7
Sulfur dioxide	<6	<7	<0.8
Carbon monoxide	15	18	2.1
	Concentration %v/v		
Carbon dioxide	3.8		
Oxygen	16.1		

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				0656-0810			0815-0929		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	2.7	3.2	0.36	1.6	1.9	0.21	3.7	4.6	0.51
Isokinetic Sampling Parameters									
Sampling time, min				70			70		
Isokinetic rate, %				103			100		
Gravimetric analysis date (total particulate)					26-07-2024			26-07-2024	

6 Sample Plane Compliance

6.1 GTG 100A

Sampling Plane Details	
Sampling plane dimensions	3300 x 2400 mm
Sampling plane area	7.92 m²
Sampling port size, number & depth	4" Flange (x4), 110 mm
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0.5 D
Upstream disturbance	Change in diameter 1.8 D
No. traverses & points sampled	4 28
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

6.2 GTG 100B

Sampling Plane Details	
Sampling plane dimensions	3300 x 2400 mm
Sampling plane area	7.92 m²
Sampling port size, number & depth	4" Flange (x4), 110 mm
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0.5 D
Upstream disturbance	Change in diameter 1.8 D
No. traverses & points sampled	4 28
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

6.3 GTG 200A

Sampling Plane Details	
Sampling plane dimensions	3300 x 2400 mm
Sampling plane area	7.92 m²
Sampling port size, number & depth	4" Flange (x4), 110 mm
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0.5 D
Upstream disturbance	Change in diameter 1.8 D
No. traverses & points sampled	4 28
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

6.4 GTG 200B

Sampling Plane Details	
Sampling plane dimensions	3300 x 2400 mm
Sampling plane area	7.92 m²
Sampling port size, number & depth	4" Flange (x4), 110 mm
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0.5 D
Upstream disturbance	Change in diameter 1.8 D
No. traverses & points sampled	4 28
Sample plane conformance to AS 4323.1	Non-conforming
The sampling plane is deemed to be non-conforming due to the following reasons:	
The downstream disturbance is <1D from the sampling plane	
The upstream disturbance is <2D from the sampling plane	

7 Plant Operating Conditions

See Western Energy Pty Ltd (Kwinana Swift Power Station) records for complete process conditions.

8 Test Methods

All sampling and analysis was performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	AS 4323.1	NA	NA	✓	NA
Flow rate, temperature & velocity	USEPA Method 2	USEPA Method 2	8%, 2%, 7%	NA	✓
Molecular weight	NA	USEPA Method 3	not specified	NA	✓
Carbon dioxide & oxygen	USEPA Method 3A	USEPA Method 3A	13%	✓	✓
Carbon monoxide	USEPA Method 10	USEPA Method 10	12%	✓	✓
Nitrogen oxides	USEPA Method 7E	USEPA Method 7E	12%	✓	✓
Sulfur dioxide	USEPA Method 6C	USEPA Method 6C	12%	✓	✓
Total particulate matter	USEPA Method 17	USEPA Method 17	7%	✓	✓††

110624

* Uncertainties cited in this table are estimated using typical values and are calculated at the 95% confidence level (coverage factor = 2).

†† Gravimetric analysis conducted at the Ektimo WA laboratory.

9 Quality Assurance/Quality Control Information

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director.

NATA is a member of APAC (Asia Pacific Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through mutual recognition arrangements with these organisations, NATA accreditation is recognised worldwide.

Unless specifically noted, all samples were collected and handled in accordance with Ektimo's QA/QC standards.

10 Definitions

The following symbols and abbreviations may be used in this test report:

% v/v	Volume to volume ratio
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
APHA	American Public Health Association, Standard Methods for the Examination of Water and Waste Water.
AS	Australian Standard
BaP-TEQ	Benzo(a)pyrene toxic equivalents
BSP	British standard pipe
CEM/CEMS	Continuous emission monitoring/Continuous emission monitoring system
CTM	Conditional test method
D	Duct diameter or equivalent duct diameter for rectangular ducts
D_{50}	'Cut size' of a cyclone is defined as the particle diameter at which the cyclone achieves a 50% collection efficiency i.e. half of the particles are retained by the cyclone and half pass through it. The D_{50} method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D_{50} of that cyclone and less than the D_{50} of the preceding cyclone.
DECC	Department of Environment & Climate Change (NSW)
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
DWER	Department of Water and Environmental Regulation (WA)
DEHP	Department of Environment and Heritage Protection (QLD)
EPA	Environment Protection Authority
FTIR	Fourier transform infra-red
ISC	Intersociety Committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
ITE	Individual threshold estimate
I-TEQ	International toxic equivalents
Lower bound	When an analyte is not present above the detection limit, the result is assumed to be equal to zero.
Medium bound	When an analyte is not present above the detection limit, the result is assumed to be equal to half of the detection limit.
NA	Not applicable
NATA	National Association of Testing Authorities
NIOSH	National Institute of Occupational Safety and Health
NT	Not tested or results not required
OM	Other approved method
OU	Odour unit. One OU is that concentration of odorant(s) at standard conditions that elicits a physiological response from a panel equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
PM_{10}	Particulate matter having an equivalent aerodynamic diameter less than or equal to 10 microns (µm).
$PM_{2.5}$	Particulate matter having an equivalent aerodynamic diameter less than or equal to 2.5 microns (µm).
PSA	Particle size analysis. PSA provides a distribution of geometric diameters, for a given sample, determined using laser diffraction.
RATA	Relative accuracy test audit
Semi-quantified VOCs	Unknown VOCs (those for which an analytical standard is not available), are identified by matching the mass spectrum of the chromatographic peak to the NIST Standard Reference Database (version 14.0), with a match quality exceeding 70%. An estimated concentration is determined by matching the area of the peak with the nearest suitable compound in the analytical calibration standard mixture.
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0 °C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa.
TM	Test method
TOC	Total organic carbon. This is the sum of all compounds of carbon which contain at least one carbon-to-carbon bond, plus methane and its derivatives.
USEPA	United States Environmental Protection Agency
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
Velocity difference	The percentage difference between the average of initial flows and after flows.
Vic EPA	Victorian Environment Protection Authority
VOC	Volatile organic compound. A carbon-based chemical compound with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the given conditions of use. VOCs may contain oxygen, nitrogen and other elements. VOCs do not include carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
WHO05-TEQ	World Health Organisation toxic equivalents
XRD	X-ray diffractometry
Upper bound	When an analyte is not present above the detection limit, the result is assumed to be equal to the detection limit.
95% confidence interval	Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.

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ATTACHMENT 8A
AGL OFFENCES HISTORY

14 March 2025

General Comment

AGL Energy Limited (**AGL**) is a large Australian publicly listed company. It holds a number of licences and approvals issued by regulators and is subject to various laws and regulations. In preparing this table AGL has undertaken a due diligence exercise to identify the instances where AGL and/or its subsidiaries have committed serious contraventions of its licences/approvals or of laws/regulations which have resulted in AGL and/or its subsidiaries being issued with a penalty infringement notice or being subject to penalties (imposed by regulators or the courts) for the last 10 years.

Without limitation, these disclosures do not include the instances where AGL and/or its subsidiaries have been issued with:

- Notices of caution;
- WorkSafe Improvement Notices;
- WorkSafe Prohibition Notices; and
- Stop-work Orders,

where AGL has not been convicted of an offence, has not been issued with a penalty or has not entered into an enforceable undertaking. In preparing the table below, AGL has used its best endeavours to ensure that it is accurate and complete having regard to the information available. However, AGL does not hold full records of incidents dating back the last 10 years, accordingly, AGL cannot guarantee that the disclosures provided are complete.

Disclosure
On 23 November 2022, SafeWork NSW commenced criminal proceedings against AGL Macquarie Pty Limited in the District Court of NSW in relation to the December 2020 Liddell Unit 3 Transformer Incident. The proceedings were based on the failure to ensure so far as is reasonably practicable the health and safety of workers and that the failure to comply with that duty exposed an employee to risk of death or serious injury (contrary to sections 19(1) and 32 of the *Work Health and Safety Act 2011*).
On 21 February 2023, an AGL subsidiary received a Penalty Infringement Notice from the Department of Environment and Science for $14,375 relating to gas leak from a subsurface petroleum pipeline at the Silver Springs Gas field.

Disclosure
On 8 February 2023, the NSW Environment Protection Authority (**EPA**) issued AGL Macquarie Pty Limited with a Penalty Infringement Notice (**PIN**) for $15,000 for the following breaches: • the pollution of waters, which is an offence under section 120 of the Environment Protection Act (NSW); and • failure to operate the seepage collection and return system in a proper and efficient manner, in contravention of Environment Protection Licence condition 2.1(b). This related to an incident between 25 November 2022 and 30 November 2022, when the Lake Liddell seepage system which transfers saline water from the Lake Liddell seepage pits back into Lake Liddell overflowed, causing saline water to flow into Bayswater Creek at approximately 40 litres per minute for the duration of the event. AGL Macquarie verbally notified the EPA of the incident on 30 November 2022. In addition to the PIN and in response to a delay in providing verbal notification of the event to the EPA, the EPA issued AGLM with a written warning, reminding AGLM of the requirement to report pollution incidents in a timely manner. AGLM is required to notify the EPA immediately after becoming aware of a pollution incident, and accordingly should have informed the EPA of the incident on or around 25 November 2022.
On 23 November 2018, a "friction event" occurred on a conveyor belt at the Loy Yang mine. No one was injured, but smoke was detected near the site of the event. AGL determined that the event did not meet the notification requirements under the Occupational Health and Safety Act 2004 (VIC) (OHS Act). WorkSafe Victoria subsequently became aware of the matter (in early 2019) and commenced a formal investigation in early 2020. On 11 January 2021, WorkSafe commenced proceedings in the Magistrate's Court and charged AGL Loy Yang Pty Ltd with six offences under the OHS Act. Magistrate Tony Burns ultimately determined that no conviction be recorded against AGL Loy Yang. His Honour ordered AGL Loy Yang to pay a fine totalling $55,000 and further ordered AGL Loy Yang to pay WorkSafe's costs totalling $9,124.
On 13 October 2021 the NSW EPA issued AGL Macquarie Pty Limited with a Penalty Infringement Notice for $15,000 for an alleged offence of failure to comply with its environmental protection licence condition that sets out particulate matter limits under the *Protection of the Environment Operations Act 1997* (NSW).

Disclosure
In June 2021, the NSW EPA issued AGL Macquarie Pty Limited with a penalty infringement notice in the amount of $15,000 for an alleged pollution of waters offence under the *Protection of the Environment Operations Act 1997* (NSW). This related to a leak that occurred in Pipeline A of the Ravensworth Pipeline, resulting in the release of approximately 13.9m^3 of fly ash slurry (slurry volume minus flush water) into Bayswater Creek.
On 26 March 2021, the NSW EPA issued AGL Macquarie Pty Limited with a Penalty Notice (for $15,000) pursuant to section 64 of the *Protection of the Environment Operations Act 1997* (NSW) for contravention of licence conditions relating to air concentration limits for solid particulates in respect of the Liddell Power Station between 31 August 2020 and 1 September 2020. AGL Macquarie was also issued with an Official Caution of the same section of the POEO Act in relation to similar issue which occurred on 15 September 2020.
On 2 September 2020, AGL Macquarie Pty Ltd (a subsidiary of AGL) entered into an enforceable undertaking with the NSW Environment Protection Authority in relation to the release of slurry (consisting of fly ash suspended in water) onto the ground (due to a hole in a pipeline) which entered into a depression within a dry bed of a creek. This enforceable undertaking requirements included: (a) further testing and rectification works for the pipeline; (b) local environmental projects to be determined by the Environment Protection Authority; (c) training; and (d) payment of the NSW Environment Protection Authority's incurred costs and issuance of print media.
On 3 July 2020, the Environment Protection Authority issued AGL Macquarie Pty Ltd (a subsidiary of AGL) with a penalty infringement notice for an alleged failure to comply with a licence condition which requires the entity to minimise dust emitting from its premises.
On 17 December 2019, AGL Macquarie Pty Limited entered into an enforceable undertaking with the NSW Environment Protection Authority in relation to non-compliances with the Coal Ash Order 2014 – for example, failing to test coal ash at the required intervals and by an accredited laboratory. The enforceable undertaking requirements included: (a) funding for environmental projects at the local council; (b) funding of the Environment Protection Authority's investigation costs; (c) payment of the Environment Protection Authority's print media costs; (d) Coal Ash Order awareness training; and (e) environmental compliance training.
On 26 August 2019, a penalty infringement notice (for AUD$15,000) was issued by the NSW Environment Protection Authority to AGL Macquarie Pty Limited for water pollution under section 120 of the Protection of the Environment Operations Act 1997. The notice related to lime sludge slurry overflow from inspection pits.
On 24 January 2019, the NSW Environment Protection Authority issued two penalty infringement notices to AGL Macquarie Pty Limited for alleged failures to comply with conditions of its environmental protection licence. The penalty infringement notices were issued in respect of an incident relating to the overflow and discharge of diesel from a diesel day-tank at the Bayswater Power Station. Each penalty infringement notice was for an AUD$15,000 fine.

Disclosure
On 14 May 2018, the Environment Protection Authority issued AGL Macquarie Pty Limited with a Penalty Infringement Notice (for AUD$15,000) in respect of the discharge of slurry from the Liddell Ash Dam Flyash Pipeline Discharge Pit.
On 4 May 2018, the Environment Protection Authority issued AGL Upstream Investments Pty Limited two penalty infringement notices (for AUD$5,000 each) for the following matters: • failure to comply with condition 9(b) of Petroleum Production Lease (PPL) 4 in relation to the coal seam gas well, Elizabeth Macarthur 4 drilled as part of the Camden Gas Project; and • failure to comply with condition 9(b) of Petroleum Production Lease 4 in relation to the coal seam gas well. In both cases, the relevant offence was failure to run cement bond logs on the relevant wells.
On 16 April 2017, AGL Macquarie Pty Limited was charged by SafeWork NSW with a category 2 offence under the Work Health and Safety Act 2011 (NSW), namely a failure to comply with the primary duty of care imposed by section 19 of that Act, which allegedly exposed individuals to a risk of death or serious injury. The prosecution arose from an incident on 12 November 2015 in which two AGL employees suffered burns due to an arc flash that occurred during maintenance work on a transformer. AGL entered into an enforceable undertaking with SafeWork NSW on 16 April 2018 (**EU**). As a result, SafeWork withdrew its proceedings against AGL.
On 3 May 2016, NSW Department of Planning & Environment issued a penalty improvement notice of AUD$3,000 to AGL in respect of a failure to upgrade a road relating to the Broken Hill Solar Farm.
On 4 March 2016, the Environment Protection Authority fined AGL Macquarie Pty Limited AUD$15,000 in respect of discharge of fly ash into Bayswater creek resulting from the partial failure of the pipeline used to transfer fly ash.
On 16 December 2015, AGL Macquarie Pty Limited received two AUD$15,000 Penalty Notices from the NSW Environment Protection Authority in relation to the release of approximately 6,000 litres of sulphuric acid solution into Tinkers Creek via an onsite stormwater drain on 24 November 2015, resulting in pH levels below the threshold set out in the environment protection licence. The penalty notices were issued for contravention of environment protection licence conditions and pollution of water under section 120 of the Protection of the Environment Operations Act.

Disclosure
In 2015, AGL announced it had been fined AUD$15,000 by the Environment Protection Authority (**EPA**) for breaching a condition of its licence, following an incident in 2014 at the Rosalind Park Gas Plant. A pressure safety valve released natural gas from a well head near Spring Farm, Camden. This well had been inactive due to maintenance activities at the gas plant and when coming back online the safety valve activated due to a build-up of pressure.
On 7 December 2015, the NSW Department of Planning & Environment filed 11 charges in the NSW Land and Environment Court against AGL Energy Limited (10 charges) and AGL Upstream Infrastructure Pty Limited (a subsidiary of AGL) (1 charge) for failing to disclose all reportable political donations, and in some cases, failing to do so within the required timeframe. Since 2008, any entity which lodges a planning application with the Department must lodge a political donations statement showing reportable political donations. On 12 January 2017, the NSW Land and Environment Court recorded convictions against both AGL entities and imposed a total penalty of AUD$124,000 and costs of AUD$150,000. Despite the convictions, no adverse findings were made against AGL.
On 4 August 2015, AGL Macquarie Pty Limited received a AUD$15,000 Penalty Notice from the NSW Environment Protection Authority (NSW EPA) in relation to ammoniated water entering Tinkers Creek via Discharge Point 7 on 9 April 2015 which resulted in elevated pH levels exceeding the threshold set out in the environment protection licence.
On 5 March 2015, the NSW Environment Protection Authority issued a penalty infringement notice (for AUD$15,000) to AGL Upstream Investments Pty Limited for breach of a condition of its licence relating to the Rosalind Park Gas Plant – the relevant condition requires all plant and equipment be maintained and operated in a proper and efficient manner. On 31 August 2014, a pressure safety valve released natural gas from a well head near Spring Farm, Camden. The well had been inactive due to maintenance activities at the gas plant and when coming back online the safety valve activated due to a build-up of pressure.