Electricity

Licence

Electricity Generation Licence

Hornsdale Power Reserve Pty Ltd

ABN 79 619 311 983

Issued by the Essential Services Commission of South Australia on 13 October 2017.

Variation history

Amendment number	Variation date	Reason

1 Definitions and interpretation

1.1 Words appearing in bold like **this** are defined in Part 1 of Schedule 1.

1.2 Clauses 1 to 20 (inclusive) in this licence must be interpreted in accordance with the rules set out in Part 2 of Schedule 1.

1.3 The conditions set out in Schedule 2 must be interpreted in accordance with:

(a) the rules set out in Part 2 of Schedule 1; and

(b) clause 1 of Schedule 2.

2 Grant of licence

2.1 The **licensee** is licensed under Part 3 of the **Act** to operate the **electricity generating plant** specified in Part A of the Annexure, at the location specified in Part B of the Annexure, subject to the conditions set out in:

(a) clause 3 to 20 (inclusive) of this licence; and

(b) schedule 2 of this licence.

3 Term

3.1 This licence commences on the date it is issued and continues until it is:

(a) surrendered by the **licensee** under section 29 of the **Act**; or

(b) suspended or cancelled by the **Commission** under section 37 of the **Act**.

4 Fees

4.1 The **licensee** must pay the applicable licence fees in accordance with section 20 of the **Act**.

5 Access

5.1 The **licensee** must:

(a) in accordance with, and to the extent required by, the **Electricity Transmission Code**, grant to a **network service provider**, rights to use, or have access to, those parts of the **licensee's electricity generating plant** that are interconnected or interface with the **network service provider's** assets for the purpose of ensuring the proper integrated operation of the South Australian power system and the proper conduct of the operations authorised by the **network service provider's transmission licence** or **distribution licence**; and

(b) in the absence of agreement as to the terms on which such rights are to be granted, comply with a determination of the **Commission** as to those terms.

6 Dispute resolution

6.1 A dispute relating to the granting of rights to use or have access to the interconnecting assets of the **licensee's electricity generating plant** referred to in clause 5 shall be resolved in accordance with any applicable **industry code** developed by the **Commission** for the resolution of disputes.

6.2 Clause 6.1 does not apply to the extent the dispute is subject to resolution in accordance with or under the **National Electricity Rules**.

7 Compliance with Codes

7.1 The **licensee** must:

(a) comply with all applicable provisions of the **Electricity Transmission Code**, the **Electricity Distribution Code** and the **Electricity Metering Code**;

(b) comply with all applicable provisions of any other **industry code** or **rule** made by the **Commission** from time to time; and

(c) notify the **Commission** if it commits a material breach of the **Electricity Transmission Code**, the **Electricity Distribution Code** or the **Electricity Metering Code** within 3 days after becoming aware of that breach.

8 Safety, reliability, maintenance and technical management plan

8.1 The **licensee** must:

(a) within 12 months of the commencement of this licence, or within 3 months of the date (as advised by the **licensee**) of final commissioning and plant acceptance, whichever is the later, prepare a safety, reliability, maintenance and technical management plan dealing with matters prescribed by regulation and submit the plan to the **Commission** for approval;

(b) annually review, and if necessary update, the plan to ensure its efficient operation, and submit the updated plan to the **Commission** for approval;

(c) comply with the plan prepared in accordance with clause 8.1(a) and as updated from time to time in accordance with clause 8.1(b);

(d) not amend the plan without the approval of the **Commission**; and

(e) undertake annual audits of its compliance with its obligations under the plan and report the results to the **Technical Regulator**, in a manner approved by the **Technical Regulator**.

9 National electricity market

9.1 Subject to clause 9.2, **licensee** must hold and comply with the conditions of any registration required under the **National Electricity Rules** granted by **AEMO** (or the person responsible for the granting of such registrations under the **National Electricity Law** or the **National Electricity**

Rules) at all times that such registration is required for the operations authorised by this licence.

9.2 In respect of the **electricity generating plant** which the **licensee** is authorised to operate under this licence, the **licensee**:

(a) must obtain registration as a semi-scheduled generator under the **National Electricity Rules**; and

(b) must not apply for any **generating unit** within that **electricity generating plant** to be classified as a non-scheduled **generating unit** under the **National Electricity Rules**.

10 Information to AEMO

10.1 The **licensee** must, following a request from **AEMO**, provide to **AEMO** such documents and information as **AEMO** may reasonably require for the performance of its functions.

11 System controller

11.1 The **licensee** must comply with any directions given to it by the **System Controller**.

12 Information to the Commission

12.1 The **licensee** must, from time to time, provide to the **Commission**, in a manner and form determined by the **Commission**:

(a) details of the **licensee's** financial, technical and other capacity to continue the operations authorised by this licence; and

(b) such other information as the Commission may require from time to time.

12.2 The **licensee** must notify the **Commission** of any changes to its **officers,** and (if applicable) major shareholders, within 30 days of that change.

13 Operational and compliance audits

13.1 The **licensee** must undertake periodic audits of the operations authorised by this licence and of its compliance with its obligations under this licence and any applicable **industry codes** in accordance with the requirements of any applicable guideline issued by the **Commission** for this purpose.

13.2 The **licensee** must also conduct any further audits at a frequency and in manner approved by the **Commission**.

13.3 The results of audits conducted under this clause must be reported to the **Commission** in a manner approved by the **Commission**.

13.4 The **Commission** may require the licensee to use an independent expert approved by the **Commission** to conduct audits under this clause.

13.5 The **Commission** may require the costs of using an independent expert approved by the **Commission** to conduct audits under this clause to be met by the **licensee**.

14 Confidentiality

14.1 The **licensee** must, unless otherwise required by law, this licence, an **industry code**, or the **National Electricity Rules**, comply with any **rules** made by the **Commission** from time to time relating to the use of information acquired by the **licensee** in the course of operating the business authorised by this licence.

15 Community service

15.1 The **licensee** must comply with the requirements of any scheme approved and funded by the Minister for the provision by the State of customer concessions or the performance of community service obligations by the **electricity entities**.

16 Compatibility

16.1 The **licensee** must not do anything to its **electricity generating plant** affecting the compatibility of its **electricity generating plant** with any **distribution network** or **transmission network** so as to prejudice public safety or the security of the power system of which the **electricity generating plant** forms a part.

17 Insurance

17.1 The **licensee** must undertake and maintain during the term of this licence insurance against liability for causing bush fires.

17.2 The **licensee** must provide to the **Commission** a certificate of the insurer or the insurance broker by whom the insurance was arranged (in a form acceptable to the **Commission**) to the effect that such insurance is adequate and appropriate, given the nature of the **licensee's** activities conducted under this licence and the risks associated with those activities.

18 Compliance with laws

18.1 The **licensee** must comply with all applicable laws including, but not limited to, any technical or safety requirements or standards contained in regulations made under the **Act**.

19 Variation

19.1 This licence may only be varied in accordance with section 27 of the **Act.**

20 Transfer

20.1 This licence may only be transferred in accordance with section 28 of the **Act**.

This licence was issued by the **Commission** on 13 October 2017.

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Essential Services Commission
COMMON SEAL

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Commissioner

13 October 2017

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Date

Schedule 1: Definitions and Interpretation

Part 1 – Definitions

In clauses 1 to 20 (inclusive) of this licence:

Act means the Electricity Act 1996 (SA).

AEMO means the Australian Energy Market Operator Ltd (ACN 072 010 327).

business day means a day on which banks are open for general banking business in Adelaide, excluding a Saturday or Sunday.

Commission means the Essential Services Commission established under the **ESC Act**.

distribution licence means a licence to operate a **distribution network** granted under Part 3 of the **Act**.

distribution network has the meaning given to that term under the **Act**.

Electricity Distribution Code means the code of that name made by the **Commission** under section 28 of the **ESC Act** which regulates connections to a **distribution network** and the supply of electricity by distributors.

electricity entity means a person who has been granted a licence under Part 3 of the **Act** to carry on operations in the electricity supply industry.

electricity generating plant includes all **generating units** and all other equipment involved in generating electrical energy authorised to be operated by the **licensee** under this licence.

Electricity Metering Code means the code of that name made by the **Commission** under section 28 of the **ESC Act** which regulates the installation, maintenance and testing of meters.

Electricity Transmission Code means the code of that name made by the **Commission** under section 28 of the **ESC Act**.

ESC Act means the Essential Services Commission Act 2002 (SA).

generator means a holder of a licence to generate electricity granted under Part 3 of the Act.

generating unit has the same meaning given to the term under the **National Electricity Rules**

industry code means any code made by the **Commission** under section 28 of the **ESC Act** from time to time.

licensee means Hornsdale Power Reserve Pty Ltd (ABN 79 619 311 983).

National Electricity Rules has the meaning given to that term in the **National Electricity Law**.

National Electricity Law means the National Electricity Law referred to in the National Electricity (South Australia) Act 1996 (SA).

network service provider means the holder of a **distribution licence** or a **transmission licence** (as the case may be) issued by the **Commission** under Part 3 of the **Act**.

rule means any rule issued by the **Commission** under section 28 of the **ESC Act**.

System Controller means the person licensed under Part 3 of the **Act** to exercise system control over a power system.

Technical Regulator means the person holding the office of Technical Regulator under Part 2 of the **Act**.

transmission licence means a licence to operate a **transmission network** granted under Part 3 of the **Act**.

transmission network has the meaning given to that term under the **Act**.

Part 2 - Interpretation

In this licence, unless the context otherwise requires:

(a) headings are for convenience only and do not affect the interpretation of this licence;

(b) words importing the singular include the plural and vice versa;

(c) words importing a gender include any gender;

(d) an expression importing a natural person includes any company, partnership, trust, joint venture, association, corporation or other body corporate and any governmental agency;

(e) a reference to any statute, regulation, proclamation, order in council, ordinance or bylaw includes all statutes, regulations, proclamations, orders in council, ordinances or by-laws varying, consolidating, re-enacting, extending or replacing them and a reference to a statute includes all regulations, proclamations, orders in council, ordinances, by-laws and determinations issued under that statute;

(f) a reference to a person includes that person's executors, administrators, successors, substitutes (including, without limitation, persons taking by novation) and permitted assigns;

(g) a reference to a document or a provision of a document includes an amendment or supplement to, or replacement or novation of, that document or that provision of that document;

(h) an event which is required under this licence to occur on or by a stipulated day which is not a **business day** may occur on or by the next **business day**.

SCHEDULE 2

Interpretation of this schedule

1. Interpretation

1.1 Terms used in this schedule and also in the National Electricity Rules (**NER**) have the same meaning in this schedule as they have in those rules (unless otherwise specified or unless the context otherwise requires).

1.2 For the purposes of this schedule, the term:

licensee means Hornsdale Power Reserve Pty Ltd (ABN 79 619 311 983).

continuous uninterrupted operation means that, for voltage disturbances within the continuous operating range (that is, connection point voltage fluctuating within 90 percent and 110 percent of normal voltage), active power must be maintained (unless there has been a change in the intermittent power source) and reactive power must be managed to meet voltage control requirements.

Disturbance ride through capability

2. Disturbance ride through capability - general requirements

2.1 The generating system of the **licensee** must meet the following requirements:

(a) The low voltage ride-through activation threshold (**LVRT**), as measured at the low voltage (**LV**) terminals of the generating units or dynamic reactive power plant (as applicable) must not be less than 85 percent of nominal voltage.

(b) The generating system must maintain continuous uninterrupted operation for voltage disturbances as specified in clauses 3, 7 and 8 of this schedule.

(c) Where LVRT and high voltage ride-through (**HVRT**) requirements in the NER are specified in respect of the generating system's connection point, the withstand capability of individual generating units is to be determined at the LV side of the generating unit's transformer. All individual generating units must remain connected for connection point voltages within the LVRT/HVRT withstand requirements, irrespective of the generating system's transformer tap position.

3. Disturbance ride-through (reactive current injection)

3.1 The generating system of the **licensee** must supply additional capacitive reactive current (reactive current injection) of up to 4 percent of the maximum continuous current of the generating system (in the absence of a disturbance) for each 1 percent reduction of connection point voltage below 90 percent of normal voltage, as shown in Table 1. This requirement applies at the LV terminals of the generating units and dynamic reactive support plant (as applicable) for power system disturbances resulting in a voltage reduction of up to 100 percent of normal voltage at the connection point.

3.2 The generating system of the **licensee** must supply additional inductive reactive current (reactive current absorption) of up to 6 percent of the maximum continuous current of the generating system (in the absence of a disturbance) for each 1 percent increase in connection point voltage above 110 percent of the normal voltage, as shown in Table 1. This requirement applies at the LV terminals of the generating units and dynamic reactive support plant (as applicable).

3.3 The reactive current injection must be maintained until the connection point voltage returns to within the range of 90 percent to 110 percent of normal voltage.

Table 1: Reactive current injection requirements

Reactive current response	Current injection gain (percent)	Current absorption gain (percent)	Minimum amount of contribution as percentage of rated current	Speed of contribution	
				Rise time (millisecond)	Settling time (millisecond)
Synchronous	4	6	250	30	N/A
Non-synchronous	4	6	100	30	60

3.4 The amount of reactive current injection required may be calculated using phase-to-phase, phase-to-ground, or sequence components of voltage.

3.5 The generating system of the **licensee** must comply with the following response characteristics for reactive current injection:

(a) A rise time no greater than 30 milliseconds and a settling time no greater than 60 milliseconds applies to reactive current injection requirements.

(b) The reactive current injection requirements described above apply for all pre-disturbance reactive power control modes (voltage control, power factor control and reactive power control).

(c) The reactive current response must be adequately damped as defined in the NER.

(d) Upon occurrence of a fault, reactive power consumption must not exceed 5 percent of maximum continuous rated current of the generating system and must be limited to the rise time duration set out in Table 1.

(e) The post-fault reactive power contribution of the generating system must be sufficient to ensure that the connection point voltage is within the following ranges for continuous uninterrupted operation:

(i) voltages over 110 percent for the durations permitted under NER clause S5.1a.4;

(ii) 90 percent to 110 percent of normal voltage continuously;

(iii) 80 percent to 90 percent of normal voltage for a period of at least 10 seconds; and

(iv) 70 percent to 80 percent of normal voltage for a period of at least 2 seconds.

4. Disturbance ride through (active power injection requirements)

4.1 The generating system of the **licensee** must be capable of restoring active power to at least 95 percent of the level existing just prior to a fault within 250 milliseconds after disconnection of the faulted element.

4.2 When the generating system of the **licensee** is supplying active power prior to a fault, the transient active power consumption of the generating system must not, upon the occurrence of a fault, exceed one power frequency cycle and must not exceed 5 percent of the maximum continuous rated current of the generating system.

5. Multiple low voltage disturbance ride-through

5.1 The generating system of the **licensee**, including, but not limited to, each of its generating units and dynamic reactive power support plant, must be capable of withstanding both of the following within a five minute interval:

(a) Any combination of voltage disturbances causing the voltage at the respective low voltage (**LV**) terminals of the equipment to drop below 85 percent of the nominal voltage for a total duration of 1,500 milliseconds regardless of disturbance type, duration, and residual voltage at the generating unit's terminals. The total number of voltage disturbances for which successful ride-through is required is limited to 15. Each fault can be a solid fault resulting in 100 percent voltage drop at the connection point with duration not exceeding the longest time expected to be taken for the breaker fail protection system to clear the fault, as set out in Table S5.1a.2 of the NER.

(b) A single worst-case long-duration shallow voltage disturbance, causing the voltage at the connection point to drop to 70 - 80 percent of the normal voltage for a total duration of 2,000 milliseconds.

5.2 Subject to compliance with the requirements in clause 5.1, the generating system of the **licensee**, including but not limited to, each of its generating units and dynamic reactive power support plant, is not required to withstand any additional voltage variation exceeding ±10 percent of nominal voltage experienced at the respective LV terminals within 30 minutes from the commencement of the first variation.

6. Disturbance ride-through (high voltage disturbance ride-through)

6.1 The generating system of the **licensee** must have a level of over-voltage withstand capability consistent with the levels shown in Table 2.

6.2 The generating system of the **licensee** must maintain continuous uninterrupted operation for temporary over voltage durations as specified in Table 2.

Table 2: Required over voltage withstand capability

Temporary overvoltage percent of normal voltage)	110–115	>115–120	>120–125	>125–130	>130–135
Duration(s)	1,200	20	2	0.2	0.02

7. Disturbance ride-through (partial load rejection)

7.1 The generating system of the **licensee** must be capable of continuous uninterrupted operation during and following a power system load reduction of 30 percent from its pre-disturbance level or equivalent impact from separation of part of the power system in less than 10 seconds, provided that the loading level remains above minimum load.

8. Disturbance ride-through (frequency disturbance ride-through)

8.1 The generating system of the **licensee** must be capable of continuous uninterrupted operation for any combination of the following rates of change of frequency:

(a) ±4 Hz/s for 250 milliseconds; and

(b) ±3 Hz/s for 1 second, until such time as power system frequency breaches the extreme frequency excursion tolerance limits.

9. Disturbance ride-through (voltage phase angle shift)

9.1 The generating system of the **licensee** must not include any vector shift or similar relay/protective function acting upon voltage phase angle which might operate for phase angle changes less than 20 degrees.

Voltage control capability

10. Voltage control capability

10.1 The generating system of the **licensee** must be capable of being controlled by a fast-acting, continuously variable, voltage control system which must be able to receive a local and remote voltage set point.

10.2 The generating system of the **licensee** must be capable of operating at either a set reactive power level or a set power factor, which must be able to be set locally or remotely at any time.

10.3 The voltage, power factor and reactive power control mode of the generating system of the **licensee** must be capable of:

(a) being overridden by the disturbance ride through requirements specified in clauses 2 to 9 of this schedule (inclusive) during power system voltage disturbances; and

(b) automatically reverting to power factor or reactive power mode when the disturbance has ceased.

System strength

11. System strength

11.1 Individual components of plant within the generating system of the **licensee**, which includes but is not limited to generating units and dynamic reactive power plant, must be capable of operating down to the following levels at the high voltage terminals in relation to each component:

(a) minimum short circuit ratio of 1.5, and

(b) minimum positive sequence X/R ratio of 2.

Active power control capability

12. Active power control capability

12.1 The generating system of the **licensee** must be capable of automatically providing a proportional increase or decrease in active power output, in response to falling and rising power system frequency respectively.

12.2 To comply with clause 12.1:

(a) An active power response to changing power system frequency must be provided with no delay, beyond that required for stable operation, or inherent in the plant controls, once frequency leaves the deadband.

(b) The steady state droop setting of the active power response must be adjustable in the range 1 percent to 10 percent.

(c) The frequency dead-band for the active power response must be adjustable in the range from 0 to +/- 1.0 Hz.

12.3 The generating system of the **licensee** must be capable of sustaining a response to abnormal frequency conditions for at least 10 minutes, to the battery system's state of charge.

12.4 The generating system of the **licensee** must be capable of applying different deadband and droop settings in response to rising and falling frequency.

13. Active power control capability (automatic generator control capability)

13.1 The generating system of **licensee** must have active power control capabilities that allow it to participate in existing national electricity market arrangements requiring automatic generation control (**AGC**).

13.2 At a minimum, the AGC must have the capability to:

(a) receive and respond to a remotely determined active power control setpoint, updated at a rate of every four seconds, transmitted to the generating system, and

(b) provide the following information to AEMO, upon a request from AEMO under NER clauses S5.2.6.1 or 3.8.2:

(i) actual active power output;

(ii) maximum raise limit;

(iii) minimum lower limit;

(iv) maximum raise ramp rate; and

(v) maximum lower ramp rate.

14. Active power control capability (rate of change of active power)

14.1 The generating system of the **licensee** must be capable of limiting the rate of change of active power, both upwards and downwards. The generating system is not required to comply with a limit on the rate of reduction of active power where the reduction in active power is caused by energy resource availability for intermittent generating systems.

14.2 The generating system of the **licensee** must be capable of implementing different active power rate limits for operation in the normal operating frequency band and for contingency events.

14.3 The generating system of the **licensee** must be capable of setting a ramp rate limit with accuracy of within 10 percent.

15. Active power control capability

15.1 The generating system of the **licensee** must have the capability to provide real-time information about its active power control settings to AEMO, including mode of operation, deadband and droop parameters and any other active power control setting that may change during real-time operation.

System restoration

16. System restoration

16.1 Where sufficient minimum fault level is available from online synchronous machines, the generating system of the **licensee** must have the following capability in the event of a black system:

(a) the generating system must be capable of operation with auxiliary loads only for 180 minutes while system load is being restored, and

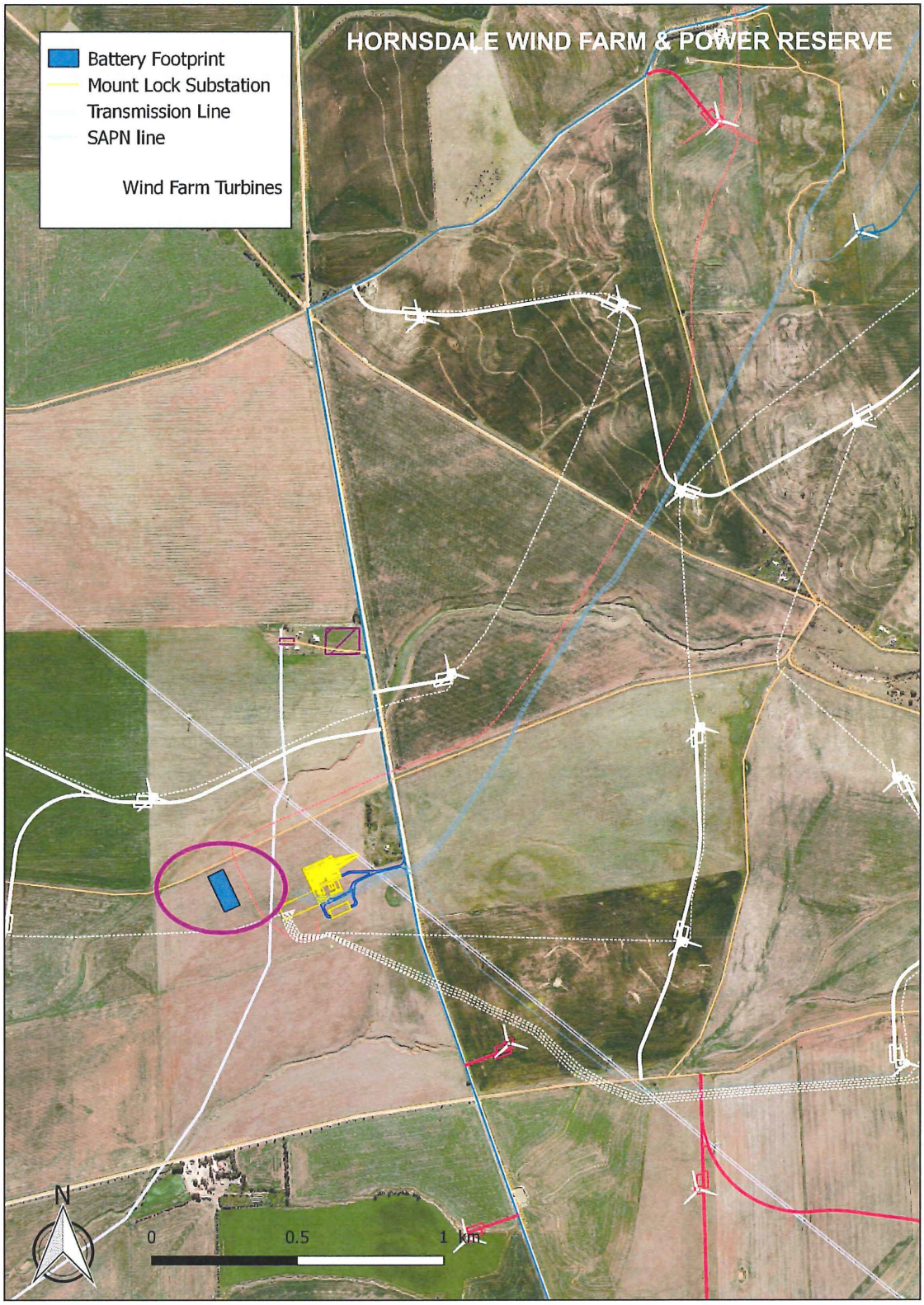
(b) the generating system, including, but not limited to, each of its generating units and dynamic reactive power plant (as applicable) must have the capability to provide steady-state and dynamic reactive power when operating with auxiliary loads only for 180 minutes while system load is being restored.

ANNEXURE

Part A –Electricity generating plant

A series of Tesla batteries with a total combined maximum output capacity of 100 MW.

Part B – Location



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