

Service Envelope Agreement

APA GasNet Australia (Operations) Pty Ltd

APA GasNet Australia (NSW) Pty Ltd

Australian Energy Market Operator Limited

(Restated as at December 2011)

Service Envelope Agreement

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Service Envelope Agreement

Details

Interpretation

Parties		APA GasNet, APA GasNet (NSW) and AEMO
APA GasNet	Name	APA GasNet Australia (Operations) Pty Ltd
	ACN	083 009 278
	Address	Level 19, 580 George St, Sydney (APA GasNet)
	Telephone	(02) 9693 0000
	Fax	(02) 9693 0093
	Attention	The Operations Manager, 180 Greens Road, Dandenong, Victoria (Fax (03) 9797 5222)
	Nominated Representative	The Company Secretary, APA Group

APA GasNet (NSW)	Name	APA GasNet Australia (NSW) Pty Ltd
	ACN	079 136 413
	Address	Level 19, 580 George St, Sydney (APA GasNet NSW)
	Telephone	(02) 9693 0000
	Fax	(02) 9693 0093
	Attention	The Operations Manager, 180 Greens Road, Dandenong, Victoria (Fax (03) 9797 5222)
	Nominated Representative	The Company Secretary, APA Group

AEMO	Name	Australian Energy Market Operator Limited
	Address	Level 22, 530 Collins Street, Melbourne, Victoria (AEMO)
	Telephone	(03) 9609 8000

Fax (03) 9609 8080

Attention The Senior Manager Gas System Operations

Nominated The Chief Executive Officer

Representative

Recitals

A APA GasNet owns those parts of the APA GasNet System that are located in Victoria, and leases those parts of the APA GasNet System that are located in NSW from APA GasNet NSW (which owns those parts of the APA GasNet System).

B AEMO has certain statutory functions under the National Gas Law, among other things:

- (a) to control the security and operation of the APA GasNet System; and
- (b) to operate the Market under the National Gas Rules.

C The National Gas Law provides in section 91BE that APA GasNet, APA GasNet NSW and AEMO must enter into a service envelope agreement for the control, operation, safety, security and reliability of the APA GasNet System, which:

- (a) provides that APA GasNet makes the APA GasNet System available to AEMO (and, in doing so, provides a pipeline service);
- (b) states the capacity of the APA GasNet System to be available to AEMO (or how that capacity is to be calculated) at points of injection or withdrawal under the various operating conditions that are likely to prevail from time to time; and deals with any other matters required by the National Gas Rules.

D Rules 329 and 330 of the National Gas Rules set out a process to be followed by APA GasNet and AEMO to agree the amount of Authorised MDQ or AMDQ Credit Certificates which may be made available as a consequence of an Expansion and/or Extension which has the effect of increasing the capacity of the APA GasNet System.

E APA GasNet, APA GasNet NSW and AEMO have agreed that the definition of the APA GasNet Service Envelope Capacity is based on the facilities which comprise the APA GasNet System and the capacity associated with those facilities.

F For the purposes of these Recitals, “the APA GasNet System” means the declared transmission system declared from time to time under section 39 of the National Gas (Victoria) Act 2008 (Vic).

Governing law Victoria

The parties agree as follows:

Service Envelope Agreement

General terms

1 Definitions and Interpretation

1.1 Definitions

In this Agreement:

Access Arrangement means an arrangement for access to pipelines by third parties lodged with the Regulator under rule 46 of the National Gas Rules.

Adviser means the dispute resolution adviser appointed under rule 135G of the National Gas Rules.

AEMO Services means the services performed by AEMO that are set out in the National Gas Law and National Gas Rules.

AEMO means the Australian Energy Market Operator.

Agreement means this agreement and any schedules, annexures and attachments to it.

Allocation Agent has the same meaning as in the National Gas Rules.

AMDO Credit Certificate has the same meaning as in the National Gas Rules.

Annual Cap means \$1 million.

APA GasNet Extensions/Expansions Policy means the extensions/expansions policy contained in the GasNet Access Arrangement from time to time.

APA GasNet Service Envelope Capacity means the capacity associated with some or all of the APA GasNet System as set out in clause 3.2.

APA GasNet Service Envelope Obligations means the obligations of APA GasNet specified in clause 4.

APA GasNet System means the declared transmission system declared from time to time under section 39 of the National Gas (Victoria) Act 2008 (Vic).

Authorised MDO has the same meaning as in the National Gas Rules.

Award means a decision of the Dispute Resolution Panel made under clause 19.

Base Date means 1 January 2008.

Benchmark Distribution Unaccounted For Gas means that quantity of Gas defined by the Gas Distribution System Code (amended and approved from

time to time by the Victorian Essential Services Commission or other authorised regulatory body) as the 'unaccounted for gas benchmark' for the relevant distributor.

Business Day has the same meaning as in the National Gas (South Australia) Act 2008 (SA).

Calendar Year means each period of 365 consecutive days commencing at 6.00am Australian Eastern Standard Time on 1 January, provided however, that any Calendar Year which contains a date of 29 February will consist of 366 consecutive days.

Confidential Information means all information disclosed by any party under this Agreement which is notified by that party in writing to the other parties as being confidential information prior to its disclosure.

Connection Point has the same meaning as in the National Gas Rules.

Corporations Act means the Corporations Act 2001 (Cth).

Customer means a person (if any) other than AEMO with whom APA GasNet contracts in relation to the provision of a Service.

Dispute Resolution Panel means a panel appointed under clause 19(a)(i).

Dispute Resolution Procedure means the dispute resolution procedure set out in clause 19.

Escalation Date has the meaning given to it in clause 4(e).

Event Cap means \$20.

Expansion means the process of upgrading the capacity or service potential of a Transmission Pipeline by:

- (a) replacing or enhancing existing plant or equipment; or
- (b) adding new plant or equipment.

Extension means a new pipeline built to enlarge the area to which Gas may be, or is, supplied, including (for the avoidance of doubt) extensions which:

- (a) connect together pre-existing pipeline systems; or
- (b) extend the supply of Gas at transmission pressure within a distribution area.

Financial Default means failure by a party to pay any amount under this Agreement to another party when due.

Force Majeure means an event or cause beyond the reasonable control of the party claiming force majeure including:

- (a) act of God, lightning, storm, flood, fire, earthquake, volcanic eruption or explosion;

- (b) act of public enemy, war (declared or undeclared), sabotage, blockade, revolution, riot, insurrection, civil commotion;
- (c) prolonged major power, gas or water shortage; and
- (d) any like or analogous event.

Gas has the same meaning as in the Gas Industry Act.

Gas Industry Act means the Gas Industry Act 2001 (Vic).

GasNet Access Arrangement means the Access Arrangement lodged by GasNet Australia (Operations) Pty Ltd relating to the APA GasNet System, as in force from time to time.

Gas Transmission System has the same meaning as in the Gas Industry Act.

Gas Transportation Services means the services set out in Schedule 3.

GJ means gigajoules and has the meaning ascribed in rule 202 of the National Gas Rules.

Good Practice means the exercise of that degree of skill, diligence and foresight consistent with the safe, secure and reliable operation of the APA GasNet System and the facilities which comprise the APA GasNet System and prudent practices that reasonably would be accepted by a significant proportion of the providers of transmission pipeline services in Australia and includes, without limitation, the establishment and maintenance of an asset management and maintenance system.

GNS means APA GasNet System.

GST has the meaning it has in the GST Act.

GST Act means the *A New Tax System (Goods and Services Tax) Act 1999* (Cwlth).

GTC means Gas Transmission Corporation established under Division 1 of Part 2 of the Gas Industry (Residual Provisions) Act 1994.

Independent Expert means a person appointed under clause 6.6.

Insolvency Event means that an order is made by a Court under section 459B of the Corporations Act that a body corporate be wound up in insolvency or a body corporate resolves to wind itself up or to dissolve or any like or analogous events.

Liability Cap means the Event Cap or the Annual Cap (as applicable).

LNG means liquefied natural gas.

Market means the declared wholesale gas market related to the APA GasNet system.

Market Participant has the same meaning as in the National Gas Rules.

Material Breach means a breach by a party having, or reasonably expected to have, a material adverse effect on any other party's ability to:

- (a) obtain and enjoy its primary rights and benefits under this Agreement; or
- (b) comply with any regulatory, legislative, licence or permit obligation, but does not include a failure by APA GasNet to fulfil the APA GasNet Service Envelope Obligations.

National Gas Law has the same meaning as in section 38BA of the Interpretation of Legislation Act 1984 (Vic).

National Gas Rules means the rules made by the Australian Energy Market Commission under Chapter 9 of the National Gas Law.

Nominated Representative means, in respect of each party, the person specified in the details or their replacement as notified in accordance with clause 6.1A(c).

Regulator means the Australian Energy Regulator, or any of its successors.

Regulatory Instrument means any Act, law, code, rule, order or sub-code regulating the gas industry in Victoria, and includes (for the avoidance of doubt) any such instrument made in any other jurisdiction which applies to the APA GasNet System.

Safety Case is the safety case referred to in Part 3 Division 2 of the Gas Safety Act 1997 (Vic).

September Quarter means the period of 3 months beginning on 1 July of each Calendar Year.

Service means a service to be provided under this Agreement or any other service in respect of the APA GasNet System that a party may agree to provide to another party under this Agreement.

Supply Point has the same meaning as in section 6C of the Gas Industry (Residual Provisions) Act 1994.

System Injection Point has the same meaning as in the National Gas Rules.

System Use Gas means gas consumed in operating the Transmission Pipeline as fuel for compressor units and heaters and for other purposes necessary for the management, operation and maintenance of the Transmission Pipeline.

Tariff V Customer means a person who receives Gas at a Tariff V Withdrawal Point.

Tariff V Withdrawal Point has the same meaning as in the National Gas Rules.

Tariffed Transmission Service means making the APA GasNet System available to AEMO for AEMO to operate in accordance with the National

Gas Rules and this Agreement and entering into agreements with users in accordance with Rule 327 of the National Gas Rules.

Tax Invoice has the meaning it has in the GST Act.

Trading Interval has the same meaning as in the National Gas Rules.

Transmission Delivery Tariff D has the same meaning as in the GasNet Access Arrangement, Schedule 1.

Transmission Payment Deed means a deed of that name made between APA GasNet and a Market Participant in accordance with Rule 327 of the National Gas Rules for the payment of transmission charges.

Transmission Pipeline has the same meaning as in the Gas Industry Act.

Transmission Supply Point means a Supply Point on APA GasNet's Transmission Pipeline.

Withdrawal Zone means a withdrawal zone as defined in the GasNet Access Arrangement.

Working Group means the working group appointed under clause 6.4.

1.2 Interpretation

In this Agreement, headings are only for convenience and do not affect interpretation and, unless the context requires otherwise:

- (a) words in the singular include the plural and the other way around;
- (b) words of one gender include any gender;
- (c) if a word or phrase is defined, another grammatical form of that word or phrase has a corresponding meaning;
- (d) an expression indicating a natural person includes a company, partnership, joint venture, association, corporation or other body corporate and a governmental agency;
- (e) a reference to a party to this Agreement includes that party's executors, administrators, successors and permitted assigns;
- (f) a promise or agreement by 2 or more persons binds them jointly and individually;
- (g) a promise or agreement in favour of 2 or more persons is for the benefit of them jointly and individually;
- (h) a reference to a clause, party, annexure, exhibit or schedule is a reference to a clause of, and a party, annexure, exhibit and schedule to, this Agreement and a reference to this Agreement includes any annexure, exhibit or schedule;

- (i) a reference to a thing (including, but not limited to, a right) includes any part of that thing;
- (j) a reference to a right includes a remedy, power, authority, discretion or benefit;
- (k) a reference to legislation includes any amendment to that legislation, any consolidation or replacement of it, and any subordinate legislation made under it;
- (l) a reference to an agreement other than this Agreement includes an undertaking, agreement, deed or legally enforceable arrangement or understanding, whether or not in writing;
- (m) a reference to a document includes all amendments or supplements to, or replacements or novations of, that document;
- (n) examples are descriptive only and not exhaustive;
- (o) a provision of this Agreement must not be construed against a party solely because the party was responsible for preparing this Agreement or that provision;
- (p) a reference to a body, other than a party to this Agreement (including, but not limited to, an association, authority, corporation, body corporate or institution), whether statutory or not:
 - (i) which ceases to exist;
 - (ii) is reconstituted, renamed or replaced; or
 - (iii) whose powers or functions are transferred to another body,
 is a reference to the body which replaces it or which serves substantially the same purposes or has the same powers or functions;
- (q) if a period of time is specified and dates from a given day or the day of an act or event, it is to be calculated exclusive of that day;
- (r) where the day on or by which something must be done is not a Business Day, that thing must be done on or by the next Business Day; and
- (s) a reference to a Regulatory Instrument or an agreement is a reference to that Regulatory Instrument or agreement (as the case may be) as amended, varied, repealed and revoked from time to time.

2 Term

Subject to clauses 18 and 20, this Agreement continues until 31 December 2022.

3 APA GasNet Service Envelope

3.1 The APA GasNet System

- (a) For the avoidance of doubt, the APA GasNet System includes Extensions and Expansions to the APA GasNet System which are included in the APA GasNet System by operation of and in accordance with the APA GasNet Extensions/Expansions Policy.
- (b) Deleted.
- (c) Deleted.
- (d) Deleted.
- (e) Deleted.
- (f) Schedule 1 sets out the facilities which comprise the APA GasNet System, and also the operating constraints and availabilities affecting or relevant to those facilities and to the APA GasNet Service Envelope Capacity.
- (g) The parties must update Schedule 1 as and when changes occur to the facilities comprising the APA GasNet System, operating constraints, availabilities or other matters relevant to the APA GasNet System.
- (h) Notwithstanding any other provisions of this clause 3.1, if APA GasNet and/or APA GasNet NSW ceases to lease or own (as the case may be) the entirety of the APA GasNet System, the parties must amend this Agreement to reflect that change and if the parties are unable to agree to those amendments, the Dispute Resolution Procedure is to apply.

3.2 Specification of the APA GasNet Service Envelope

- (a) Subject to clauses 3.3 and 3.5, the APA GasNet Service Envelope Capacity is the available capacity under applicable operating conditions (if any) associated with the pipelines and other facilities which comprise the APA GasNet System from time to time as agreed between APA GasNet and AEMO in accordance with clause 5.1 and as set out in Schedule 2 but only if and to the extent that Authorised MDQ or AMDQ Credit Certificates have been allocated by AEMO in respect of that available capacity including but not limited to any deemed allocations of Authorised MDQ to Tariff V Customers.
- (b) If there are no or inadequate descriptions of operating conditions provided in Schedule 2, the parties must have regard to the following matters to determine the applicable operating conditions in respect of a facility which comprises the APA GasNet System:
 - (i) whether the facility is operating or not;
 - (ii) existing actual operating conditions affecting the facility, including without limiting the generality of this clause

3.2(b)(ii), the following parameters each of which can individually affect the operation of the APA GasNet System:

- (A) gas quality and the heating value (by zone);
- (B) the configuration of linepack in the APA GasNet System at the beginning of the day;
- (C) the scheduling of gas injections and withdrawals under the National Gas Rules;
- (D) the existence and effect of curtailment and emergency activities;
- (E) the hourly profiles of pressure and flows of gas at each injection point on the APA GasNet System;
- (F) the hourly flows and/or pressures of Gas at key delivery points on the APA GasNet System which are selected by agreement between APA GasNet and AEMO as being appropriate for the purposes for which the common computer models referred to in clause 5.2(d) are to be used; and
- (G) any other variable that is not a fixed parameter already included as part of the common computer models referred to in clause 5.2(d);
- (iii) the requirements of Good Practice in relation to equipment which is the same or similar to the facility;
- (iv) the relevant manufacturer's guidelines for operating equipment which is the same or similar to the facility;
- (v) the performance specifications applicable to equipment which is the same or similar to the facility; and
- (vi) the operating requirements of other facilities which are integrated with the facility.
- (c) If the parties are unable to agree the operating conditions which are applicable to any one or more of the facilities comprising the APA GasNet System, the parties may refer that matter to a Working Group to facilitate agreement between the parties in accordance with clause 6.

3.3 Effect of Expansions and/or Extensions

If at any time during the term of this Agreement:

- (a) APA GasNet NSW and/or APA GasNet undertakes an Expansion and/or Extension that will become part of the APA GasNet System; and

- (b) APA GasNet and AEMO are required to agree the effect on the APA GasNet Service Envelope Capacity as a consequence of that Expansion and/or Extension to ensure that for the purposes of section 91BE of the National Gas Law there remains in force between them a valid service envelope agreement which accurately describes the available capacity of the APA GasNet System,

the parties must agree that effect in accordance with clause 5.1 of this Agreement (either with or without either facilitation by a Working Group or assistance from an Independent Expert) and the APA GasNet Service Envelope Capacity is varied in accordance with that agreement.

3.4 Authorised MDQ

For the avoidance of doubt, in agreeing the APA GasNet Service Envelope Capacity, including any effect on the APA GasNet Service Envelope Capacity as a consequence of any Expansion and/or Extension, the parties will agree an associated amount of Authorised MDQ or AMDQ Credit Certificates and may utilise the computer models referred to in clause 5.2(c) to enable them to do so.

3.5 Effect of maintenance on APA GasNet Service Envelope

The capacity represented by a component of the APA GasNet System which is not in service due to:

- (a) maintenance by APA GasNet in accordance with clause 7; and/or
 - (b) emergencies, emergency repairs or emergency maintenance being conducted, where those repairs or that maintenance are not attributable to a failure by APA GasNet to:
 - (i) undertake maintenance in accordance with clause 7; or
 - (ii) comply with the requirements of Good Practice,
- is not included in the APA GasNet Service Envelope Capacity for the period during which it is not in service due to such maintenance, emergency, emergency repairs or emergency maintenance.

4 APA GasNet Service Envelope Obligations

- (a) Subject to clauses 4(b) and 4(c), the obligations of APA GasNet under this Agreement are to provide the Gas Transportation Services and make available the APA GasNet System to AEMO at all times during the term of this Agreement in accordance with the requirements of Good Practice.
- (b) Subject to clause 4(c), if APA GasNet fails to comply with clause 4(a), then APA GasNet is only liable to the extent it fails to make available the APA GasNet Service Envelope Capacity.
- (c) Any liability of APA GasNet under or in connection with this Agreement (including a payment by APA GasNet or APA GasNet

NSW under rule 240 of the National Gas Rules) must not exceed an amount which equates to the Event Cap per GJ (being the GJ per Trading Interval determined under clause 5.2(b) of this Agreement as representing the extent of a failure by APA GasNet to fulfil the APA GasNet Service Envelope Obligations), provided that in no case shall APA GasNet's aggregate liability under or in connection with this Agreement exceed the Annual Cap in any Calendar Year.

- (d) Subject to clause 4(a) and to APA GasNet's obligations under any applicable Regulatory Instrument, in making available the APA GasNet System and providing the Gas Transportation Services, APA GasNet must:

- (i) perform and discharge its obligations under any applicable Regulatory Instrument in a timely and efficient manner, including acting in accordance with any reasonable instruction by AEMO;
- (ii) act in a manner that will not preclude or materially adversely affect AEMO's ability to perform the AEMO Services;
- (iii) upon becoming aware of any matter or thing which in APA GasNet's opinion materially adversely affects AEMO's ability to provide the AEMO Services, promptly inform AEMO of that matter or thing;
- (iv) provide all personnel, facilities, materials, equipment, spare parts, and other things reasonably required to fulfil the APA GasNet Service Envelope Obligations; and
- (v) have reasonable regard to the operating requirements of AEMO under this Agreement for the facilities comprising the APA GasNet System.

- (e) On each 1 January ("Escalation Date") following the Base Date, the Event Cap and the Annual Cap are each escalated in accordance with the following formula:

$$LC_n = LC_{n-1} \times (1 + CPI_n)$$

where:

LC_n means the Liability Cap as at the Escalation Date;

LC_{n-1} means the Liability Cap as at the preceding 1 January;

$$CPI_n = \left(\frac{CPI_{n-1} - CPI_{n-2}}{CPI_{n-2}} \right)$$

CPI_{n-1} means the CPI published for the September Quarter immediately preceding the Escalation Date;

CPI_{t-2} means the CPI published for the September Quarter immediately preceding the September Quarter the subject of *CPI_{t-1}*; and

CPI means the Australian Bureau of Statistics Consumer Price Index (All Groups, Weighted Average of Eight Capital Cities).

5 Matters requiring agreement by the parties

5.1 Effect of changes to the APA GasNet System and the APA GasNet Service Envelope Capacity

- (a) Subject to clause 5.4, if at any time:
- (i) APA GasNet NSW and/or APA GasNet undertakes or proposes to undertake an Expansion and/or Extension that will become part of the APA GasNet System; or
 - (ii) any other circumstance or event arises which causes a variation in the capacity of the facilities comprising the APA GasNet System, including but not limited to a permanent change in operating conditions affecting the capacity of the facilities comprising the APA GasNet System,
- the extent to which that circumstance or event:
- (iii) causes or is expected to cause a variation in the APA GasNet System and the APA GasNet Service Envelope Capacity; and
 - (iv) results in or is expected to result in additional or less Authorised MDQ or AMDQ Credit Certificates being made available for allocation by AEMO,
- must be agreed by the parties, having regard to the nature of the circumstance or event, in accordance with this clause 5 as soon as practicable (and in any case no later than 10 Business Days or such other time as may be agreed between the parties) after notification of the circumstance or event.
- (b) Subject to clause 5.4, if a matter described in clause 5.1(a) arises, the parties must resolve the matter by agreeing:
- (i) subject to clause 5.1(c), the extent to which:
 - (A) an Expansion and/or Extension; and/or
 - (B) any other circumstance or event,changes the capacity of the APA GasNet System and the APA GasNet Service Envelope Capacity; and
 - (ii) the amount of Authorised MDQ or AMDQ Credit Certificates made available for allocation under rule 329 of the National

Gas Rules or withdrawn from being available (as the case may be) as a consequence of the change in the capacity of the APA GasNet System, expressed in GJ.

- (c) In reaching a conclusion as to the matters set out in clauses 5.1(b)(i) and (ii), the following matters must be taken into account:
 - (i) the amount of Authorised MDQ or AMDQ Credit Certificates which, at the relevant time, will already have been allocated;
 - (ii) Deleted.
 - (iii) relevant design assumptions associated with the Expansion and/or Extension including without limitation the matters referred to in rule 324(2) and 324(4) of the National Gas Rules;
 - (iv) changes in operating conditions affecting or expected to affect the capacity of the APA GasNet System, including but not limited to permanent cessation of operation or de-rating or re-rating of any of the facilities comprising the APA GasNet System;
 - (v) the operational and technical requirements necessary for the safe and reliable operation of the APA GasNet System including any relevant Expansion and/or Extension;
 - (vi) the economically efficient operation of the APA GasNet System including any relevant Expansion and/or Extension; and
 - (vii) any other matters that the parties consider to be relevant.

5.2 APA GasNet's contribution to uplift payments

- (a) AEMO will follow the procedures set out in this clause 5.2 before it makes a determination under rule 240(9) of the National Gas Rules as to the extent to which APA GasNet has failed to fulfil the APA GasNet Service Envelope Obligations.
- (b) Subject to clause 5.4, if at any time APA GasNet or AEMO or both need to determine the extent to which APA GasNet has failed to fulfil the APA GasNet Service Envelope Obligations, the parties must reach agreement as to the extent to which APA GasNet has failed to fulfil the APA GasNet Service Envelope Obligations, expressed in GJ per Trading Interval, in accordance with this clause 5.2.
- (c) If the parties need to determine the extent of any failure by APA GasNet to fulfil the APA GasNet Service Envelope Obligations under clause 5.2(b), then to the extent that any such determination is required to be translated from capacity into energy (measured in GJ) for the purposes of rule 240 of the National Gas Rules, AEMO and APA GasNet must have regard to and utilise the computer models agreed between them under clause 5.2(d), to enable translations of that kind to be made.

- (d) Subject to clause 5.4, the parties must, immediately upon execution of this Agreement:
 - (i) identify and attempt to agree a common computer model which can be used by them for the purposes of clause 5.2(c), which must be consistent with and take into account:
 - (A) the APA GasNet Service Envelope Obligations; and
 - (B) matters of a kind identified in rule 324(2) and 324(4) of the National Gas Rules; and must from time to time:
 - (ii) update those computer models to take account of:
 - (A) changes in the APA GasNet System and the APA GasNet Service Envelope Capacity as agreed under clause 5.1;
 - (B) changes in operating conditions affecting the operation and/or capacity of the facilities comprising the APA GasNet System;
 - (C) changes in the number of customers who withdraw gas from the facilities comprising the APA GasNet System;
 - (D) changes to the matters of a kind identified in clauses rule 324(2) and 324(4) of the National Gas Rules; and
 - (E) any other matter the parties consider to be relevant to the accurate operation of the model.
- (e) The parties must treat the computer models referred to in clause 5.2(d) and the application of those models as Confidential Information and must not disclose any part of those models or any information in relation to those models except:
 - (i) to the extent that such disclosure may reasonably be necessary to apply the models for the purposes expressly contemplated by this clause 5.2; or
 - (ii) with the consent of the other party, which consent must not unreasonably be withheld.

5.3 Allocation of Authorised MDQ

- (a) Subject to clause 5.3(c), if at any time AEMO proposes to allocate Authorised MDQ under rule 330 of the National Gas Rules (other than in circumstances in which the parties have agreed that Authorised MDQ is or will become available under clause 5.1 of this Agreement), then to the extent that it is not inconsistent with the National Gas Rules for AEMO to do so and subject to clause 5.4, AEMO and APA GasNet must reach agreement as soon as practicable

in accordance with this clause 5.3 to determine whether there is sufficient available Authorised MDQ to allow that proposed allocation to be made and if so, the amount of such Authorised MDQ which is available for allocation.

- (b) Deleted.
- (c) In reaching a conclusion as to the matters set out in clause 5.3(a), the following matters must be taken into account:
 - (i) the amount of Authorised MDQ already allocated, or agreed by the parties to be available for allocation;
 - (ii) any of the matters referred to in clause 5.1(c) to the extent that the parties agree the matter is relevant; and
 - (iii) any other matters that the parties consider to be relevant.

5.4 Failure to agree

If the parties are unable to agree any matter under this clause 5, the parties may refer that matter for resolution in accordance with clause 6.

5.5 Effect of parties' agreement

- (a) If under clause 5.1:
 - (i) the parties agree (either with or without facilitation by a Working Group);
 - (ii) an Independent Expert assists the parties to resolve; or
 - (iii) a Dispute Resolution Panel makes an Award,
- that a circumstance or event has or will upon commencement of operation of the relevant Expansion and/or Extension cause a variation in the APA GasNet System and the APA GasNet Service Envelope Capacity, the APA GasNet System and the APA GasNet Service Envelope Capacity is to be varied accordingly with effect from the date on which the variation becomes effective and APA GasNet and AEMO must amend this Agreement, to the extent necessary to reflect the variation in accordance with that agreement, resolution or Award.
- (b) If under clause 5.1:
 - (i) the parties agree (either with or without facilitation by a Working Group);
 - (ii) an Independent Expert assists the parties to resolve; or
 - (iii) a Dispute Resolution Panel makes an Award,
- that additional Authorised MDQ or AMDQ Credit Certificates are or will be made available as a consequence of an Expansion and/or

Extension, AEMO must allocate additional Authorised MDQ or AMDQ Credit Certificates if and to the extent that the additional Authorised MDQ or AMDQ Credit Certificates are made available as a consequence of that Expansion and/or Extension, in accordance with rule 329 of the National Gas Rules and with effect from the date on which that additional Authorised MDQ or AMDQ Credit Certificates become available; but AEMO must not allocate Authorised MDQ or AMDQ Credit Certificates in excess of the amount of Authorised MDQ or AMDQ Credit Certificates agreed or resolved under clause 5.1 to have been made available as a consequence of that Expansion and/or Extension.

(c) If under clause 5.3:

- (i) the parties agree (either with or without facilitation by a Working Group); or
- (ii) an Independent Expert assists the parties to resolve,

that an amount of Authorised MDQ is available for allocation, AEMO must allocate Authorised MDQ in accordance with that agreement or resolution (as the case may be) and for the avoidance of doubt, this clause 5.5(c) does not apply in the case of deemed allocations of Authorised MDQ for Tariff V Customers arising under rule 330(3) of the National Gas Rules.

(d) If at any time:

- (i) the parties reach agreement (either with or without facilitation by a Working Group); or
- (ii) an Independent Expert assists the parties to make a resolution; or
- (iii) a Dispute Resolution Panel makes an Award,

in respect of a matter which has the effect of changing a matter or thing contemplated by this Agreement, the parties must amend this Agreement to appropriately reflect that agreement, resolution or Award.

6 Representatives and Working Groups

6.1 A Nominated Representatives

- (a) AEMO and APA GasNet must each nominate a representative, being a senior executive of their organisation or of a Related Body Corporate, to fulfil the functions of the Nominated Representative under this agreement.

- (b) The Nominated Representatives are the persons set out in the Details unless a party gives notice of a replacement in accordance with clause 6.1(c).

- (c) Any party may appoint a replacement Nominated Representative at any time by notice in writing to the other parties.

6.1 Facilitation of agreement by Working Group

The parties may refer any matter which requires agreement between the parties under clause 3.2(b) or clause 5 to a Working Group to facilitate such agreement between the parties.

6.2 Resolution by Independent Expert

- (a) After referring a matter described in clause 5.1 to a Working Group to facilitate agreement between the parties, the parties may seek alternative dispute resolution of that matter by an Independent Expert in accordance with clause 6.6.
- (b) If the parties are unable to agree on any matter described in clauses 3.2(b), 5.2 or 5.3 with the facilitation of a Working Group, that matter must be referred to an Independent Expert in accordance with clause 6.6.

6.3 Failure to agree

If the parties are unable to reach agreement on a matter described in clause 5.1, either with or without facilitation of agreement by a Working Group or an Independent Expert, the parties acknowledge and agree that the matter is then a dispute between them which may be referred for resolution in accordance with the Dispute Resolution Procedure.

6.4 Appointment of Working Groups

- (a) The Nominated Representatives of AEMO and APA GasNet must appoint one or more Working Groups as soon as practicable after execution of this Agreement to review from time to time or deal with any matter required to be referred for alternative dispute resolution in accordance with clauses 3.2(c) or 5.
- (b) Each Working Group appointed under clause 6.4(a) is to comprise:
 - (i) 2 persons appointed by AEMO; and
 - (ii) 2 persons appointed by APA GasNet.
- (c) Any person who has served as a member of a Working Group may be appointed to serve as a member of any subsequently appointed Working Group.

6.5 Role of Working Group

- (a) The matter to be resolved by a Working Group appointed under clause 6.4, must be referred to that Working Group as soon as practicable after the Working Group is appointed.
- (b) If a matter is referred to the Working Group under clause 6.5(a), the Working Group must:

- (i) resolve the matter by unanimous agreement of the members of the Working Group within a reasonable time of the date on which the relevant matter was referred to it, given the nature of the matter; and
- (ii) consult with such relevant persons, including suitably qualified experts, as the Working Group in its absolute discretion decides may assist the Working Group to resolve the matter.

6.6 Appointment of Independent Expert

- (a) If a Working Group is unable to resolve a matter referred to it under clauses 3.2(c) or 5:
 - (i) the matter must immediately be referred to a suitably qualified Independent Expert; and
 - (ii) the Nominated Representatives of APA GasNet and AEMO must appoint such a suitably qualified Independent Expert to resolve the matter; and
 - (iii) if the Nominated Representatives are unable to agree on the expert to be appointed, they must ask the Regulator to appoint a suitably qualified Independent Expert to resolve the matter.
- (b) The Nominated Representatives must, or (as the case may be) must ask the Regulator to:
 - (i) appoint a suitably qualified Independent Expert under clause 6.6(a) on such terms and conditions as are considered appropriate by the person or persons making the appointment; and
 - (ii) use reasonable endeavours to ensure that the Independent Expert has experience which is appropriate in the circumstances, having regard to the nature of the matter to be resolved.
- (c) Subject to clause 6.6(b), an Independent Expert appointed to resolve a matter under clause 6.6(a) may be appointed to resolve any number of subsequent matters.
- (d) The costs of an Independent Expert appointed under clause 6.6(a) are to be shared equally between APA GasNet and AEMO.

6.7 Role of Independent Expert

- (a) For the purposes of clause 5.1 the Independent Expert will act as mediator.
- (b) For the purposes of clauses 3.2(c), 5.2 and 5.3, the Independent Expert will act as arbitrator and the Commercial Arbitration Act (Vic) 1984 does not apply.

7 Maintenance by APA GasNet

APA GasNet and AEMO agree that maintenance will be carried out in accordance with rule 326 of the National Gas Rules.

8 AEMO Obligations

8.1 Performance of AEMO Services

- (a) Subject to AEMO's obligations under any Regulatory Instrument, in providing the AEMO Services and performing its obligations under this Agreement, AEMO must:
 - (i) perform and discharge its obligations under any applicable Regulatory Instrument in a timely and efficient manner;
 - (ii) observe Good Practice;
 - (iii) operate the facilities which comprise the APA GasNet System in a manner that will not preclude or materially adversely affect APA GasNet's ability to comply with the APA GasNet Service Envelope Obligations;
 - (iv) upon becoming aware of any matter or thing which in AEMO's opinion materially adversely affects APA GasNet's ability to fulfil the APA GasNet Service Envelope Obligations, promptly inform APA GasNet or APA GasNet NSW and, subject to its obligations under the National Gas Rules, this Agreement and any applicable Regulatory Instrument, act in accordance with any reasonable instruction given by APA GasNet;
 - (v) use due care and act in a manner which is consistent with the maintenance of and furtherance of the legitimate business interests of APA GasNet and APA GasNet NSW and their investment in the facilities which comprise the APA GasNet System;
 - (vi) comply with the policies of APA GasNet and APA GasNet NSW that are relevant to the operation of the APA GasNet System as advised by APA GasNet and APA GasNet NSW from time to time, unless;
 - (A) any change in policies would materially increase the cost of providing the AEMO Services; and
 - (B) an amended charge for provision of that higher level of AEMO Services is not agreed;
 - (vii) provide all personnel, facilities, materials, equipment, spare parts and other things reasonably required to enable AEMO to provide the AEMO Services;

- (viii) have reasonable regard to the operating cost, maintenance and service life of each of the assets forming part of the APA GasNet System; and
- (ix) observe and comply with all asset maintenance procedures conducted in accordance with Good Practice and as notified to it by APA GasNet from time to time.

(b) AEMO:

- (i) acknowledges that the provision of the AEMO Services and its obligations under this Agreement will permit and enable APA GasNet to carry out and discharge the APA GasNet Service Envelope Obligations; and
- (ii) must use its reasonable endeavours to provide the AEMO Services in a manner which will not prevent APA GasNet from carrying out and discharging the APA GasNet Service Envelope Obligations.

8.2 Reports

Subject to any obligation of confidence imposed on AEMO, AEMO must in a prompt and efficient manner prepare and provide to APA GasNet such reports and operational information and documents relating to AEMO's provision of the AEMO Services and do such things as are set out in Schedule 3.

9 Operation of compressors

Subject to AEMO's obligations under rule 206 of the National Gas Rules, AEMO must operate the compressors:

- (a) in a manner which results in the efficient operation of those compressors; and
- (b) in accordance with clause 8.1(a)(viii).

10 Insurances

10.1 Current insurance

The parties acknowledge and confirm that they each presently have in place insurance in the form and to the amounts set out in this clause.

10.2 APA GasNet and AEMO to insure

- (a) APA GasNet must arrange and maintain for the duration of this Agreement with insurers or underwriters of good repute, minimum insurances agreed by the parties with respect to cover for:
 - (i) industrial special risks insurance of the facilities that comprise the APA GasNet System for their full insurable value against damage or destruction caused by accident and

any insurable risk commonly insured with respect to assets of a similar nature to the facilities that comprise the APA GasNet System and against such other insurable risks as APA GasNet may specify;

- (ii) public liability insurance of \$250 million or such other amount specified by APA GasNet from time to time to cover liability for loss, injury or damage to any person or property caused by, or arising out of, any action of, or omission by, APA GasNet NSW, APA GasNet or any officer, employee, agent, contractor or invitee of APA GasNet NSW or APA GasNet under, or in relation to, the facilities which comprise the APA GasNet System; and
- (iii) any insurance required by law.
- (b) APA GasNet must pay all premiums in respect of the insurance it is obliged to maintain by due date to ensure no lapse in the policy.
- (c) APA GasNet must provide annually to AEMO details of insurances maintained by it, provided that any material change must be notified to AEMO at the time of such change.

10.3 AEMO to insure

- (a) AEMO must arrange and maintain for the duration of this Agreement with insurers or underwriters of good repute, minimum insurances agreed by the parties with respect to cover for:
 - (i) public liability insurance of \$250 million and professional indemnity insurance of \$50 million or such other amount specified by AEMO from time to time to cover liability for loss, injury or damage to any person or property caused by, or arising out of, any action of, or omission by AEMO or any officer, employee, agent, contractor or invitee of AEMO under, or in relation to, the APA GasNet System. These insurances may be combined into a single policy arrangement as appropriate; and
 - (ii) any insurance required by law.
- (b) AEMO must pay all premiums in respect of the insurance it is obliged to maintain by due date to ensure no lapse in the policy.
- (c) AEMO must provide annually to APA GasNet and APA GasNet NSW details of insurances maintained by it, provided that any material change must be notified to APA GasNet and APA GasNet NSW at the time of such change.

10.3A Other insurance

Nothing in this Agreement affects the right of AEMO, APA GasNet and APA GasNet NSW to arrange and maintain insurance with respect to the APA GasNet System for its own account and at its own expense, provided that

arranging and maintaining such insurance does not prejudice the arrangement or maintenance of insurances required under this Agreement.

10.4 Insurance claims procedure

- (a) Each of APA GasNet and AEMO must follow insurance policies procedures and subject to those procedures:
 - (i) immediately notify the other party in writing of any occurrence or incident likely to give rise to a claim under the policies referred to in this Agreement, or of any other matter or thing in respect of which notice should be given by APA GasNet and AEMO under those policies;
 - (ii) after having given the notification to the other party under clause 10.4(a)(i), give all such information and assistance to the other party, and to the insurer or underwriter as may reasonably be practicable in the circumstances; and
 - (iii) give to the other party, if requested, a statutory declaration as to any such occurrence or incident likely to give rise to a claim under the policies referred to in this clause 10, or of any other matter or thing in respect of which notice should be given by APA GasNet or AEMO under those policies.
- (b) Each of APA GasNet and AEMO must ensure that, in the event of a claim being made under the policies referred to in this clause 10, the other party is:
 - (i) entitled to; and
 - (ii) is given a proper opportunity to, make full representations to the insurer or underwriter as to the loss suffered by that other party.
- (c) Despite anything to the contrary in clauses 10.4(a) or (b), each of APA GasNet and AEMO may take immediate action to avoid loss of life or damage to property where that is reasonably necessary in the circumstances, and any such action will not prejudice the position of APA GasNet and AEMO under the policies referred to in this clause 10 in respect of that occurrence or incident.

11 Payment of Transmission Service Charges

APA GasNet acknowledges and agrees that APA GasNet receives payment for the Tariffed Transmission Services from Market Participants in accordance with Transmission Payment Deeds entered into between APA GasNet and those Market Participants, and that AEMO has no liability to APA GasNet for payment of charges for those Tariffed Transmission Services. For the avoidance of doubt, AEMO is not liable to APA GasNet for payment of charges for Tariffed Transmission Services relating to the provision of System Use Gas.

12 Data

12.1 Unverified metering data

- (a) Unless and to the extent the National Gas Rules provide otherwise, APA GasNet owns all raw unverified metering data obtained from metering installations owned by APA GasNet or APA GasNet NSW, and AEMO has a non-exclusive royalty free right to make use of such metering data during the term of this Agreement.
- (b) The parties agree that all raw, unverified metering data is Confidential Information for the purposes of this Agreement and the National Gas Rules.

12.2 Verified metering data

- (a) Unless and to the extent the National Gas Rules provide otherwise, AEMO owns all verified metering data obtained from metering installations for the purposes of the National Gas Rules and APA GasNet has a non-exclusive royalty free right to make use of such verified metering data during the term of this Agreement.
- (b) AEMO and APA GasNet may each use verified metering data for a purpose contemplated by the National Gas Rules provided that AEMO and APA GasNet each takes all reasonable actions to ensure that its use of the verified metering data does not enable identification of any component part of that data, having regard to the potential commercial sensitivity of information relating to the demand and consumption patterns of customers, and otherwise, all verified metering data is Confidential Information for the purposes of this Agreement and the National Gas Rules.

12.3 Provision of Metering data to APA GasNet

- (a) In order to enable APA GasNet to calculate charges to Market Participants AEMO must provide to APA GasNet the following data on a calendar monthly basis:
 - (i) the total GJ of Gas injected on behalf of each Market Participant through each System Injection Point as metered at each custody transfer meter and allocated by an Allocation Agent;
 - (ii) the total GJ of Gas delivered to each Market Participant through each Withdrawal Zone, as metered at each custody transfer meter and, where relevant, allocated by an Allocation Agent; and
 - (iii) the total daily GJ of Gas delivered through each Withdrawal Zone to those of each Market Participant's customers who are subject to Transmission Delivery Tariff D, as metered at each of those customers' sites and adjusted by the addition of Benchmark Distribution Unaccounted For Gas.

- (b) AEMO must provide the information referred to in clause 12.3(a) as preliminary, final and revised data in accordance with the timetable for provision of preliminary statements, final statements and revised statements under the National Gas Rules.

12.4 Gas flow data at Connection Points

In order to enable APA GasNet to calculate charges to Market Participants, each day AEMO must provide to APA GasNet details of the amount of Gas flowing through custody transfer meters at each Connection Point by no later than the 3rd Business Day after the relevant day of each month.

12.5 Operational data

In order to enable APA GasNet to monitor the extent of use of the APA GasNet System from time to time, AEMO must provide to APA GasNet:

- (a) information concerning alarms and alarm signals relevant to the APA GasNet System, which must be provided to APA GasNet on a live basis; and
- (b) other operational information relating to the APA GasNet System of a nature specified in Schedule 4 including but not limited to pressure, temperature and flow data along pipelines comprising the APA GasNet System, which must be provided to APA GasNet as soon as practicable after the operational information has become available to AEMO in the form of the TADIS database (or in another form as agreed between the parties from time to time).

The parties agree that the operational information provided to APA GasNet under clause 12.5, relies on software which may contain errors or omissions. As such, AEMO does not warrant the accuracy, reliability or completeness of the operational information provided under this clause and APA GasNet assumes all risk in relation to its use of that information.

13 Intellectual property

- (a) If, in the course of carrying out its obligations under this Agreement, AEMO develops, discovers or produces a new product, concept or process which is capable of being patented or otherwise protected, that product, concept or process is the property of AEMO, provided that AEMO must and hereby does grant to APA GasNet a non-exclusive royalty free right to make use of such property for the purposes of and associated with the activities, matters and things reasonably contemplated by this Agreement during the subsistence of the relevant intellectual property rights applicable to the relevant product, concept or process.

- (b) If, in the course of carrying out its obligations under this Agreement, APA GasNet develops, discovers or produces a new product, concept or process which is capable of being patented or otherwise protected, that product, concept or process is the property of APA GasNet, provided that APA GasNet must and hereby does grant to AEMO a non-exclusive royalty free right to make use of such property for the

purposes of and associated with the activities, matters and things reasonably contemplated by this Agreement during the subsistence of the relevant intellectual property rights applicable to the relevant product, concept or process.

14 Emergencies

Each party agrees to cooperate in good faith to the extent to which that party is reasonably able to do so, to enable the other parties to comply with:

- (a) the Gas Industry Act;
- (b) the Gas Safety Act 1997;
- (c) all other Regulatory Instruments; and
- (d) each party's Safety Case.

15 Environment and occupational health and safety

15.1 Compliance with environmental laws

- (a) Each party agrees to cooperate in good faith to the extent to which that party is reasonably able to do so, to enable the other parties to:
 - (i) achieve compliance with all relevant Commonwealth and State environmental laws, including but not limited to the Environment Protection Act 1970, the Environment Effects Act 1978, the Planning and Environment Act 1987, and any regulation, State environment protection policy, scheme, licence, approval, permit, notice, direction or other instrument made or issued under such Acts; and
 - (ii) handle any third party legal actions involving either of the parties under any of the Acts or other instruments referred to in clause 15.1(a)(i).
- (b) The parties may agree from time to time that one or more of the parties will, in respect of any particular pipeline or site, be primarily responsible for compliance with the obligations imposed by any of the Acts or other instruments referred to in clause 15.1(a)(i), but no party will be deemed to have admitted any legal liability under those Acts or other instruments solely by reason of entering into such an agreement.

15.2 Compliance with occupational health and safety laws

- (a) Each party agrees to cooperate in good faith to the extent to which that party is reasonably able to do so, to enable the other parties to:
 - (i) achieve compliance with the Occupational Health and Safety Act 1985, and any regulation, State policy, scheme, licence,

approval, permit, notice, direction or other instrument made or issued under such Act; and

- (ii) handle any third party legal actions involving either of the parties under any of the Acts or other instruments referred to in clause 15.2(a)(i).

- (b) The parties may agree from time to time that one or more of the parties will, in respect of any particular pipeline or site, be primarily responsible for compliance with the obligations imposed by the Gas Industry Act or other instruments referred to in clause 15.2(a), but no party will be deemed to have admitted any legal liability under that Gas Industry Act or those other instruments solely by reason of entering into such an agreement.

16 Force Majeure

16.1 General position

Non-performance (other than the obligation to pay money) of any obligation or condition required by this Agreement to be performed by any party due to Force Majeure:

- (a) will be excused during the time and to the extent that performance is prevented, wholly or in part, by Force Majeure; and
- (b) will not to that extent give rise to any liability to the other parties for any losses or damages arising out of, or in any way connected with, such non-performance.

16.2 Notification to other parties

Except as set out in this Agreement, if a party seeks relief from performance of any obligation or condition under this Agreement due to Force Majeure, the party must:

- (a) as soon as reasonably practicable but in any event within two days, give notice to the other parties of the occurrence of the event or circumstance claimed to be Force Majeure, including:
 - (i) full particulars relating to the event or circumstance and the cause of such failure to perform; and
 - (ii) an estimate of the period of time required to remedy such failure to perform;
- (b) provide the other parties with a reasonable opportunity and assistance to examine and investigate the relevant event or circumstance which constitutes the Force Majeure and failure to perform;
- (c) exercise reasonable efforts to mitigate or remove the effects of the relevant event or circumstance by excluding any measures which are not economically feasible for the parties; and

- (d) give notice immediately to the other parties upon termination of the event or circumstance of Force Majeure.

16.3 Industrial disturbance

Nothing in this Agreement requires a party to adjust or settle any strike, lockout or other industrial disturbance against the will of that party.

16.4 Qualification

No Force Majeure affecting the performance of any obligation or condition under this Agreement by a party operates to prevent a cause of action arising from or altering the expiration of the period of time within which by the exercise of reasonable diligence and the employment of all reasonable means, that party could have remedied the situation preventing its performance.

17 Remedies

17.1 Material Breach

- (a) If a party commits a Material Breach, then another party may give the party in default written notice specifying the Material Breach and the Service (if any) relevant to the Material Breach.
- (b) If the party in default does not cure the Material Breach specified in the notice referred to in clause 17.1(a) within 14 days of the other party giving the notice, then the other party may by further notice to the party in default, invoke the Dispute Resolution Procedure.

17.2 Financial Default

- (a) If a party commits a Financial Default, then another party may give the party in default written notice specifying the Financial Default and the Service (if any) relevant to the Financial Default.
- (b) If the party in default does not cure the Financial Default specified in the notice referred to in clause 17.2(a) within 7 days of the other party giving the notice, then the other party may by further notice to the party in default invoke the Dispute Resolution Procedure.

17.3 Cure

A Material Breach or Financial Default (as the case may be) is taken to have been cured where:

- (a) in the case of a Material Breach that is capable of remedy, the Material Breach has been remedied;
- (b) in the case of a Material Breach that is incapable of remedy (for example, because the time for performance has passed), then the Material Breach is taken to have been cured when the party in default:

- (i) has paid reasonable compensation to the other party for any loss suffered by the other party as a result of the Material Breach (including all costs of enforcement); and
- (ii) has taken all reasonable steps to prevent the Material Breach being repeated; and
- (c) in the case of a Financial Default, when the party in default has paid to the other party the total amount (including interest and all costs of recovery and enforcement) which is the subject of the Financial Default.

18 Ongoing application of Agreement

18.1 Parties must agree

At least twelve months prior to the termination of this Agreement, AEMO and APA GasNet must agree upon the terms of this Agreement (if any) that will continue to apply after the termination of this Agreement.

18.2 Failure to reach agreement

- (a) IF:
 - (i) AEMO and APA GasNet are unable to reach agreement or continue to agree upon the terms of this Agreement:
 - (A) during the term of this Agreement; or
 - (B) under clause 18.1; or
 - (ii) a dispute arises between AEMO and APA GasNet in relation to this Agreement, then either party may refer the matter for resolution in accordance with the Dispute Resolution Procedure.
- (b) For the avoidance of doubt, the referral of a matter to a Working Group or an Independent Expert under clause 5 does not constitute a dispute to which clause 18.2(a)(ii) relates.
- (c) If the parties do not reach agreement in accordance with clause 18.1, this Agreement will continue to operate with full force and effect after the due date for termination of this Agreement, until:
 - (i) the parties agree upon the provisions of this Agreement that will continue to apply; or
 - (ii) an Award is made by a Dispute Resolution Panel as to the provisions of this Agreement that will continue to apply,and unless the parties otherwise agree, any such agreement of Award is to have effect from the due date of termination of this Agreement.

18.3 Amendment of Agreement

Except as set out in the National Gas Rules or as required by the Regulator, and subject to obtaining any necessary approvals from the Regulator, this Agreement may only be amended or supplemented in writing, signed by the parties, generally in the form of Schedule 5.

18.4 Change to Regulatory Instrument

- (a) If any Regulatory Instrument is altered or any relevant determination or decision of the Regulator is made that materially affects the operation of any provision of this Agreement, this Agreement is to be amended to accommodate that change.
- (b) Without limiting clause 18.4(a), if the National Gas Rules are amended so that APA GasNet is no longer liable to make a payment under rule 240 of the National Gas Rules due to a failure to comply with the APA GasNet Service Envelope Obligations, the parties must renegotiate the terms of this Agreement to:
 - (i) reflect any relevant provision of the National Gas Rules which makes APA GasNet otherwise liable to make a payment due to a failure to any extent by APA GasNet to make available the APA GasNet System; or
 - (ii) otherwise amend this Agreement to provide for APA GasNet to make a payment equivalent to that which would have been payable under rule 240 of the National Gas Rules, in the event that APA GasNet fails to any extent to make available the APA GasNet System.
- (c) If the parties fail to agree on the terms of this Agreement in accordance with clause 18.4(a) or (b), either party may invoke the Dispute Resolution Procedure.

19 Disputes

- (a) If a matter is referred for resolution in accordance with the Dispute Resolution Procedure, the Nominated Representatives of AEMO and APA GasNet must:
 - (i) appoint a Dispute Resolution Panel as soon as practicable after the dispute is brought to the attention of either of them; and
 - (ii) refer that matter to the Dispute Resolution Panel as soon as practicable after that Dispute Resolution Panel is appointed.
- (b) A matter referred for resolution under clauses 19(a)(ii) must be arbitrated in accordance with this clause 19 and the Commercial Arbitration Act 1984 (Victoria).

- (c) A Dispute Resolution Panel appointed under clause 19(a)(i) is to comprise:
 - (i) a person who is:
 - (A) independent of both APA GasNet and AEMO;
 - (B) legally qualified;
 - (C) has an understanding of the gas industry;
 - (D) has a detailed understanding and experience of alternative dispute resolution practice and procedures which do not involve litigation; and
 - (E) has the capacity to determine the most appropriate dispute resolution in the particular circumstances of the dispute; and/or
 - (ii) two persons:
 - (A) one of whom is appointed by APA GasNet and one of whom is appointed by AEMO;
 - (B) who have an understanding of the gas industry; and
 - (C) who have technical qualifications appropriate to resolve the dispute including but not limited to a technical understanding of matters relevant to operation of gas transmission pipelines.
- (d) A person who has previously served on a Dispute Resolution Panel is not precluded from being appointed to another Dispute Resolution Panel established in accordance with clause 19(a).
- (e) If the Nominated Representatives of AEMO and APA GasNet are unable to reach agreement as to the composition of the Dispute Resolution Panel to be appointed in accordance with clause 19(a), they must ask the dispute resolution Adviser appointed under rule 135G of the National Gas Rules to appoint the Dispute Resolution Panel in accordance with clause 19(a) and must pay the reasonable costs of the Adviser in relation to the making of those appointments.
- (f) When a matter is referred to a Dispute Resolution Panel under clause 19(a)(ii), the person appointed to the Dispute Resolution Panel under clause 19(c)(i) must select the form of, and procedures to apply to, the dispute resolution process which is, in the opinion of that person, reasonable, and which:
 - (i) is simple, quick and inexpensive;
 - (ii) observes the rules of natural justice; and
 - (iii) encourages resolution of disputes without formal legal representation or reliance on legal procedures.

- (g) For the purpose of any Award of the Dispute Resolution Panel, the parties may agree that as part of the Award, the Dispute Resolution Panel may settle the terms and conditions of any amendments required to be made to this Agreement or any agreement replacing this Agreement.

20 Termination

20.1 Termination of Agreement

- (a) APA GasNet NSW or APA GasNet may terminate this Agreement at any time by notice in writing to AEMO if AEMO ceases to be responsible for the security and operation of the APA GasNet System or ceases to operate the Market under the National Gas Rules or otherwise ceases to perform the AEMO Services.
- (b) AEMO may terminate this Agreement at any time by notice in writing to APA GasNet and APA GasNet NSW if an Insolvency Event occurs in relation to APA GasNet or APA GasNet NSW.
- (c) For the avoidance of doubt, APA GasNet NSW or APA GasNet is not permitted to terminate this Agreement due solely to the transfer of the property, rights and liabilities of AEMO under the Gas Industry Act and this Agreement to a Company incorporated under the Corporations Law of Victoria to which the business, affairs and assets of AEMO are assigned where that company undertakes to provide the services which are the same as or substantially similar to the AEMO Services.

20.2 After termination

Termination of this Agreement for any reason does not affect:

- (a) any rights of a party against the other party which:
- (i) arose prior to the time at which the termination occurred; or
- (ii) otherwise relates to or may arise at any future time from any breach or non-observance of that other party's obligations under this Agreement occurring prior to termination; and
- (b) the rights and obligations of the parties under this Agreement in respect of any monies outstanding under this Agreement.

21 Confidentiality

Except as otherwise provided in this Agreement:

- (a) each Party must treat Confidential Information as confidential and must take all reasonable precautions to ensure that its employees maintain such confidentiality; and

- (b) the confidentiality provisions of the National Gas Rules apply to all Confidential Information under this Agreement.

22 Notices

22.1 How notices may be given

A notice, request, demand, consent or approval (each a notice) under this Agreement:

- (a) must be in writing;
- (b) may be signed for the party giving it by the party's authorised officer, attorney or solicitor; and
- (c) may be:
 - (i) delivered personally to the person to whom it is addressed; or
 - (ii) left at or sent by prepaid post to the person's address; or
 - (iii) faxed to the person's fax number,

as given below:

- (i) if to APA GasNet Australia (Operations) Pty Ltd or to APA GasNet Australia (NSW) Pty Ltd:

The Operations Manager, 180 Greens Road, Dandenong, Victoria
(Fax (03) 9797 5222)

- (ii) if to AEMO:

The Senior Manager Gas System Operations, Level 22, 530 Collins
Street, Melbourne, Victoria
(Fax (03) 9609 8080)

22.2 When notice taken as given

A notice is taken as given by the sender and received by the intended recipient:

- (a) if posted, 3 days after posting; and
- (b) if faxed, on completion of the transmission as evidenced by receipt by the delivering party of a delivery report confirming the fax has been transmitted,

but if delivery or receipt is on a day which is not a Business Day of a party or is after 5.00 pm at the place of delivery or receipt, it is taken as given at 9.00 am on the next Business Day.

22.3 Change of address or fax number

A party may change its address or fax number for notices by giving notice to the other parties.

23 Assignment

23.1 Assignment generally

A party may not assign its rights under this Agreement unless it has the other parties' written consent and each other party must not unreasonably withhold its consent.

23.2 Deleted

23.3 Assignment not a restriction on securities

Nothing in this Agreement prevents a party from pledging, mortgaging, encumbering or assigning by way of security its rights under this Agreement provided that the chargee or mortgagee must first acknowledge in writing to the other parties that upon it realising its charge or mortgage, it will be bound by the terms of this Agreement.

24 GST

24.1 Recovery of GST

If GST is imposed on any supply made under this Agreement by one party ("**the supplying party**") to another party ("**the receiving party**") and the consideration payable or to be provided for the supply under any other clause in this Agreement is not expressed to be inclusive of GST, the receiving party must pay, in addition to and at the same time as any GST exclusive consideration is payable or to be provided for the supply, an additional amount calculated by multiplying the value of that GST exclusive consideration (without deduction or set-off) by the prevailing GST rate.

24.2 Tax invoice

The supplying party must provide a Tax Invoice to the receiving party for any taxable supply made by the supplying party under this Agreement.

24.3 Adjustment of consideration for a supply

If the amount of GST recovered by the supplying party from the receiving party differs from the amount of GST payable at law by the supplying party in respect of that supply, the amount payable by the receiving party to the supplying party must be adjusted accordingly.

24.4 Change in taxes

(a) If at any time after this Agreement is executed a sales tax, use tax, consumption tax, goods and services tax, value-added tax or any similar tax, impost or duty is levied upon the Services, whether that tax, impost or duty is levied under legislation of the Commonwealth of Australia or any State or Territory, the parties agree to renegotiate in good faith any provision of this Agreement which any party reasonably considers to have been affected by that change in taxes, including but not limited to any charges payable under this Agreement.

- (b) If the negotiations referred to in clause 24.4(a) do not result in an agreement between the parties within 20 Business Days after such negotiations have commenced, the parties must:
 - (i) refer a dispute concerning charges payable under this Agreement to the Regulator and request the Regulator to decide on a fair and reasonable variation in those charges; and
 - (ii) resolve any other dispute in accordance with the Dispute Resolution Procedure.
- (c) The parties must comply with:
 - (i) any decision of the Regulator relating to charges payable under this Agreement; and
 - (ii) a resolution of any other matter in accordance with the Dispute Resolution Procedure.

25 Relationship between parties

25.1 No partnership or fiduciary relationship

The parties agree and confirm that:

- (a) neither the terms of this Agreement nor any rights or obligations of any party is to be construed as creating a partnership, association, trust or other fiduciary relationship between the parties;
- (b) AEMO is not the agent of either APA GasNet and APA GasNet NSW, and AEMO does not have any authority to receive notices or serve process on behalf of APA GasNet or APA GasNet NSW;
- (c) neither APA GasNet NSW nor APA GasNet is an agent of AEMO, and nor does APA GasNet NSW or APA GasNet have any authority to receive notices or serve process on behalf of AEMO;
- (d) AEMO will not incur any liabilities on behalf of APA GasNet or APA GasNet NSW, pledge the credit of APA GasNet or APA GasNet NSW or make any contract binding upon APA GasNet or APA GasNet NSW except where it is specifically authorised to do so pursuant to this Agreement; and
- (e) neither APA GasNet NSW nor APA GasNet will incur any liabilities on behalf of AEMO, pledge the credit of AEMO nor make any contract binding upon AEMO except where either of them is specifically authorised to do so pursuant to this Agreement.

25.2 Joint and several liability of APA GasNet

- (a) The liability of APA GasNet NSW and APA GasNet for performance of the obligations of APA GasNet under this Agreement, is joint and several.

- (b) The liability of APA GasNet NSW and APA GasNet for performance of the obligations of APA GasNet NSW under this Agreement, is joint and several.

26 General

26.1 Approvals and consents

Subject to the express provisions of this Agreement, whenever in this Agreement the agreement, approval or consent of a party is required, the agreement, approval or consent may be withheld at the party's sole discretion, delayed or given subject to any condition.

26.2 Costs and expenses

Each party must pay its own legal costs and expenses for the negotiation, preparation, completion and stamping of this Agreement.

26.3 Governing law and jurisdiction

- (a) This Agreement is governed by the law of Victoria.
- (b) Each party irrevocably submits to the non-exclusive jurisdiction of the courts of Victoria and courts hearing appeals from them.
- (c) A party must not object to the jurisdiction of a court merely because the forum is inconvenient.

26.4 Waiver

- (a) A party waives a right under this Agreement only if it does so in writing.
- (b) A party does not waive a right simply because it:
- (i) fails to exercise the right;
- (ii) delays exercising the right; or
- (iii) only exercises part of the right.
- (c) A waiver of one breach of a term of this Agreement does not operate as a waiver of another breach of the same term or any other term.

26.5 Further action

Each party must promptly sign any document and do anything else that is necessary or reasonably requested by the other party to give full effect to this Agreement.

26.6 Whole agreement

This Agreement:

(a) replaces all previous agreements, representations, warranties or understandings between the parties concerning the subject matter of this Agreement; and

(b) contains the whole agreement between the parties.

26.7 Unenforceable provision

If a provision in this Agreement (not being clause 4(b)) is wholly or partly invalid or unenforceable in any jurisdiction, that provision or part must, to that extent and in that jurisdiction, be treated as deleted from this Agreement. This does not affect the validity or enforceability of the remaining provisions in that jurisdiction, or of the deleted provision in any other jurisdiction.

26.8 Counterparts

This Agreement:

- (a) may be executed in a number of counterparts; and
- (b) comprises all the counterparts, taken together.

26.9 Survival of provisions

A provision of this Agreement that has not been met on, or can have effect after, completion of the transaction contemplated by this Agreement, or termination of this Agreement, continues to apply after completion or termination.

26.10 Separate obligations and expenses

Any indemnity in this Agreement is a continuing obligation, separate and independent from the other obligations of the parties. It is not necessary for a party to incur expense or make payment before enforcing a right of indemnity conferred by this Agreement.

26.11 Settlement of claims

A party must not agree to settle any claim by a third party for which the party claims indemnity under this Agreement without first obtaining the consent of the other parties.

26.12 Specific performance

Nothing in this clause limits the right of the parties to enforce this Agreement by seeking an order for specific performance in any Court of competent jurisdiction.

EXECUTED as an agreement

Service Envelope Agreement

Signing page

DATED:

EXECUTED by APA GASNET
AUSTRALIA (NSW) PTY LTD in
accordance with section 127(1) of the
Corporations Act 2001 (Cw/ith) by
authority of its directors:

Signature of director

Michael McCormack

Name of director (block letters)

Signature of ~~director~~/company
secretary*

*delete whichever is not applicable

M. McCormack
Name of ~~director~~/company secretary*
(block letters)

*delete whichever is not applicable

EXECUTED by APA GASNET
AUSTRALIA (OPERATIONS)
PTY LTD in accordance with section
127(1) of the Corporations Act 2001
(Cw/ith) by authority of its directors:

Signature of director

Michael McCormack

Name of director (block letters)

Signature of ~~director~~/company
secretary*

*delete whichever is not applicable

M. McCormack
Name of ~~director~~/company secretary*
(block letters)

*delete whichever is not applicable

EXECUTED by AUSTRALIAN
ENERGY MARKET OPERATOR
LIMITED in accordance with
Section 127(1) of the Corporations Act
2001 (Cwlth) by authority of its directors



.....
Signature of Director

.....
Matt Zema

.....
Name of Director (block letters)



.....
Signature of Company Secretary

.....
Brett A Hausler

.....
Company Secretary (block letters)

- (b) In this Schedule, unless the context otherwise requires,
- (i) All references to engineering documentation such as key plans, site layouts, assembly, process and instrumentation drawings (P&ID) form part of the Service Envelope. Amendments to such drawings shall only be considered valid if mutually agreed to by all parties in writing. In default of agreement the Dispute Resolution Procedure shall apply.
 - (ii) The APA GasNet System assets include transmission system pipelines, pipe line valves, pressure regulator stations, gas compression stations, and telemetry facilities.
 - (iii) Regard shall be had to the common or usual gas industry or engineering descriptions of, and acronyms for, any place, asset, facility, thing, service, quantity, size or matter as an aid to interpretation of this Schedule.
 - (iv) A reference to any licence, permit, plan, drawing, design or other document includes a reference to that licence, permit, plan, drawing or other document as amended, revised, substituted and replaced from time to time as agreed by the parties from time to time in accordance with clause 18.3 of this Agreement.

2 Description of Assets

2.1 Pipelines

The Service Envelope covers the APA GasNet System.

The assets under the pipeline category within the APA GasNet System are located in accordance with the following key plan drawings and all revisions of those drawings agreed by the parties from time to time, initial copies of which are included in the Appendix 1.

The existing APA GasNet System - Part A

In this section 2.1, those assets described in Part A are assets which are included in the APA GasNet System as at the date of execution of the amendments to this Schedule 1.

Sections 2.2-2.6 describe all other assets (including but not limited to regulators, compressor stations and pipeline valves), section 3 describes design capability and section 4 describes operating constraints. These sections apply with immediate effect to the assets described in Part A of section 2.1, insofar as they affect or are directly associated with those Part A assets.

Extensions, expansions and other enhancements to the APA GasNet System - Part B

The assets described in Part B of this section 2.1 are subject to each of those assets and groups of assets becoming part of the APA GasNet System. Each

of those assets and groups of assets may become part of the APA GasNet System at different times.

In addition, the operation of sections 2.2-2.6, 3 and 4 of this Schedule 1, insofar as these sections relate to the assets described in Part B of section 2.1, is subject to those Part B assets becoming part of the APA GasNet System.

Future extensions, expansions and enhancements to the APA GasNet System

If further extensions, expansions and enhancements are made to the APA GasNet System, the parties to this Agreement acknowledge and agree that, under clauses 3.1, 3.3, 3.4 and 5.1 of this Agreement, they are required to agree the effect of those changes and to update these Schedules accordingly.

Part A: Assets included in APA GasNet System as at date of execution of amendments to these Schedules

- (a) APA GasNet System, Longford - Dandenong - Wollert
A4 - 363 - 1
- (b) APA GasNet System, 750 diameter Dandenong - West Melbourne - Brooklyn
A4 - 363 - 2
- (c) APA GasNet System, Brooklyn - Geelong
A4 - 363 - 3
- (d) APA GasNet System, Ballarat - Bendigo
A4 - 363 - 4
- (e) APA GasNet System, Wollert - Albury - Echuca - Koonoomoo - Culcairn
A4 - 363 - 5
- (f) APA GasNet System, (Lara - Iona)
A4 - 363 - 7
- (g) APA GasNet System, North Paratte - Portland, Cobden and Hamilton
A4 - 363 - 6

Part B: Assets to be included in APA GasNet System

Nil

The pipeline assets include the provision of passive linepack as follows:

- (a) The pipelines owned and operated by GTC immediately prior to 11 December 1997 - 462,117 GJ;
- (b) Chiltern to Koonoomoo - 2,135 GJ;
- (c) Barnawartha North to Culcairn - 9,733 GJ;

- (d) Lara to Iona - 21,875 GJ;
- (e) Paaratte to Iona - 106 GJ;
- (f) Paaratte/Allansford/Portland/Cobden/Hamilton - 6,116 GJ; and
- (g) Epping to Somerton - 143 GJ.
- (h) Brooklyn to Lara – 8735 GJ

2.1.1 APA GasNet System

Rural Eastern (Key Plan No. A4-363-1)

Licence 50 (part) - T1 Diameter 450 mm Morwell to Dandenong (Morwell to Dandenong)

The pipeline commences from line valve T001-LV16 near Morwell City Gate travelling in a westerly direction to Dandenong Terminal Station Frankston/Dandenong Road, Dandenong. The length of the pipeline is 126.8 km.

Licence 50 (part) - T1, 300 mm Diameter Supply to Jeeralang (Morwell to Dandenong)

This pipeline commences from branch valve T001-BV20 off the 450 mm Morwell to Dandenong pipeline travelling in an easterly direction to the Jeeralang Metering Station. The length of the pipeline is 0.4 km.

Licence 68 - T38 Diameter 80 mm Pakenham (Healesville - Koo-Wee-Rup Road)

The pipeline commences from branch valve T001-BV09 on pipeline licence 50 in Pakenham travelling along Healesville - Koo-Wee-Rup Road to Meter Station M040 at the Pakenham South City Gate at Healesville - Koo-Wee-Rup Road/Bald Hill Road. The length of the pipeline is 1.2 km.

Licence 67 - T37 Diameter 150 mm Maryvale (Supply to APM Maryvale)

The pipeline commences from two branch valves T060-BV05S and T060-BV05N on pipeline licences 75 and 117 in Tyers travelling in a southerly direction to A.P.M. Maryvale. The length of the pipeline is 5.4 km.

Licence 91 - T44 Diameter 100 mm Warragul (Supply to Anderson Street, Warragul)

The pipeline commences from branch valve T001-BV13 on pipeline licence 50 travelling in a northerly direction to Meter Station M090 near the regulator/station at Anderson Street/Princes Highway. The length of the pipeline is 4.8 km.

**Licence 75 - T60 Diameter 750 mm Longford to Dandenong
(Longford to Dandenong)**

The pipeline commences from Longford Metering Station travelling in a westerly direction via Gooding Compressor Station to Dandenong City Gate in Frankston/Dandenong Road, Dandenong. The length of the pipeline is 174.2 km.

Licence 117 - T60 Diameter 750 mm Rosedale to Tyers (Rosedale to Tyers)

The pipeline commences from the tee after the line valve T060-LV02 on pipeline licence 120 near Rosedale-Limestone Quarry Road/Old Rosedale Road travelling in a westerly direction parallel and to the south of pipeline licence 75 to Tyers Pressure Limiter near Tyers Glengarry West Road. The length of the pipeline is 34.3 km.

Licence 107 - T32 Diameter 100 mm Clyde North (Pound Road to Tuckers Road)

The pipeline commences from branch valve T001-BV06 on pipeline licence 50 at Clyde North Offtake travelling along Pound Road in a southerly direction to Meter Station M038 near Clyde North regulator station at Tuckers Road. The length of the pipeline is 2.0 km.

**Licence 120 - T60 Diameter 750 mm Longford to Rosedale
(Longford to Rosedale)**

The pipeline commences from the Longford Metering Station travelling in a westerly direction in parallel with and to the south of pipeline licence 75 to terminate at a tee on pipeline licence 117 after line valve T060-LV02S and at two branch valves T060-SV204 and T060-SV205 on the pipeline licence 75 at Old Rosedale Road. The length of the pipeline is 30.5 km.

Licence 121 - T63 Diameter 500 mm Tyers to Morwell (Tyers to Morwell)

The pipeline commences from the line valve T001-LV16 on pipeline licence no. 50 near Morwell City Gate at Fourth Avenue travelling in a northerly direction to the branch valves on the pipeline licences 75 and 117 at Tyers Pressure Limiter near Tyers Glengarry West Road. The length of the pipeline is 15.7 km.

**Licence 135 - T60 Diameter 750 mm Bunyip to Pakenham
(Bunyip to Pakenham)**

The pipeline commences from two branch valves T060-SV804 and T060-SV805 on licence 75 at Line valve 8 at Doran Road travelling in a westerly direction parallel with and to the south of pipeline licence 75 to branch valves T060-SV904 and T060-SV905 and the welds on the tees on pipeline licence 141 at Line valve 9 at Dore Road, Princes Highway. The length of the pipeline is 18.7 km.

**Licence 141 - T61 Diameter 750 mm Pakenham to Wollert
(Pakenham to Wollert)**

The pipeline commences from the Pakenham Offtake (Line valve 9) at Dore Road/Princes Highway travelling in a north westerly direction to the Wollert Compressor Station along Summerhill Road. The length of the pipeline is 93.1 km.

2.1.2 APA GasNet System

Rural Central Northern (Key Plan No. A4-363-5)

Licence 101 (part) - T74 Diameter 300 mm Melbourne-Wodonga-Shepparton (Wollert to Wodonga)

The pipeline commences from Wollert Compressor Station near Summerhill Road travelling in a north easterly direction to Meter Station M091 at the Wodonga City Gate near Hume Freeway/Old Murray Valley Highway. The length of the pipeline is 269.4 km.

Licence 101 (part) - T59 Diameter 200 mm Melbourne-Wodonga-Shepparton (Euroa to Shepparton)

The pipeline commences from a branch valve T074-BV09 near Meter Station M064 at Euroa City Gate on the Wollert to Wodonga pipeline traveling in a north westerly direction to Meter Station M081 at Shepparton City Gate, Archer Street. The length of the pipeline is 34.5 km.

Licence 132 - T71 Diameter 200 mm Tatura (Shepparton to Tatura)

The pipeline commences from a weld west of line valve T059-LV02 on the pipeline licence 101 near Meter Station M081 at Shepparton City Gate, Archer Road travelling in a westerly direction to a weld west of line valve T071-LV05 on pipeline licence 132 at Meter Station M082 at Tatura City Gate, Dhurringile Road. The length of the pipeline is 16.2 km.

Licence 136 - T71 Diameter 200 mm Tatura to Kyabram (Tatura to Kyabram)

The pipeline commences from a weld west of line T071-LV05 on the pipeline licence 132 at Meter Station M082 at Tatura City Gate, Dhurringile Road travelling in a north westerly direction to a weld west of line valve T071-LV09 at Meter Station M067 at Kyabram City Gate at McEwan Road/Lilford Road. The length of the pipeline is 21.3 km.

**Licence 152 - T85 Diameter 150 mm Kyabram to Echuca
(Kyabram to Echuca)**

The pipeline commences from a weld west of line valve T071-LV09 at Meter Station M067 at Kyabram City Gate at McEwan Road/Lilford Road travelling in a north westerly direction to Meter

Station M063 at EchUCA City Gate at EchUCA Road/Cornella Road.
The length of the pipeline is 30.7 km.

**Licence 176 - T96 Diameter 200 mm Chiltern to Rutherglen
(Murray Valley)**

The pipeline commences from a branch valve T074-BV16B located on the pipeline licence 101 at Chiltern travelling in a north westerly direction to a weld west of line valve T096-LV03 at the Rutherglen City Gate at Jacks Road/Kings Road in Rutherglen. The length of the pipeline is 14.7 km.

**Licence 182 - T98 Diameter 200 mm Rutherglen to Koonoomoo
(Murray Valley)**

The pipeline commences at a weld west of line valve T096-LV03 at Rutherglen City Gate and travels in a north westerly direction to the Koonoomoo City Gate. The length of the pipeline is 88.8 km.

**Licence 178 - T99 Diameter 450 mm Barnawartha North to
VIC/NSW Border (Barnawartha North to VIC/NSW Border) and
NSW Licence 24 - T99 Diameter 450 mm VIC/Border to Culcairn
(VIC/Border to Culcairn)**

The pipeline commences from branch valve T074-BV16C and T074-BV16D on the Wollert to Wodonga pipeline at Barnawartha - Howlong Rd in Barnawartha travelling in a northerly direction to the EAPL Culcairn Meter Station in NSW. The length of APA GasNet - owned pipeline is 62.5 km.

2.1.3 APA GasNet System

Rural Central (Key Plan No. A4-363-4)

**Licence 78 (part) - T56 Diameter 200 mm Brooklyn-Ballarat-
Bendigo (Brooklyn to Ballan)**

The pipeline commences from Brooklyn Compressor Station in Brooklyn travelling in a westerly direction to Ballan Bifurcation at Ballan. The length of the pipeline is 66.6 km.

**Licence 78 (part) - T57 Diameter 150 mm Brooklyn-Ballarat-
Bendigo (Ballan to Ballarat)**

The pipeline commences from Ballan Bifurcation at Ballan travelling in a westerly direction parallel and to the south of pipeline licence 134 to Meter Station M057 at Ballarat City Gate at Warrenheip Road/Clarks Road, Ballarat. The length of the pipeline is 22.7 km.

**Licence 78 (part) - T70 Diameter 150 mm Brooklyn-Ballarat-
Bendigo (Ballan to Bendigo)**

The pipeline commences from Ballan Bifurcation at Ballan travelling in a northerly direction to Bendigo City Gate near Calder Highway. The length of the pipeline is 90.8 km.

Licence 125 - T67 Diameter 150 mm Maryborough (Guildford to Maryborough)

The pipeline commences from branch valves T070-BV05W, T070-BV04W and T070-BV05E on the pipeline licence 78 and 131 at Guildford Offtake near Midland Highway travelling in a north westerly direction to Meter Station M068 at Maryborough City Gate at Pyrenees Highway/Townsend Road. The length of the pipeline is 31.4 km.

Licence 128 - T66 Diameter 300 mm Mt. Franklin to Kyneton (Mt. Franklin to Kyneton)

The pipeline commences from a branch valve T070-BV03 on pipeline licence 78 and line valve T070-LV04 on pipeline licence 128 at Mt. Franklin Offtake travelling in a easterly direction to a tee south of line valve T066-LV02 at the Kyneton City Gate near Harts Road. The length of the pipeline is 24.5 km.

Licence 131 - T70 Diameter 300 mm Mt Franklin to Bendigo (Mt. Franklin to Bendigo)

The pipeline commences from a tee on the line valve T070-LV04E pipeline licence 128 at Mt. Franklin Offtake near Porcupine Ridge Road travelling in a northerly direction parallel and to the east of pipeline licence 78 to Meter Station M057 at Bendigo City Gate. The length of the pipeline is 50.8 km.

Licence 134 - T57 Diameter 300 mm Ballan to Ballarat (Ballan to Ballarat)

The pipeline commences from three branch valves T057-SV107, T057-SVBBF13 and T056-BV09 on licence 78 at Ballan Bifurcation travelling in a southerly direction in parallel with and to the north of pipeline licence 78 to Meter Station M054 at the Ballarat City Gate at Clarks Road/Warrenheip Road. The length of the pipeline is 22.8 km.

Licence 143 - T75 Diameter 300 mm Wandong to Kyneton (Wandong to Kyneton)

The pipeline commences from two branch valves T074-BV04 and T074-BV05 on pipeline licence 101 at Wandong Offtake in Wandong travelling in a westerly direction to a tee south of line valve T066-LV02 at Meter Station M068 at Kyneton City Gate near Lauriston-Reservoir Road/Harts Road. The length of the pipeline is 59.5 km.

2.1.4 APA GasNet System

Northern Metropolitan (Key Plan No. A4-363-1)

Licence 101 (part) - T74 Diameter 600 mm Melbourne-Wodonga-Shepparton (Keon Park to Wollert)

The pipeline commences from the Wollert Compressor Station near Summerhill Road travelling in a southerly direction to two branch valves T018-BV38 and T018-BV39 on pipeline licence 202 at Keon Park Offtake. The length of the pipeline is 14.1 km.

Licence 202 (part) - T18 Diameter 450 mm Dandenong to West Melbourne (*Keon Park East - Keon Park West*)

The pipeline commences from Metering Station M115 at Keon Park East along Anstey Avenue travelling in a westerly direction to Metering Station M116 at Keon Park West. The length of the pipeline is 0.6 km.

Licence 238 - T102 Diameter 250 mm Somerton (*Epping to Somerton*)

The pipeline commences from a branch valve T074-BV01A at line valve T074-LV01 on 600 mm Keon Park to Wollert pipeline at O'Herns Road and travels westerly to AGL Power's power station in O'Herns Road, Somerton. The length of the pipeline is 3.4 km.

2.1.5 APA GasNet System

South Eastern Metropolitan (Key Plan No. A4-363-2)

Licence 36 (part) - T16 Diameter 750 mm Dandenong to West Melbourne (*Dandenong to West Melbourne*)

The pipeline commences from Dandenong to City Gate in Frankston/Dandenong Road, Dandenong via Dandenong Terminal Station to the West Melbourne Regulator Station Footscray Road, West Melbourne. The length of the pipeline is 36.2 km.

Licence 36 (part T15 Diameter 200 mm Dandenong to West Melbourne (*Princes Highway to Regent St.*)

The pipeline commences from a branch valve T016-BV07 on pipeline licence 36 at Princes Highway along Clyde Street and Regent Street to Meter Station M017 at Regent Street/Burlington Street. The length of the pipeline is 0.8 km.

Licence 129 (part) - T65 Diameter 750 mm Dandenong to Princes Highway (*Dandenong to Princes Highway*)

The pipeline commences from Dandenong City Gate branching to Dandenong Terminal Station, and travelling in a northerly direction to a branch valve T65-LV84 on pipeline licence 36 near Princes Highway/Henty Street. The length of the pipeline is 5.0 km.

Licence 129 (part) - T65 Diameter 500 mm Dandenong to Princes Highway (*Princes Highway to Henty Street*)

The pipeline branches from the 750 mm pipeline licence 129 mentioned above section travelling in a north easterly direction via

Meter station M003 to a branch valve T065-BV07 on the pipeline licence 36. The length of the pipeline is 0.2 km.

2.1.6 APA GasNet System

Western Metropolitan (Key Plan Nos. A4-363-2, 3 and 4)

Licence 108 - T33 Diameter 750 mm South Melbourne to Brooklyn (*South Melbourne to Brooklyn*)

The pipeline commences from two branch valves T016-BV17 and T016-BV18 on pipeline licence 36 along Cecil Street at South Melbourne travelling in a westerly direction to Brooklyn Compressor Station at Old Geelong Road/Jones Road. The length of the pipeline is 12.8 km.

Licence 122 - T62 Diameter 150 mm Derrinut to Sunbury (*Derrinut to Sunbury*)

The pipeline commences from two branch valves T056-BV02 and T056-BV03 on pipeline licence 78 at Hopkins Road/Middle Road travelling in a northerly direction to Meter Station M045 at Sunbury City Gate near Government Road/Shields Street. The length of the pipeline is 24.0 km.

Licence 124 - T64 Diameter 450 mm Newport (*Supply to Newport Power Station*)

The pipeline commences from a branch valve T033-BV07 on pipeline licence 108 near Craig Street travelling in a southerly direction to Meter Station M103 at Newport Power Station. The length of the pipeline is 1.0 km.

Licence 164 - T89 Diameter 150 mm Unichema (*Bay Street to Unichema*)

The pipeline commences from a branch valve T033-BV04 on pipeline licence 108 at Bay Street/Buckhurst Street travelling in a north westerly direction to the Unichema Meter Station M105 at Boundary Street/Munro Street. The length of the pipeline is 0.4 km.

Licence 162 - T88 Diameter 150 mm Laverton to BHP (*Laverton to BHP*)

The pipeline commences from Laverton North City Gate travelling in a northerly direction along Fitzgerald Road to the Meter Station M107 BHP Methanol at Fitzgerald Road/William Angliss Road. The length of the pipeline is 1.6 km.

Licence 81 - T24 Diameter 350 mm Brooklyn to Corio (*Brooklyn to Corio*)

The pipeline commences from Brooklyn Compressor Station at Brooklyn travelling in a south westerly direction to Meter Station

M065 at Corio City Gate near School Road in Corio. The length of the pipeline is 50.7 km.

Licence 253 – T110 Diameter 350 mm Supply to Snowy Hydro Power Plant, North Laverton (*Snowy Hydro*)

The pipeline commences from a branch valve T24-BV03D on Pipeline Licence 81 at James Street travelling in a south easterly direction then westerly along Cherry Lane terminating at the outlet of Meter Station M143 at Cherry Lane in North Laverton. The length of the pipeline is 1.6 km.

2.1.7 APA GasNet System - South West Pipeline

South West Pipeline (Key Plan No. A4-363-7)

Licence 231 - T92 Diameter 500 mm South West Pipeline (*Lara to Iona*)

This pipeline commences at two branch valves T024-BV12A and T024-BV12B at the Lara SWP City Gate at Lara travelling in a south westerly direction to the Iona SWP City Gate. The length of the pipeline is 143.9 km.

Licence 266 – T112 Diameter 500 mm Brooklyn Lara Pipeline (*Brooklyn to Lara*)

This pipeline commences at valve 1221UV62001 on the Brooklyn BCP City Gate Pipeline Licence 81 at Jones Road Brooklyn travelling in a south westerly direction to the Lara SWP City Gate at Hovells Creek Reserve terminating at a weld on the SWP Licence 231 east of T092-BV01. The length of the pipeline is 58.0 km.

2.1.8 APA GasNet System

North Paaratte to Iona Transmission Pipeline (Key Plan No. A4-363-6)

Licence 227 - T100 Diameter 150 mm North Paaratte to Iona

The 150 mm pipeline starts at branch valve T081-BV01A and T081-SVPM15 on the Paaratte to Allansford pipeline at the North Paaratte Metering Station travelling in an easterly direction to the Iona South West Pipeline City Gate where it terminates at the branch valve T092-SC1G12 on the Lara to Iona pipeline. The length of the pipeline is 7.80 km.

2.1.9 APA GasNet System

Western Transmission Pipeline (Key Plan No. A4-363-6)

Licence 145 - T81 Diameter 150 mm Paaratte to Allansford

The pipeline commences at an isolating valve T081-SCPM14 and branch valves T081-BV01A and T081-SVPM15 at the North

Paratite Metering Station travelling in a north westerly direction to branch valve T081-BV03, T081-SVACG262 and T081-SVACG263 and meter M097 at the Allansford City Gate. The length of the pipeline is 33.3 km.

Licence 155 - T86 Diameter 150 mm Allansford to Portland

The pipeline commences from the Allansford City Gate at branch valve T081-BV03 and T086-BV01A travelling in a westerly direction to meter M096 at the Portland City Gate. The length of the pipeline is 100.4 km.

Licence 168 - T91 Diameter 150 mm Curdievale to Cobden

The pipeline commences from the branch valve T081-BV01 at the Curdievale Offtake travelling in a northerly direction to the Cobden City Gate and terminating at meter M093. The length of the pipeline is 27.7 km.

Licence 171 - T93 Diameter 150 mm Codrington to Hamilton

The pipeline commences from the weld on reducer north of branch valves T086-BV06 and T086-BV07 at the Codrington Offtake travelling in a northerly direction to the Hamilton City Gate and terminating at meter M094. The length of the pipeline is 54.6 km.

Licence 252 – T109 Diameter 100 mm Supply to Iluka Resources, Hamilton

The pipeline commences from the branch valve T093-BV01 on the Codrington to Hamilton pipeline Licence 171 near Monivae Subdivision Rd, travelling in a westerly direction to the gas yard within Iluka Resources and terminating at valve 51. The length of the pipeline is 1.1 km.

2.2 Pressure Regulators

The assets under this category are installed within the APA GasNet System and identified as City Gate (CG) or Pressure Limiter (PL) or Pressure Reduction Station (PRS) installations.

The asset reference number, a Key Plan drawing number, and relevant P&IDs are identified in Appendix 8 – Regulator Drawing Index.

The nominated layout plans, assembly drawings, P&IDs and any changes to such drawings will be available to AEMO through formal Data Transmittal and Change Management procedures (MAN 232 Change Management).

Procedures for operating pressure regulators and associated equipment are listed in Appendix 2. - Operational Procedures.

2.2.1 Tyers Pressure Limiter

The installation provides a pressure limiting function for gas supplied into the downstream pipeline Licence 121, T63, 500 mm diameter transmission system and connecting to Morwell Regulator Station. The two branch valve off takes to Tyers Pressure Limiter are from the 750 mm diameter pipelines on the Longford to Dandenong 6890 and 7070 kPa(g) pressure transmission system.

The site plan P9-3-24 shows the layout details of this installation. Monitoring of the facility operational conditions is by inlet and outlet pressure transmitters and outlet temperature transmitter, the data from which is telemetered to the AEMO Operations Centre. The two branch valves can each be remotely opened or closed. Regulator pressure set point can be remotely adjusted.

The drawings P9-3-8 and P9-3-5 show the general arrangement and instrumentation for this installation.

The purpose of the installation is to achieve delivery temperatures at M102 Jeeralang meter station above minus 2 degrees C through ground heat recovery in the Tyers to Morwell pipeline without the need for heaters under all reasonable conditions of inlet temperature, pressure and flow.

The complete pressure limiter facility is within a security fence enclosure and includes station inlet pipe work connecting from the off-takes on the North and South Longford to Dandenong 750mm diameter duplicate pipelines and the station outlet including the pig trap assembly serving the 500 mm Tyers to Morwell pipeline. The pressure regulator installation is enclosed in a solid brick building providing protection and security for that asset. The regulator station may be manually bypassed for maintenance.

2.2.2 Morwell City Gate

The regulator station provides pressure reduction for gas supplied from the Tyers to Morwell MAOP 7070 kPag pipeline into the Morwell to Dandenong MAOP 2760 kPag "Lurgi Pipeline" 450 mm diameter transmission system and connecting to Dandenong Terminal Station/Dandenong Pressure Limiter.

The site plan N3-076-6 shows the site layout details of this installation.

The drawings P8-13-5 and P8-13-4 show the general arrangement and instrumentation for this installation.

The complete City Gate facility is an above ground assembly within a security fence enclosure and includes station inlet pipe work and pig trap assembly connecting from the 500 mm Tyers to Morwell pipeline and supplies the 450 mm "Lurgi Pipeline".

2.2.3 Dandenong City Gate

The regulator station provides pressure reduction of gas supplied from the Longford to Dandenong MAOP 6890 kPa(g) pipeline system and delivering into the 750 mm diameter MAOP 2760 kPa(g) transmission pipeline to West Melbourne.

The drawings Q31-3-29 and Q31-3-36 show the site layout of this facility.

The regulator assembly includes remote control capability for regulator run shutoff and outlet pressure set point adjustment that is operated and maintained in accordance with APA GasNet procedures listed in Appendix 2.

The drawings 3221-PB-001 through 3221-PB-007 show the details for this installation.

The regulator assembly has provision for the addition of three extra assemblies.

The complete City Gate facility is an above ground complex within a security fence enclosure and includes the station pig trap receiving assembly from the Longford Pipeline Licence 75, T60, 750 mm diameter and the outlet station pipe work connecting to the 750 mm diameter transmission pipelines to West Melbourne.

2.2.4 Wollert City Gate

This regulator station provides pressure reduction of gas being supplied into the “Keon Park to Wollert” transmission pipeline, (Licence 101-T74, 600 mm diameter) connecting to the distribution pipeline assets at Meter stations M116 and M115 respectively.

The facility provides a selection of two alternative sources of gas being supplied into the Keon Park to Wollert pipeline (Licence 101-T74, 600 mm 2760 kPa(g) MAOP) via either Run 1 or Run 2 of the Wollert City Gate (P8-16). The two sources of gas supply are Longford gas from the Pakenham to Wollert pipeline (Licence 141 T61, 750mm 6890 kPa(g) MAOP) and Moomba gas from the Wollert to Wodonga pipeline (Licence 101, T74, 300mm 7400kPa(g) MAOP).

The general site plan L1-37-48 shows the layout details of this installation.

P&ID drawings 1312-PB-001 through 1312-PB-007 and 1312-PB-013 and 1312-PB-014 show the details of the control and instrumentation system.

The Wollert City Gate consists of a water bath heater, four regulator runs (each with slam-shut valves and single active regulator), station inlet and outlet isolation valves.

The facility has an RTU, shared with the Wollert Pressure Limiter, which allows remote set-point control of the single cut regulators and remote operation of both the slam-shut and run selection valves. The station PLC controller performs other local control, flow calculation and monitoring functions as shown on the P&ID drawings.

The regulator assembly includes remote control capability for the following equipment that is operated and maintained in accordance with the APA GasNet procedures listed in Appendix 2.

- Remote operation of inlet actuated valves for Runs 1 and 2. (There are two actuated inlet valves in each run to select source of gas).
- Remote shutoff of inlet slamshut valves to isolate regulator runs.
- Outlet pressure set point adjustment.
- There is no flow control at Wollert City Gate (P8-16)

The drawings P8-16-1 and L1-37-25 show the general arrangement and flow diagram details for this installation.

The Wollert City Gate facility is an above ground facility fully enclosed within a security fence enclosure and includes the station pig trap receiving assembly from the Pakenham to Wollert pipeline (Licence 141-T61, 750 mm diameter) and the outlet station pipe work connecting to the Wollert Compressor Station and Keon Park pipeline.

2.2.5 Wollert Pressure Limiter

The Wollert Pressure Limiter has been designated as P9-12. The facility provides one of the following two operational modes:

- (1) Bi-directional flow of gas between the Pakenham to Wollert pipeline (Licence 141 T61, 750mm 6890 kPa(g) MAOP) and the Wollert to Wodonga pipeline (Licence 101, T74 300mm, 8800 kPa(g) MAOP) or
- (2) Pressure reduction of gas flowing from the Pakenham to Wollert pipeline and into the Wollert to Wodonga pipeline and/or into the inlet of the City Gate regulator runs.

Site plan 1321-MA-001 shows the layout of this pressure limiter installation.

P&ID drawings 1312-PB-010, 1312-PB-011 and 1312-PB-012 show the details of the control and instrumentation system of this pressure limiter.

The facility comprises three parallel runs:

- One 300mm bi-directional un-regulated by-pass run through which gas can flow between the Pakenham to Wollert pipeline and the Wollert to Wodonga pipeline.
- Two uni-directional pressure/flow regulator runs (one duty and one stand-by) which provide pressure reduction of gas flowing from the Pakenham to Wollert pipeline and into the Wollert to Wodonga pipeline.

The outlet header of the regulator runs is connected to inlet valves to Run 1 and Run 2 of Wollert City Gate which in turn supply gas into the Keon Park to Wollert pipeline (Licence 101, T74 600mm 2760 kPa(g) MAOP).

The facility has an RTU, shared with the Wollert City Gate, which allows remote set-point control of the single cut regulators and remote operation of both the slam-shut and run isolation valves. The station PLC controller performs other local control, flow calculation and monitoring functions as shown on the P&ID drawings.

The complete pressure limiter facility is an above ground assembly installed within the same security fence enclosure as the Wollert City Gate P8-016. The facility includes:

- (a) Inlet pipe work connecting to the Wollert City Gate inlet header; and
- (b) Outlet pipe work connection to Run 1 and Run 2 of the Wollert City Gate P8-016, and to valve 501 on the Wollert Compressor Station outlet pipe work.

2.2.6 Laverton North City Gate

The City Gate provides pressure reduction of gas from the Brooklyn Compressor Station to Corio City Gate transmission pipeline Licence 81, T24, 350 mm diameter and supplies gas into the transmission pipeline Licence 162, T88, 150 mm diameter connecting to the BHP Methanol Plant.

The site plans L1-49-1 and L1-49-4 show the layout of this City Gate installation.

The drawings P8-27-9 and P8-27-3 show the general arrangement and auxiliary diagram details for this installation.

The complete City Gate facility is an above ground assembly installed within a security fence enclosure and includes the station inlet pipe work connecting from the Brooklyn-Corio transmission pipeline and outlet pipe work connecting to the pipeline supplying the Methanol Plant. This is adjacent to another City Gate.

The City Gate is located within a brick building on APA GasNet property.

2.2.7 Hopkins Road Pressure Limiter

Decommissioned.

2.2.8 Clunes Road Pressure Limiter

Decommissioned.

2.2.9 Toolamba Road Pressure Limiter

Decommissioned.

2.2.10 Dandenong Pressure Limiter (Lurgi Backup Regulator)

The facility is also known as the “Lurgi backup regulator” and is operated to support receipt pressures at Dandenong from the Morwell to Dandenong “Lurgi” 450mm diameter pipeline.

The drawings N3-005-2, N3-005-5 and N3-005-26 show the layout of this facility.

The facility comprises two runs each fitted with an active regulator.

The facility provides pressure reduction from a maximum 2760 kPa(g) to a typical 1700 kPa(g) minimum.

The complete regulator assembly is an above ground facility installed within the security fencing of the Dandenong Terminal Station complex.

The facility includes a gas water bath type heater installed to offset the Joule-Thompson cooling effect produced by the pressure reduction through the regulator assembly.

2.2.11 Clonbinane Pressure Limiter

Decommissioned.

2.2.12 Lara SWP City Gate

The Lara SWP City Gate facility is designed to:

- supply gas from the Port Campbell gas fields and Western Underground Gas Storage facility (WUGS) as well as the SeaGas / Otway / Mortlake gas facilities to the APA GasNet System (GNS) and;
- deliver gas from Brooklyn to WUGS and the Paaratte / Allansford / Portland / Cobden / Hamilton pipeline during the off-peak season.

This pressure regulator facility has been designated as P10-01. This facility can be operated in either one of the following two modes of operations:

- (1) Uni-directional flow of gas from Brooklyn to Corio pipeline (Licence 81, T24, 350mm) to the South West Pipeline (Licence 183, T92, 500mm)

- (2) Pressure reduction of gas flowing from the South West Pipeline into the Brooklyn to Corio pipeline.

Lara SWP City Gate consists of a bi-directional flowmeter, a water bath heater, five regulator runs [i.e. one small run (Run 1) and four larger runs of equal size (Runs 2, 3, 4 & 5)] with slam-shut valves and a by-pass line with over-pressure protection.

Site plan 2631-MA-001 shows the general layout of this City Gate installation.

P&ID drawings 2631-PB-001, 2631-PB-002, 2631-PB-003, and 2631-PB-004, show the details of the control and instrumentation system of this City Gate.

The facility has an RTU, which allows remote set-point control of the active regulators and remote operation of the slam-shut valves in all runs. The RTU also performs other local control, flow calculation, set-point tracking of monitor regulators and monitoring functions as shown on the P&ID drawings.

The complete City Gate facility is an above ground assembly installed within a security fence enclosure.

Each regulator run consists of an upstream actuated slam-shut block valve to provide overpressure protection and two independent regulator valves in series to provide pressure control. The upstream regulator is known as the *Monitor Regulator* and the downstream regulator is known as the *Active Regulator*. A check valve is located downstream of the regulators, followed by a manual isolation valve at the end of the run.

2.2.13 Brooklyn (BCP) City Gate

Brooklyn (BCP) City Gate is designed to supply gas from the Port Campbell gas fields and underground gas storage facility (WUGS) as well as the SeaGas / Otway/ Mortlake supplies to the APA GasNet System (GNS):

This pressure reduction station has been designated as P8-28. The station provides pressure reduction of gas flowing from the Brooklyn to Corio pipeline (Licence 81-T24, 350mm 7390kPa(g) MAOP) and/or from the outlet of Brooklyn (BLP) City Gate into the South Melbourne to Brooklyn pipeline (Licence 108-T33, 750mm, 2760 kPa(g) MAOP).

Brooklyn (BCP) City Gate consists of a regulator station containing five regulator runs [i.e. one small run (Run 1) and four larger runs of equal size (Runs 2, 3 & 4)] with inlet isolation (slam-shut) valves and a by-pass line with over-pressure protection. A bi-directional flowmeter and two water bath heaters each with two burners, are

located in the common line upstream of the regulator station and the pressure limiter station.

Site plan 1221-MA-001 shows the general layout of this City Gate installation. P&ID drawings 1221-PB-001, 1221-PB-002, 1221-PB-003, 1221-PB-004 and 1221-PB-005 show the details of the control and instrumentation system of this City Gate.

Brooklyn (BCP) City Gate shares an RTU with the Brooklyn BBP pressure limiter (P9-11). The RTU provides remote set-point control of the active regulators and remote operation of the inlet isolation slam-shut valves. The RTU also performs other local control, flow calculation and monitoring functions as shown on the P&ID drawings.

The complete City Gate facility is an above ground assembly installed within the Brooklyn site security fence enclosure.

Each regulator in runs one to four consists of an upstream actuated slam-shut block valve to provide overpressure protection and two independent regulator valves in series to provide pressure control. The upstream regulator is known as the *Monitor Regulator* and the downstream regulator is known as the *Active Regulator*. A check valve is located downstream of the regulators, followed by a manual isolation valve at the end of the run.

Run five consists of an upstream actuated slam-shut block valve to provide overpressure protection and only one independent regulator valve to provide pressure control. This run and the bypass run are directly controlled by the station safety PLC via the station RTU.

Actuated valves in these two runs operate on instrument air which is generated by the compressor station instrument air system. A dry gas receiver is dedicated to the Brooklyn (BLP) and BCP City Gates.

2.2.14 Brooklyn (BBP) Pressure Limiter

Brooklyn BBP Pressure Limiter is designated as P9-11. The station provides pressure reduction of gas flowing from the Brooklyn to Corio pipeline (Licence 81-T24, 350mm 7390 MAOP) into the Brooklyn to Ballan pipeline (Licence 78-T56, 200mm, 7390 kPa(g) MAOP).

Site plan 1221-MA-001 shows the general layout of this pressure limiter installation.

P&ID drawings 1223-PB-001 and 1223-PB-003 show the details of the control and instrumentation system of this pressure limiter.

Brooklyn Pressure Limiter shares an RTU with the Brooklyn BCP City Gate (P8-28). The RTU provides remote set-point control of the single cut regulators and remote operation of the inlet isolation valves. The RTU also performs other local control, flow calculation and monitoring functions as shown on the P&ID drawings.

The complete pressure limiter facility is an above ground assembly installed within the Brooklyn site security fence enclosure. The inlet to the limiter is connected to the inlet header of the Brooklyn BCP City Gate. The Limiter and City Gate share a common single path ultrasonic flow meter to provide indicative flow measurement and provision to implement flow control.

The pressure limiter station consists of two identical runs containing an actuated inlet isolation valve, a pressure regulator, a check valve and a manual outlet isolation valve.

2.2.15 Barnawartha City Gate

The pressure reduction station is designated as P10-02. The facility provides one of the following two operation modes:

- (1) Bi-directional flow of gas between the Barnawartha North to the Victorian/NSW border pipeline (Licence 178-T99, 450mm, 10200kPa(g) MAOP) and the Wollert to Wodonga Pipeline (Licence 101, T74 300mm, 7400kPa(g) MAOP); and
- (2) Pressure reduction of gas flowing from the Interconnect (Barnawartha North to Culcairn) pipeline and into the Wollert to Wodonga pipeline.

Site plan 6650-MA-001 shows the general layout of this City Gate installation.

P&ID drawings 6650-PB-001, 6650-PB-002, 6650-PB-003 and 6650-PB-004 show the details of the control and instrumentation system of this City Gate.

The facility has an RTU, which allows remote set-point control of the active regulators and remote operation of the slam-shut valve in all three runs (two regulator runs and one bypass). The RTU also performs other local control, flow calculation and monitoring functions as shown on the P&ID drawings.

The complete City Gate facility is an above ground assembly installed within a security fence enclosure and includes the station pipe work, two line valve assemblies, a pig launching and receiving assembly, a station vent connecting to the Interconnect (Barnawartha North to Culcairn) pipeline and station pipe work connecting to the Wollert to Wodonga pipeline.

2.2.16 Wandong PRS

This pressure reduction station has been designated as P9-13. The facility provides pressure reduction of gas flowing from the Wollert to Wodonga pipeline (Licence 101, T74, 300mm 7400 kPa(g) MAOP) into the Wandong to Kyneton pipeline (Licence 143 T75, 300mm, 7390 kPa(g) MAOP).

Site plan 2451-MA-001 shows the general layout of this pressure limiter installation.

P&ID drawings 2451-PB-001, 1312-PB-002 and 1312-PB-003, show the details of the control and instrumentation system of this pressure limiter.

The facility has an RTU, which allows remote set-point control of the single cut regulators and remote operation of the run isolation valves. The RTU also performs other local control, flow calculation and monitoring functions as shown on the P&ID drawings.

The complete pressure limiter facility is an above ground assembly installed within a security fence enclosure and includes inlet pipe work that connects directly into the Wollert to Wodonga pipeline and the outlet pipe work connects into the Wandong to Kyneton pipeline.

2.2.17 Iona City Gate

The Iona pressure reduction station has been designated as P10-03. This facility can be operated in either one of the following two operational modes:

- (a) Uni-directional flow of unregulated gas from the 150mm North Paaratte to Iona pipeline (Licence 227, T100, 150mm) to South West Pipeline (Licence 231, T92, 500mm); and
- (b) Pressure reduction of gas flowing from the South West Pipeline into the 150mm North Paaratte to Iona pipeline.

Site plan 4630-MA-001 shows the general layout of this City Gate installation. P&ID drawings 4630-PB-001, 4630-PB-004, 4630-PB-005, 4630-PB-006, and 4630-PB-011 show the details of the control and instrumentation system of this City Gate.

The facility shares a common RTU with other facilities in the Iona station complex to allow remote set-point control of the active regulators and remote operation of the slam-shut valves in all runs. The RTU also performs other local control, flow calculation and monitoring functions as shown on the P&ID drawings.

The complete City Gate facility is an above ground assembly installed within the security fenced enclosure of the Iona station complex and includes:

- (a) the station pipe work connecting to the South West Pipeline and the North Paaratte to Iona pipeline;
- (b) a three valve assembly for future installation of a water bath heater;
- (c) a bi-direction single path ultrasonic flow meter to provide indicative flow measurement and provision to implement flow control;
- (d) a City Gate regulating station with two regulator runs [one 100mm (Run 1) and one 150mm (Run 2)] with slam-shut valves and a by-pass line with over-pressure protection;

- (e) an ESD valve (UV-71) on the line to the WUGS Custody Metering Station;
- (f) a Pig Launcher/Receiver at the end of the Iona-Lara Pipeline (SWP);
- (g) a Pig Launcher/Receiver at the end of the Iona-North Paratite Pipeline; and
- (h) station isolation valves for the Iona Compressor Station.

Each regulator run consists of an upstream actuated slam-shut block valve to provide overpressure protection and two independent regulator valves in series to provide pressure control. The upstream regulator is known as the *Monitor Regulator* and the downstream regulator is known as the *Active Regulator*. A check valve is located downstream of the regulators, followed by a manual isolation valve at the end of the run.

2.2.18 Brooklyn (BLP) City Gate

Brooklyn (BLP) City Gate was designed to supply gas from the Port Campbell gas fields and underground gas storage facility (WUGS) to the APA GasNet System:

This pressure reduction station has been designated as P10-04. The station provides pressure reduction of gas flowing from the Brooklyn to Lara Pipeline (Licence 266-T112, 500mm 10,200 kPa(g) MAOP) into the Brooklyn to Corio Pipeline (Licence 81-T24, 350mm 7390kPa(g) MAOP), the BCP City Gate facility or the BBP City Gate facility.

Brooklyn BLP City Gate consists of a regulator station containing five regulator runs [i.e. one small run (Run 1) and four larger runs of equal size (Runs 2, 3 & 4)] with inlet isolation (slam-shut) valves and a by-pass line with over-pressure protection. A bi-directional flowmeter and two water bath heaters and each Heater has one burner are located in the common line upstream of the regulator station and the pressure limiter station.

Site plan 1221-MA-001 shows the general layout of this City Gate installation. P&ID drawings 1222-PB-001 through 1221-PB-014 show the details of the control and instrumentation system of this City Gate. Instrument air is shown on 1200-PB-190.

The Brooklyn BLP City Gate RTU provides remote set-point control of the active regulators and remote operation of the inlet isolation slam-shut valves and heaters. The station safety PLC also performs other local control, flow calculation and monitoring functions as shown on the P&ID drawings. The RTU also provides control for the adjacent BCP City Gate heaters, BCP regulator run 5 and BCP bypass run.

The complete City Gate facility is an above ground assembly installed within the Brooklyn site security fence enclosure.

Each regulator in runs one to four consists of an upstream actuated slam-shut block valve to provide overpressure protection and a single *Active* regulator valve to provide pressure control. A check valve is located downstream of the regulators, followed by a manual isolation valve at the end of the run.

All actuated valves (with the exception of the BLP station inlet valve) operate on instrument air which is generated by the compressor station instrument air system. An instrument air dry gas receiver is dedicated to the Brooklyn (BLP) and BCP City Gates.

2.2.19 Euroa Pressure Reduction Station

This pressure reduction station has been designated as P10-7. The facility provides pressure reduction of gas flowing north from the Wollert to Euroa pipeline (Licence 101, T74, 300mm 8800 kPa(g) MAOP) into the Euroa to Wodonga pipeline (Licence 101, T74, 300mm 7400 kPa(g) MAOP). The facility also provides control for the two line-valves which permit southerly flow

Site plan 1600-MA-001 shows the general layout of this pressure reduction station.

P&ID drawing 1600-PB-001 shows the details of the control and instrumentation system.

The facility has an RTU, which allows fixed set-point control of the single cut regulator and remote operation of the run isolation valve. The RTU also performs automated and manual control functions for the operation of the two line valves and associated loading valves, plus other local control, flow calculation and monitoring functions as shown on the P&ID drawing.

The complete pressure reduction station is an above ground assembly installed within a security fence enclosure and includes inlet and outlet pipe work that connects directly into the Wollert to Wodonga pipeline.

2.3 Compressor Stations

The assets under this category are installed within the APA GasNet System. The engines and compressors at each facility are identified in the Compressor Stations Key Data Plan No. A1-301-1.

The compressor stations provide appropriate gas pressures and inventory control utilising the transmission pipeline system as detailed in this document.

The asset reference number, a Key Plan drawing number, and relevant P&IDs are identified in Appendix 3.

Compressor unit staging and gas turbine facilities are also identified in the Compressor Stations Key Data Plan A1-301-1 as amended by the parties from time to time.

2.3.1 Gooding Compressor Station

The compressor station provides gas compression on the Longford-Dandenong 750 mm diameter MAOP 6890 kPa(g) pressure pipeline at the location of Line valve 5, under Licence 75, T60.

The compressor station is fitted with four (4) "Centaur" gas turbine driven centrifugal compressors manufactured by Solar Turbines of the U.S.A. Each compressor set is rated at a Nominal Power of 2850 kW. The four machines are housed in a solid brick sound attenuated building with the compressor control room, electrical switch room, staff amenities and maintenance workshop located in the annex adjacent to the compressor building.

The compressor station facilities include underground inlet station pipe work connecting to four compressor suction liquid separators (one dedicated to each machine) with associated inlet and outlet header pipe work, connecting into the Longford-Dandenong pipeline system. Other features of the facility include station inlet and outlet pipe work blowdown manifolds and blowdown stack, condensate collection pipe work and storage vessels, lubricating oil coolers, lubricating oil storage facilities, gas turbine fuel gas supply system with redundant electric immersion heaters, station capacity control valve, instrument air system, station and compressor unit controls and SCADA facilities to the AEMO Operations Centre.

The complete facility is enclosed within an inner and outer security chain wire fence and locked security gates.

2.3.2 Wollert Compressor Station

Wollert Compressor Station

The compressor station provides gas compression from the Pakenham-Wollert outer ring main being a 750 mm diameter MAOP 6890 kPa(g) pressure pipeline and delivering into the APA GasNet System for Shepparton, Echuca, Albury and the inter-connect to New South Wales.

The compressor station 'B' has two (2) Centaur gas turbine driven centrifugal compressors manufactured by Solar Turbines of the U.S.A. The compressor sets are rated at a Nominal Power of 4550 kW. The two packages each incorporate a sound attenuated enclosure. Unit controls and associated DC supply are housed within an adjacent Control Room which has fire suppression fitted. Station safety controls are located within the Station 'A' building with the compressor control room, electrical switch room, staff amenities, and maintenance workshop located in the annexe adjacent to the compressor building for Station 'A'.

Station 'A' has three (3) Saturn compressor sets with Nominal ISO Power of between 850 and 950 kW. The packages are housed in a sound-attenuated solid brick compressor hall.

The compressor station 'B' facilities include above-ground inlet station pipe work connecting two (2) filter-separators with associated header pipe work and station outlet pipe work with gas after-coolers connecting into the Wollert/Albury pipeline system. Other features of the facility include station inlet and outlet pipe work, blowdown manifolds and blowdown stack, condensate collection pipe work, unit fin-fan coolers, station capacity control valve, station instrument air system, lubricating oil coolers, lubricating oil storage facilities, gas turbine fuel gas supply and conditioning system, station and unit controls and SCADA facilities to the AEMO Operations Centre.

The complete facility is installed within a site secured chain wire security fence with locked security gates.

2.3.3 Brooklyn Compressor Station

The compressor station provides gas compression from the 750 mm diameter MAOP 2760 kPa(g) South Melbourne to Brooklyn pipeline and delivers into the Brooklyn to Corio pipeline (Licence 81, 350mm diameter) and Brooklyn to Ballarat/Bendigo pipeline (Licence 78, 200mm and 150mm diameter).

The compressor station has two (2) Centaur and two (2) Saturn gas turbine driven centrifugal compressors rated at 3350 kW, 2850 kW 950 kW and 850 kW per unit respectively. The Centaur compressors are fitted with "dry seals" which are supported by redundant air compression facilities. The two Centaur and two Saturn compressor sets are packaged skid mounted assemblies.

Unit isolating valves for the Saturn compressor sets allow connection between various combinations of inlet and outlet headers. Similarly, the unit discharge isolating valves for the Centaur compressor sets allow connection between either the Geelong or Ballarat discharge headers. The station logic is managed by a Triconex control system.

The compressor control rooms, electrical switch rooms, staff amenities, stand-by power generator room and maintenance workshop are located in adjacent buildings.

The compressor station facilities include underground inlet station pipe work connecting to compressor suction liquid separators (one dedicated to each machine) with associated inlet header pipe work. While each compressor set has its own dedicated gas cooler, the associated water cooling towers for unit 8 is shared with unit 11, and unit 9 is shared with unit 10. The gas aftercooler for unit 12 is a fin-fan cooler. The station outlet headers with pipe work connect into the APA GasNet System for Geelong and Ballarat.

Other features of the facility include station inlet and outlet pipe work blowdown manifolds and blowdown stack, condensate collection pipe work, lubricating oil coolers, lubricating oil storage facilities, gas turbine fuel gas supply system, station and unit controls, and SCADA facilities to the AEMO Operations Centre.

The facility is installed within a site secured chain wire security fence with locked security gates.

2.3.4 Springhurst Compressor Station

The assets more particularly described in this Schedule as the Springhurst Compressor ("Springhurst Compressor") were originally installed by or on behalf of APA GasNet under an accelerated schedule to meet the requirements of the Winter 99 Project initiated by the Victorian State Government. As a result, the parties to this Agreement acknowledge and agree paragraphs (i) to (v) of clause 2.3.4 do not apply to any equipment or plant of the Springhurst Compressor that was modified or upgraded at any time following operational handover to AEMO of the Winter 99 Project:

- (i) the design of the Springhurst Compressor may not have occurred in accordance with Good Practice;
- (ii) the Springhurst Compressor may perform with diminished capability and with little or no in-built redundancy capable of allowing the Springhurst Compressor to continue to operate at an acceptable level in the event of a failure of any part of the assets which comprise the Springhurst Compressor;
- (iii) the Springhurst Compressor may not have undergone a comprehensive testing and commissioning program;
- (iv) deleted
- (v) if the capacity or potential capacity of an Extension and/or an Expansion is affected by the operational capability or functionality of the Springhurst Compressor, then for the purposes of determining:
 - (A) the additional capacity made available by any Extension and/or Expansion under clause 5.1 of the Agreement;
 - (B) the extent of any failure by APA GasNet to provide the APA GasNet Service Envelope Capacity under clause 5.2 of the Agreement; or
 - (C) the amount of additional Authorised MDQ which may be made available as a consequence of that Extension and/or Expansion under clause 5.1 of the Agreement,

the parties must take into consideration the diminished capability of the assets as described in this paragraph 2.3.4.

The diminished capability of the Springhurst Compressor is set out as follows:

- No redundant capacity of the Springhurst Compressor is available;
- The Cooler capacity is undersized for the full weather spectrum expected at the Springhurst Compressor station. Its operating range is specified in clause 4.3.4.15 of this Schedule.

The Springhurst Compressor Station provides gas compression to boost the line pressure in the 300mm diameter MAOP 7400 kPa(g) Wodonga to Euroa pipeline. It can compress gas in a southward direction towards Melbourne into the APA GasNet System to Shepparton, Echuca, Ballarat and Wollert, or compress in a northward direction towards Wodonga and Culcairn.

The compressor station has one (1) “Centaur 50” gas turbine driven centrifugal compressor manufactured by Solar Turbines of the U.S.A. This compressor is rated at a Nominal Power of 4550 kW. The compressor is fitted with “dry seals” which is supported from the redundant instrument air facilities. The single machine is housed in a sound attenuated enclosure. A separate process control room (PCR) houses the unit and station control systems, switch room and battery systems. There is a diesel stand-by power generator.

The compressor station facilities include inlet station pipe work connecting to a suction filter separator with associated header pipe work and station outlet pipe work with fin fan gas after-cooler connecting into the Wollert/Albury pipeline system. An actuated linevalve and two sets of actuated station isolation valves provide the means of compressing either north or south, and permitting pipeline free flow. Other features of the facility include station inlet and outlet pipe work, blowdown manifolds and vent stack, station and unit controls and SCADA facilities to the AEMO Operations Centre. Auxiliary systems include the fuel gas custody meter, dual run fuel gas regulators and oily liquids separators.

The complete facility is installed within a site secured chain wire security fence with locked security gates.

2.3.5 Iona Compressor Station

The Iona Compressor Station is designed to compress natural gas from the 500mm diameter 10,000 kPa(g) Lara to Iona Pipeline into the 150mm diameter MAOP 7,400 kPa(g) North Paratte to Iona Pipeline.

The facilities include two compressor/driver packages each housed in individual acoustic enclosures with associated process gas coolers, outlet and inlet scrubbers and unit vents. Each package has a Caterpillar reciprocating engine of nominal 298 kW power driving a single stage Gemini reciprocating compressor with integral load controller and recycle valve. One unit is required to meet 100% of the design capacity requirements with the other unit as standby. A common fuel gas system, control building, electrical supply and station control services both packages. The SCADA facilities to the AEMO Operations Centre utilise the same RTU as the Iona City Gate.

The complete compressor facility is an above ground assembly installed within the security fenced enclosure of the Iona station WUGS complex.

2.4 Pipeline valves

The assets under this category within the APA GasNet System are identified as Line valves, Branch Valves, Pig Trap Valves, Pig Trap Kicker Valves and Blowdown Valves. The Line valves, Branch Valves and Blowdown Valves are located in accordance with the key plan drawings listed in Appendix 1.

The Pig Trap Valves and Pig Trap Kicker Valves are installed at the termination of each piggable pipeline to facilitate the pigging operation. APA GasNet will make drawings available to AEMO at the time of pigging.

Descriptions of each type of Pipeline Valves are listed as below:

2.4.1 Line valves

Line valves are provided in the APA GasNet System to isolate the pipeline in segments for maintenance, operation, repair and for protection of the environment and public in the event of loss of pipeline integrity. Usually, they have by-pass facilities and provision for “blowing down” the section of main upstream and downstream of the valve operators and blowdown assemblies. The line valves are usually located within a wire enclosure in cross country pipelines and in pits in built-up area. The Mainline valves are normally in an “Open” Position.

2.4.2 Remotely Actuated Line valves

Appendix 9 tabulates all the main line valves, which are remotely actuated from within the AEMO Operations Centre.

2.4.3 Branch Valves

Branch (offtake) Valves are installed at the branches of the pipeline to provide isolation between the offtake and the pipeline. Branch Valves are normally in an “Open” Position.

2.4.4 Pig trap valves

Pig trap valves are provided at the termination of each piggable transmission pipeline as part of pigging pipe works to isolate the pipeline and the pig trap. The Pig trap valves are normally in a “Close” position.

2.4.5 Pig trap kicker valves

Pig trap kicker valves are provided at pigging pipe works to facilitate the launching and receiving of the pig during pigging operation. The Pig trap kicker valves are normally in a “Close” position.

2.4.6 Blowdown valves

Blowdown valves are installed to facilitate pipeline blowdown, flaring, purging and pipeline pressure equalisation prior to line valve operation by providing a throttling facility. The bypass assembly enables the line valve to be operated to fully closed position for a short period and still maintain gas flow.

The valve status/position depends on its location in the pipeline system listed on the “APA GasNet’s Critical TP Valves” in Appendix 4. The valve positions shown reflect the initial setting. The parties agree that operational positions and the relevant AEMO database will be under AEMO control in accordance with the AEMO Valve Change Procedure, developed and maintained in consultation with APA GasNet.

2.5 Telemetry

The telemetry system provided under this Service Envelope includes Remote Telemetry Units (RTU’s) located at each compressor station, receipt points on the GNS, major valve installations, pressure limiters and City Gates. The communications diagrams A4-362-1, A4-362-3, A4-362-4, A4-362-5, A4-362-6 and RTU555 identify the relevant network topology, communications line reference numbers, baud rates, RTU addresses, control centres and other technical details necessary to identify the communication path between each RTU and AEMO. Each RTU shall be configured in accordance with a functional specification prepared specifically for the RTU.

The telemetry system is the primary means of monitoring and managing the capacity of APA GasNet assets by AEMO, and is designed to carry data for both AEMO and APA GasNet. Data interfaces, signal names, storage requirements, polling frequencies and alarm responses shall be specified by APA GasNet in the functional specification for each particular RTU as agreed by AEMO. Changes to this specification are managed under the APA GasNet change management procedure MAN 232 and are subject to agreement of both parties.

2.6 Odourisation

Natural gas is delivered by Esso from its Longford natural gas processing plant into the APA GasNet System via the Longford Metering Station. Odourant is injected by APA GasNet into the natural gas stream at the Longford Metering facility to achieve odourant concentration levels as required by the Gas Industry Act 2001 (Vic) and/or Gas Safety Act 1997 and/or relevant subordinate legislation.

The operation, maintenance and control of the Longford odourant installation is the responsibility of APA GasNet. AEMO will provide monitoring services to APA GasNet in line with the agreed functional specification.

The facility is located within the site of the Longford Metering station. The main components of the odourant plant includes two (2) stainless steel storage tanks each of 20,000 litres liquid capacity within a concrete wall bund, dual odourant injection pumps complete with controls to achieve odourant injection proportional to gas flow rate and in concentration required by relevant legislation. Monitoring of odourant dosing rate achieved by the system is provided by an RTU supervisory system which provides data and alarms to the AEMO Operations Centre.

2.7 Pressure Transmitters at Embedded Meter Sites

APA GasNet have installed pressure transmitters at the embedded meter sites of Sale (M079), Corio (M065), Ballarat (M054), Bendigo (M057) and Castlemaine (M059). These pressure transmitters have been installed to enable AEMO to monitor the system pressures at these delivery points and data is available via the associated CTM RTU.

3 Design Capability

This section describes the capability of the APA GasNet assets in the Service Envelope with respect to operation of the system, and the specific design capability of these assets.

The system is made available for carriage of gas which meets the gas specification for transmission systems in the Gas Safety (Gas Quality) Regulations 2007 (Vic) or any other like applicable laws or regulations.

The design capability of the APA GasNet System requires that gas injected into the APA GasNet System is free from objectionable odours and from dust and other solid or liquid matters, waxes, gums or gum forming constituents which may interfere with its merchantability or cause injury to or interference with the proper operation of the pipelines, meters, regulators or other appliances through which it flows. Accordingly, AEMO will use its reasonable endeavours to ensure that, to the extent that it is within AEMO's reasonable power, gas injected into the APA GasNet System meets these standards.

3.1 Pipelines

To facilitate AEMO to operate the APA GasNet's transmission pipeline for transportation of natural gas to all defined transfer points within the APA

GasNet System, the following key design parameters in relation to the pressure control of the pipeline system are determined.

- Maximum Allowable Operating Pressure (MAOP)
- Recorded Pipeline Length
- Pipeline Internal Diameter
- Internal Lining of the Pipeline (where applicable)

Pipeline capability presumes temperatures of operation between minus 20 degC and 45 degC. Details of the above design parameters for each licensed pipeline are summarised in the APA GasNet “Pipeline’s Specifications” Appendix 5.

Good Practice for pipelines does not require redundant or stand-by pipeline assets.

3.2 Pressure Regulators

Regulator design capacities and over-pressure device set-points where applicable are provided in the “Regulator Capacity Table” in Appendix 6. These capacities are associated with a minimum inlet pressure below which the nominated capacity may be restricted.

Good Practice at these facilities comprises the number of duty runs and stand-by runs as designated in Appendix 6. The capability of each facility is that provided by the total of the duty runs.

3.2.1 Tyers Pressure Limiter

The pressure reduction station is designated as P9-003. The details of its design, construction and configuration are defined by drawing P9-3-8 and the details of its control and instrumentation systems are defined by drawing 2130-PB-001.

The design purpose of the facility is to defer the installation and operating costs associated with heaters when very low temperatures would otherwise be experienced as a result of the Joule-Thompson cooling at regulator stations. The assembly inlet and outlet valving and pipe work is designed as a Class 600 pressure rating system and hydrostatically tested for M.A.O.P. of 6890 kPa(g).

The pressure reduction regulator is a single 200 mm diameter “Jetstream” J8-60 Class 600 unit complete with pneumatic controllers and providing pressure control from an inlet pressure (maximum) of 6890 kPa(g) to the downstream gas pressure set point of 4400 (typical) kPa(g) or as determined by AEMO and adjusted by remote operation.

Good Practice at this facility comprises one duty run and no stand-by runs. A by-pass is provided for the purposes of maintenance or breakdown.

3.2.2 Morwell City Gate

The pressure reduction station is designated as P8-013. The details of its design, construction and configuration are defined by drawing P8-13-5 and details of its control and instrumentation systems are defined by drawings 4205-PB-001 to 005.

The assembly inlet valving and pipe work up to and including the outlet pipe spool connecting to the outlet valve is designed as a Class 600 system MAOP 7070 kPa(g) and downstream from the outlet valve and downstream system being designed as a Class 300 system MAOP 2760 kPa(g).

The pressure reduction regulator assembly is arranged as a dual run system with 300 mm diameter "Fisher" Class 600 regulators in active and monitor configuration and providing a pressure reduction from 4400 (typical) kPa(g) inlet to 2760 kPa(g) outlet. Pressure is normally controlled from the site RTU.

In event of RTU failure, regulator control will revert to pneumatic control with a setpoint 2700 kPa(g).

The inlet valves to each of the two runs are fitted with pneumatic actuators for slamshut over pressure protection of the downstream system. The slamshut valves can be remotely operated. The slamshut valve will automatically slamshut when the sensed pressure exceeds the set point. The valves require manual intervention to re-open. Once tripped, remote operation function of the valve will be disabled until the high pressure condition has disappeared and the pressure fallen below a set point to reset the interlock.

The slamshut valves will also slamshut when the sensed pressure is less than 1,000 kPa(g).

3.2.3 Dandenong City Gate

The pressure reduction station is designated as P8-004. The details of its design, construction and configuration are defined by drawings Q31-3-41 and Q31-3-42 and details of its control and instrumentation systems are defined by drawing Q31-5-88.

The assembly inlet valving and pipe work up to and including the outlet pipe spool connecting to the outlet valve is designed as a Class 600 system MAOP 6890 kPa(g) and the outlet valve being designed as a Class 300 system connecting to the 750 mm Dandenong to West Melbourne pipeline system.

The pressure reduction regulator assembly is arranged as a multiple run system with seven (7) runs each with a 200 mm diameter "Jetstream" Class 600 regulator active 200 mm diameter Fisher V Ball Class 600 control valve in and monitor configuration for each run and providing a pressure reduction from 6890 (maximum) kPa(g) inlet to 2760 kPa(g) outlet. The inlet valves to each of the seven (7) runs are fitted with pneumatic actuators for slamshut over pressure protection of the downstream system.

3.2.4 Wollert City Gate

The pressure reduction station is designated as P8-016. The details of its design, construction and configuration are defined by drawing P8-16-1 Revision B and details of its control and instrumentation systems are defined by drawing P8-16-2 Revision B. The assembly inlet valving and pipe work up to and including the run inlet valves is designed as a Class 600 system MAOP 6890 kPa(g) and the downstream system being designed as a Class 300 system MAOP 2760 kPa(g). Regulator runs have been designed as a Class 600 system capable of 10,200 kPa(g).

A 3000 kW water-bath heater is located in the common gas supply line upstream of the regulator runs. It consists of a water-bath heat exchanger through which a number of tubes transport the gas to be heated. The heater includes a dual natural gas burner system comprising a main and pilot burner, burner management control system, flame-tubes and flue stacks. Fuel gas is sourced from the compressor station custody transfer meter.

The pressure reduction regulator assembly is arranged as a multiple run system with four (4) runs each with a 250 mm diameter "Mascof" Class 600 regulator providing pressure reduction from 6890 (maximum) kPa(g) inlet to 2760 kPa(g) outlet. The inlet valves on each of the four (4) runs are fitted with pneumatic actuators for slamshut over pressure protection of the downstream system.

Regulator runs 1 and 2 have two remotely actuated inlet valves which are connected to common headers. One inlet valve of each of these two regulator runs are directly connected to the Pakenham to Wollert pipeline (upstream of Wollert pressure limiter P9-12) and the other is connected to the Wollert to Wodonga pipeline (downstream of the Wollert pressure limiter P9-12).

The inlet valve for Runs 3 and 4 do not have remote operation capability and are connected to the Pakenham to Wollert pipeline (upstream of the Wollert pressure limiter P9-12).

The assets which comprise the Wollert City Gate have been designed and installed with the intention that if gas supply from Longford is required:

- The slam-shut valve in the 300mm by pass run of the Wollert pressure limiter P9-12 may need to be opened; and
- Close inlet isolation valves connected to the Wollert to Wodonga pipeline of both Run 1 and Run 2; and
- Open inlet isolation valves connected to the Pakenham to Wollert pipeline of both Run 1 and Run 2.

The assets which comprise the Wollert City Gate have been designed and installed with the intention that if gas supply from Moomba is required:

- The Wollert pressure limiter P9-12 requires a set point to operate and the slam-shut valve in the 300mm by pass run of the Wollert pressure limiter needs to be closed; and
- Open the inlet isolation valve connected to the Wollert to Wodonga pipeline in either Run 1 or Run 2. The facility is designed to supply gas from Moomba through one regulator run only. The second run is a stand by run for gas supply from Moomba; and
- Close the inlet isolation valve connected to the Pakenham to Wollert pipeline of the selected run.

3.2.5 Wollert Pressure Limiter

The pressure reduction station is designated as P9-12. The facility can be operated in one of the following two operation modes:

- (a) Bi-directional flow of gas between the Pakenham to Wollert pipeline (Licence 141 T61, 750mm 6890 kPa(g) MAOP) and the Wollert to Wodonga pipeline (Licence 101, T74 300mm, 8800 kPa(g) MAOP); or
- (b) Pressure reduction of gas flowing from the Pakenham to Wollert pipeline into the Wollert to Wodonga pipeline and/or into the inlet of Wollert City Gate run 1 or 2.

The site plan 1321-MA-001 shows the layout of this City Gate installation.

The P&ID drawings 1312-PB-010, 1312-PB-011, 1312-PB-012, 1312-PB-014, and 1312-PB-015 show the details of the control and instrumentation system of this pressure limiter.

The facility comprises three parallel runs:

- one bi-directional unregulated by-pass run through which gas can flow to and from the Pakenham to Wollert pipeline and the Wollert to Wodonga pipeline;
- two uni-directional pressure regulator runs (one duty and one stand-by) which provide pressure reduction from the Pakenham to Wollert pipeline to the Wollert to Wodonga pipeline. A vortex flow meter is fitted in each regulator run to provide indicative flow measurement and provision to implement flow control.

The regulator outlet is connected to the inlet to Run 1 and Run 2 of the Wollert City Gate, and to the Wollert to Wodonga pipeline.

3.2.5.1 Station Pipe Work

All new station pipe work of the facility is designed as a Class 600 system MAOP 10200 kPa(g).

3.2.5.2 Bi-directional By-Pass Run

The bi-directional bypass run is equipped with three levels of over pressure protection to ensure that over pressurisation of the Pakenham to Wollert pipeline (MAOP 6890 kPa(g)) cannot occur from the Wollert to Euroa pipeline (MAOP 8,800 kPa(g)).

The valves for the first two levels (levels 1 & 2) of over pressure protection will automatically re-open once the over pressure condition disappears. The first and second levels of over pressure protection are set to automatically close the valves when the pressure in the Wollert to Wodonga pipeline is above the high set points, and re-open when the pressure is below the low set points.

The final level of over pressure protection (slamshut level 3) once tripped to shut will require manual intervention to re-open. There are two slamshut valves. One is located in the 300 mm by pass run and the other is located in the regulator outlet header. The slam-shut valves can be remotely operated to close and re-open the by-pass run and to isolate/enable the limiter outlet header to the Wollert to Wodonga pipeline. The slam-shut valves shall not be re-opened when the differential pressure across the valve is greater than 200 kPa.

The slamshut valve UV-61 in the 300mm by-pass run must be closed for the regulators to operate.

3.2.5.3 Regulator Runs

The slamshut valve UV-61 in the 300mm by-pass run must be closed for the regulators to operate.

The regulator assembly is arranged as a dual run system with a single 200mm diameter Fisher globe type control valve in each run (one duty run and one standby). The regulator is electronically controlled by the RTU and therefore is dependent on power supply and RTU. The maximum allowable set point for the regulators is 6890 kPa(g) and can be remotely adjusted to suit operational requirements.

If the RTU fails, the backup pneumatic controller fitted to each regulator will control the regulator to a predetermined set point. The set point for the pneumatic controller can only be adjusted on site.

The inlet valves to each run are fitted with pneumatic actuators for remote operation.

A vortex flow meter is fitted in each regulator run to provide indicative flow measurement and provision to implement flow control.

3.2.5.4 Slamshut Valves

The slamshut valves can be remotely operated. The slamshut valve will automatically slam shut when the sensed pressure exceeds the set point. The valves require manual intervention to re-open. Once

tripped, remote operation function of the valve will be disabled until the high pressure condition has disappeared and the pressure fallen below a set point to reset the RTU software interlock.

The slamshut valves will also slam shut when the sensed pressure is less than 1,000 kPa(g).

Slamshut valve UV-61 in the 300mm by-pass run must be closed for the regulators to operate.

3.2.6 Laverton North City Gate

The pressure reduction station is designated as P8-27. The details of its design, construction and configuration are defined by drawing P8-27-9 and details of its control and instrumentation systems are defined by drawing P8-27-3.

The assembly inlet valving and pipe work up to and including the outlet pipe spool and outlet valve is designed as a Class 600 system MAOP 7390 kPa(g) and the outlet downstream system being designed as a Class 300 system MAOP 2760 kPa(g).

The pressure reduction regulator assembly is a dual run system with 50 mm diameter “Welker Jet” Class 600 regulators in active and monitor (with monitor over-ride) configuration and providing pressure reduction from 5000 (typical) kPa(g) inlet to 2000 kPa(g) outlet. The inlet valve on each of the two runs is fitted with a pneumatic actuator for slamshut over pressure protection of the downstream system.

3.2.7 Hopkins Road Pressure Limiter

Decommissioned.

3.2.8 Clunes Road Pressure Limiter

Decommissioned.

3.2.9 Toolamba Road Pressure Limiter

Decommissioned.

3.2.10 Dandenong Pressure Limiter (Lurgi Backup Regulator)

The pressure reduction station is designated as P8-007. The details of its design, construction and configuration are defined by drawings P6-3-1 and details of its control and instrumentation systems are defined by drawing P6-3-3.

The assembly inlet valving and pipe work up to and including the outlet pipe spool connecting to the outlet valve is designed as a Class 300 system MAOP 2760 kPa(g) and the outlet valve being designed as a Class 300.

The pressure reduction regulator assembly is arranged as a dual run system of 150 mm diameter Class 300 regulators in active only configuration for each run and providing pressure reduction from 2760 (maximum) kPa(g) inlet to typical 1700 kPa(g) outlet. Pressure is normally controlled from the site RTU.

In event of RTU failure, regulator control will revert to pneumatic control, setpoint 1700 kPa(g).

3.2.11 Clonbinane Pressure Limiter

Decommissioned

3.2.12 Lara City Gate

The pressure reduction station is designated as P10-01. The facility provides the following two operation modes:

1. Uni-directional bypass for flow of gas from Brooklyn to Corio pipeline (Licence 81, T24, 350mm 7390 kPa(g) MAOP) to South West Pipeline (Licence 231, T92, 500mm MAOP 10000 kPa(g)).
2. Pressure reduction of gas flowing from the South West Pipeline and into the Brooklyn to Corio pipeline.

The site plan 2631-MA-001 shows the layout of this City Gate installation. The P&ID drawings 2631-PB-001, 2631-PB-002, 2631-PB-003, and 2631-PB-004 show the details of the control and instrumentation system of this City Gate.

The station pipe work between the hot tap fitting on the Brooklyn to Corio pipeline to the South West Pipeline is designed as a Class 600 system MAOP 10000 kPa(g).

The uni-directional bypass run is equipped with three levels of over pressure protection (one non-return valve and two over pressure shut off valves) to ensure that over pressuring of the Brooklyn to Corio pipeline cannot occur from the higher pressure South West Pipeline. The non-return valve allows gas to automatically flow from the Brooklyn to Corio pipeline to the South West Pipeline when the pressure in the Brooklyn to Corio pipeline is higher than the pressure in the South West Pipeline.

The regulator assembly is arranged as a multiple run system with four (4) runs of 300mm diameter (three duty runs and one stand by run) and one (1) run of 200mm diameter Fisher EWD globe type control valves in active and monitor configuration. Each active regulator is electronically controlled by the RTU and therefore is dependent on the availability of power supply and the RTU. The four large runs are operated in parallel to avoid damage due to high flow through the basket filters.

The set point for the monitor regulators is controlled by the RTU to track the set point of the active regulators and will hold the last set

point if the RTU fails. The intent of the set point tracking is to minimise the difference between the active and monitor regulators, to prevent or minimise sudden and significant surge of flow through the City Gate if the RTU fails and causes the active regulators to fail wide open. The inlet valves of each regulator run are fitted with pneumatic actuators for slamshut over pressure protection of the downstream system.

An upper limit of 7390 kPa(g) is placed on the outlet pressure set point to protect the downstream pipeline from overpressure. Similarly, the maximum limit on station flow set point to protect the filters is 400,000 sm³/h. The RTU has been designed to ramp the AEMO set points when changed to control the rate and extent of opening and closing of the regulators.

A 500 kW water-bath heater is located in the common gas supply line upstream of the regulator runs. It consists of a water-bath heat exchanger through which a number of tubes transport the gas to be heated. The heater includes a dual natural gas burner system comprising a main and pilot burner, burner management control system, flame-tubes and a flue stack and custody transfer meter for fuel gas.

The site has a single bi-directional single path ultrasonic flowmeter designed to indicate flow rates between 40,000 sm³/h and 400,000 sm³/h when in regulator run mode, and between 10,000 sm³/h and 100,000 sm³/h when in bypass mode. The flow readout figure should be used only as an indication of the flow rate.

3.2.13 Brooklyn (BCP) City Gate

The pressure reduction station is designated as P8-28. This facility provides pressure reduction of gas flowing from the Brooklyn to Corio pipeline (Licence 81-T24, 350mm 7390 kPa(g) MAOP) into the South Melbourne to Brooklyn pipeline (Licence 108 T33, 750mm, 2760 kPa(g) MAOP). The site plan 1221-MA-001 shows the layout of this City Gate installation. The P&ID drawings 1221-PB-001 and 1221-PB-008 show the details of the control and instrumentation system of this City Gate.

The station inlet pipe work between the hot tap fitting on the Brooklyn to Corio pipeline and including the regulator outlet isolation valves is designed as a Class 600 system MAOP 10,200 kPa(g). The station outlet pipe work between the regulator outlet isolation valves and the hot tap fitting on the South Melbourne to Brooklyn pipeline is designed as Class 300 MAOP (maximum operating pressure is currently 2,760 kPa(g)).

The regulator assembly is arranged as a multiple run system four (4) runs of 300mm diameter (three duty runs and one standby run) and one (1) run of 200mm diameter. Runs 1 to 4 comprise Fisher globe type control valves in active and monitor configuration and Run 5 comprises a Mascot globe type control valve.

Each active regulator is electronically controlled by the RTU and therefore is dependent on the availability of power supply and the RTU. The four large runs are operated in parallel to avoid damage due to high flow through the basket filters. The maximum allowable set point for the regulators is 2,760 kPa(g) and can be remotely adjusted to suit operational requirements. The monitor regulator is fully pneumatically operated and the set point is fixed to the value set at site. The inlet valves to each regulator run are fitted with pneumatic actuators for slamshut over pressure protection of the downstream system.

An upper limit of 2,760 kPa(g) is placed on the outlet pressure set point to protect the downstream pipeline from overpressure. Similarly, the maximum limit on station flow set point to protect the filters is 400,000 sm³/h. The RTU has been designed to ramp the AEMO set points when changed to control the rate and extent of opening and closing of the regulators.

Two 2050 kW water-bath heaters are located in the common gas supply line upstream of the regulator runs. Each heater consists of a water-bath heat exchanger through which a number of tubes transport the gas to be heated. The heater includes a dual forced draft natural gas burner system comprising a main and pilot burner, burner management control system, flame-tubes and two flue stacks. Fuel gas is sourced from the compressor station custody transfer meter. The heater is required for the regulator station mode of operation only. The heater is controlled by the regulator station gas outlet temperature when gas is flowing. The heater is not required by the pressure limiter station mode of operation, nor does the pressure limiter station have any control over the heater operation.

The site has a single bi-directional single path ultrasonic flowmeter designed to indicate flow rates between 22,000 sm³/h and 500,000 sm³/h. The flow readout figure should be used only as an indication of the flow rate. The flow meter is shared by both the Brooklyn pressure limiter (P9-11) and this City Gate. It provides flow measurement through the City Gate only when the Brooklyn pressure limiter is not flowing gas. If both facilities are flowing gas then the meter will measure the combined flow.

3.2.14 Brooklyn (BBP) Pressure Limiter

The pressure reduction station is designated as P9-11. The facility provides pressure reduction of gas flowing from the Brooklyn to Corio pipeline (Licence 81, T24, 350mm 7390 kPa(g) MAOP) into the Brooklyn to Ballan pipeline (Licence 78 T56, 200mm, 7390 kPa(g) MAOP). The site plan 1221-MA-001 shows the layout of this pressure limiter installation. The P&ID drawings 1221-PB-001 and 1221-PB-003 show the details of the control and instrumentation system of this pressure limiter.

The station pipe work between the hot tap fittings on the Brooklyn to Corio pipeline and the Brooklyn to Ballan pipeline is designed as a Class 600 system MAOP 10,200 kPa(g).

The regulator assembly is arranged as a dual run system (one duty run and one stand by) with a single 80mm diameter Fisher globe type control valve in each run. The regulator is electronically controlled by the RTU and therefore is dependent on power supply and the RTU. The maximum allowable set point for the regulators is 7390 kPa(g) and can be remotely adjusted to suit operational requirements. If the RTU fails, the backup pneumatic controller fitted to each regulator will control the regulator to a predetermined set point. The set point for the pneumatic controller can only be adjusted on site. The inlet valves to each run are fitted with pneumatic actuators for remote operation.

3.2.15 Barnawartha City Gate

The pressure reduction station is designated as P10-02. The facility can be operated in one of the following two operation modes:

- (a) bi-directional flow of gas between the Interconnect (Barnawartha North to Culcairn) (Licence 178, T99, 450mm, 10,200 kPa(g) MAOP) and the Wollert to Wodonga pipeline (Licence 101, T74 300mm, 7400 kPa(g) MAOP); and
- (b) pressure reduction of gas flowing from the Interconnect pipeline (450mm Culcairn to Barnawartha North) into the Wollert to Wodonga pipeline.

The site plan 6650-MA-001 shows the layout of this City Gate installation. The P&ID drawings 6650-PB-001, 6650-PB-002, 6650-PB-003, 6650-PB-004 show the details of the control and instrumentation system of this City Gate.

The facility comprises of three parallel runs:

- one 300mm bi-directional un-regulated by-pass run through which gas can flow to and from the two pipelines; and
- two 100mm uni-directional pressure regulator runs (one duty and one stand-by) which provide pressure reduction from the Interconnect (Barnawartha North to Culcairn) 10200 kPa(g) MAOP pipeline to the Wollert-to-Wodonga 7400 kPa(g) MAOP pipeline.

The station pipe work, excluding the hot tap fitting on the Wollert to Wodonga pipeline, is designed as a Class 600 system MAOP 10200 kPa(g).

The bi-directional bypass run is equipped with three levels of over pressure protection to ensure that over pressurisation of the Wollert to Wodonga pipeline cannot occur from the higher pressurised Interconnect (Barnawartha North to Culcairn) pipeline. The bypass run is set to automatically close when the pressure in the Interconnect (Barnawartha North to Culcairn) pipeline is greater than 7400 kPa(g), and automatically re-open when the pressure falls below 6955 kPa(g).

The slam-shut valve shall not be re-opened when the differential pressure across the valve is greater than 200 kPa.

The regulators are set to automatically come on line to regulate and limit the downstream pressure to a set point when the 300mm by pass run is closed. The regulator assembly is arranged as a dual run system of 100mm diameter Fisher globe type control valves in active and monitor configuration. The active regulator is electronically controlled by the RTU and therefore is dependent on the availability of power supply and the RTU. The maximum allowable set point for the regulators is 7400 kPa(g) and can be remotely adjusted to suit operational requirements. The monitor regulator is fully pneumatically operated and the set point is fixed to the valve set at site. The inlet valves to each run are fitted with pneumatic actuators for slam-shut over pressure protection of the downstream system.

The slamshut valves can be remotely operated and will automatically slamshut when the sensed pressure exceeds the set point. The valves require manual intervention to re-open. Once tripped, remote operation of the valve will be disabled until the pressure falls below 6955 kPa(g) which resets the RTU software interlock. The slamshut valves will also slamshut when the sensed pressure is less than 1,000 kPa(g).

A vortex flow meter is fitted in each regulator run to provide indicative flow measurement and provision to implement flow control.

3.2.16 Wandong PRS

The pressure reduction station is designated as P9-13. The facility provides pressure reduction of gas flowing from the Wollert to Wodonga pipeline (Licence 101, T74, 300mm 8800 kPa(g) MAOP) into the Wandong to Kyneton pipeline (Licence 143 T75, 300mm, 7390 kPa(g) MAOP). The site plan 2451-MA-001 shows the layout of this pressure limiter installation. The P&ID drawings 2451-PB-001, 1312-PB-002 and 1312-PB-003 show the details of the control and instrumentation system of this pressure reduction station.

The facility comprises of two parallel runs:

- Two uni-directional pressure regulator runs (one duty and one stand-by) which provide pressure reduction from the Wollert to Wodonga pipeline and supply gas into the Wandong to Kyneton pipeline.

The station pipe work between the hot tap fittings on the Wollert to Wodonga pipeline and the Wandong to Kyneton pipeline is designed as a Class 600 system MAOP 10,200 kPa(g).

The regulator assembly is arranged as a dual run system with a single 150mm diameter globe type Fisher control valve regulator in each run. The regulator is electronically controlled by the RTU and therefore is dependent on power supply and RTU. The maximum

allowable set point for the regulators is 7390 kPa(g) and can be remotely adjusted to suit operational requirements. If the RTU fails, the backup pneumatic controller fitted to each regulator will control the regulator to a predetermined set point. The set point for the pneumatic controller can only be adjusted on site. The inlet valves to each run are fitted with pneumatic actuators for slam-shut over pressure protection of the downstream system.

The slamshut valves can be remotely operated and will automatically slam shut when the sensed pressure exceeds the set point. The valves require manual intervention to re-open. Once tripped, remote operation of the valve will be disabled until the pressure falls below 6955 kPa(g) which resets the RTU software interlock. The slamshut valves will also slam shut when the sensed pressure is less than 1,000 kPa(g).

A vortex flow meter is fitted in each regulator run to provide indicative flow measurement and provision to implement flow control.

3.2.17 Iona City Gate

The pressure reduction station is designated as P10-03. The facility provides one of the following two operation modes:

- (a) Uni-directional flow of unregulated gas from the 150mm North Paaratte to Iona pipeline to South West Pipeline (Licence 183, T92, 500mm, 10000 kPa(g) MAOP).
- (b) Pressure reduction of gas flowing from the South West Pipeline into the 150mm North Paaratte to Iona pipeline.

The site plan 4630-MA-001 shows the layout of this City Gate installation. The P&ID drawings 4630-PB-001, 4630-PB-004, 4630-PB-005, 4630-PB-006, and 4630-PB-011 show the details of the control and instrumentation system of this City Gate.

The station pipework is designed as a Class 600 system MAOP 10200 kPa(g).

The uni-directional bypass run is equipped with three levels of over pressure protection (one non-return valve and two over pressure shut off valves) to ensure that over pressurisation of the Iona to North Paaratte pipeline cannot occur from the South West Pipeline. The non-return valve (first level) allows gas to automatically flow from the North Paaratte to Iona pipeline to the South West Pipeline when the pressure in the North Paaratte to Iona pipeline is higher than the pressure in the South West Pipeline, provided the remote actuated slamshut valve (second level) in the bypass run is open. The final level of over pressure protection (slamshut level 3) once tripped to shut will require manual intervention to re-open. The slam-shut valve can be remotely operated to close and re-open the by-pass run. The slam-shut valve shall not be re-opened when the differential pressure across the valve is greater than 200 kPa.

The regulator assembly is arranged as a dual run system with one (1) runs of 150mm diameter and one (1) standby run of 100mm diameter Fisher globe type control valves in active and monitor configuration. The active regulator is electronically controlled by the RTU and therefore is dependent on the availability power supply and RTU. The maximum allowable set point for the regulators is 7400 kPa(g) and can be remotely adjusted to suit operational requirements. The monitor regulator is fully pneumatically operated and the set point is fixed to the value set at the site. The inlet valves of each regulator run are fitted with pneumatic actuators for slamshut over-pressure protection of the downstream system.

If the slam-shut valve trips on high pressure, the ability to reopen in auto mode will be locked out until downstream pressure is reduced to a defined point below MAOP (eg. 94% of MAOP). Reopening requires a person on site to open the slam-shut bypass line to reduce differential pressure to less than 200 kPa across the valve. Therefore, remote closure of the slam-shut valve should be reserved for emergency situations or situations where there is a concern for safety.

When in manual mode, local manual control is enabled and remote control by AEMO is disabled. Manual mode is used when local shut down for maintenance is required.

All slam-shut valves are provided with a spring to close, gas to open, pneumatic actuator. This is to provide a “fail closed” valve for maximum safety. Any condition constituting a system failure, such as loss of power gas pressure, loss of (or low) sensed signal pressure, rupture of gas tubing, etc. will result in the slam-shut valve closing which is the “fail safe” position.

If a slam-shut valve has been closed or tripped shut, AEMO must notify APA GasNet.

Provision for a future connection of a gas heater is provided in the inlet pipe work to the regulator runs.

The site has a single bi-directional ultrasonic flowmeter located at the Iona-Lara Pipeline end of the Iona City Gate facility, downstream of the take-off to WUGS. The flowmeter is designed to indicate flow rates between 4,500 sm³/h and 45,000 sm³/h in either direction and should be used only for indicative purposes.

3.2.18 Brooklyn (BLP) City Gate

The pressure reduction station is designated as P10-04. This facility provides pressure reduction of gas flowing from Brooklyn Lara Pipeline (Licence 266-T112, 500mm 10,200 kPa(g) MAOP) into the Brooklyn to Corio pipeline (Licence 81-T24, 350mm 7390 kPa(g) MAOP). The site plan 1222-MA-001 shows the layout of this City Gate installation. The P&ID drawings 1222-PB-001 to 1222-PB-008 show the details of the control and instrumentation system of this City Gate.

The station inlet pipe work between the hot tap fitting on the Brooklyn to Lara pipeline and including the station outlet isolation valve is designed as a Class 600 system MAOP 10,200 kPa(g) (maximum outlet operating pressure is currently 7,390 kPa(g)).

The regulator assembly is arranged as a multiple run system four (4) runs of 300mm diameter (three duty runs and one standby run) and one (1) run of 200mm diameter. Runs 1 to 5 comprise Mascot globe type control valves and also fitted with a liquids knock out drum with an actuated isolation and bypass valve.

Each active regulator is electronically controlled by the RTU and therefore is dependent on the availability of power supply and the RTU. All runs are controlled by the station controller (PLC) to limit flow in each run to avoid damage due to high flow through the strainers. The maximum allowable set point for the regulators is 7,390 kPa(g) and can be remotely adjusted to suit operational requirements. The inlet valves to each regulator run are fitted with pneumatic actuators for slamshtut over pressure protection of the downstream system.

An upper limit of 7,390 kPa(g) is placed on the outlet pressure set point to protect the downstream pipeline from overpressure. Similarly, the maximum limit on station flow set point to protect the filters is 400,000 sm³/h. The PLC has been designed to ramp the AEMO set points when changed to control the rate and extent of opening and closing of the regulators.

Two 625 kW water-bath heaters are located in the common gas supply line upstream of the regulator runs. Each heater consists of a water-bath heat exchanger through which a number of tubes transport the gas to be heated. Each heater includes a forced draft natural gas burner system comprising a main and pilot burner, burner management control system, flame-tube and flue stack. Fuel gas is sourced from the compressor station custody transfer meter. The heater is required for the regulator station mode of operation only. The heater is controlled by the regulator station gas outlet temperature when gas is flowing.

The site has a single bi-directional dual path ultrasonic flowmeter designed to indicate flow rates between 22,000 sm³/h and 500,000 sm³/h. The flow readout figure should be used only as an indication of the flow rate.

3.2.19 Eurua Pressure Reduction Station

The pressure reduction station is designated as P10-07. The details of its design, construction and configuration are defined by drawing I600-PB-001.

The design purpose of the facility is to prevent overpressure of the pipeline north of the facility when gas is flowing north. The assembly inlet and outlet valving and pipe work is designed as a Class 600 pressure rating system and hydrostatically tested for

MAOP of 10,200 kPa(g). Instrumentation is designed and set to permit operation of the northern pipeline to the pipeline MAOP of 7,400 kPa(g).

The pressure reduction regulator is a single 250 mm diameter Valek Mega Stream Mark 1 Class 600 unit complete with backup pneumatic controller and providing pressure control from an inlet pressure (maximum) of 8800 kPa(g) to the downstream gas pressure set point of 7400 kPa(g).

Good Practice at this facility comprises one duty run and no stand-by runs. The facility may be by-passed using the linevalves for the purposes of southerly flow, maintenance or breakdown, provided the pressure south of the station is less than 7400 kPa(g).

3.3 Compressor stations

The compressor stations are equipped with industrial gas engines with Nominal Power capabilities summarised as follows:

- (a) Gooding Compressor Station - combined Nominal Power of 8550 kW at 15 deg. Celsius ambient (equivalent to 3 Centaur units).
- (b) Brooklyn Compressor Station
Geelong - combined Nominal Power of 4650 kW at 15 deg. Celsius (equivalent to 1 Centaur and 2 Saturn units)
Ballarat - combined Nominal Power up to 2850 kW at 15 deg. Celsius (equivalent to 1 Centaur unit)
- (c) Wollert Compressor Station - combined Nominal Power of 9100 kW at 15 deg. Celsius (equivalent to 2 Centaur units)
- (d) Springhurst Compressor Station - Nominal Power of 4550 kW at 15 deg. Celsius (equivalent to 1 Centaur units), subject always to clause 2.3.4 of this Schedule 1
- (e) Iona Compressor Station - Nominal Power of 298 kW at 15 deg. Celsius or as required to compress gas from the Lara to Iona Pipeline into the North Paratte to Iona pipeline.

These Nominal Power capabilities will vary when operating conditions differ from standard conditions as specified in this Service Envelope Agreement and the attached schedules. Supplier references for compressor performance details are listed in Compressor Stations Key Data Plan No. A1-301-1. These factors include, but are not limited to, non-standard ambient air temperatures, pipeline service conditions, and in-service equipment wear and tear consistent with the approved maintenance schedule and supplier recommendations as determined from the manufacturer's proprietary engine and compressor performance evaluation software (Ref: Solar Centaur T4002 tcb2rev0.exe, Solar Centaur T6102 thd2rev1.exe, Solar Saturn T1302 tsc2rev0.exe and Solar Saturn T1202 tsb2rev0.exe) which is provided to AEMO. APA GasNet shall provide updates to the software under its change management system.

At each compressor station complex, good design practice comprises the provision of spare capacity equivalent to the largest duty unit in use (within the Service Envelope). It does not comprise of the provision of redundant common elements at each compressor station.

3.3.1 Gooding Compressor Station

The compressor sets are configured to operate in a parallel mode such that the total station flow is divided nominally equally among the operating machines. As Gooding Compressor Station is not fitted with a gas discharge after cooling system, recycling of gas through the compressors or station capacity control valve is limited due to the potential for recycled gas overheating.

The control system of the compressor unit allows initiation of gas recycle, if, due to the pipeline operating conditions, recycle is required to prevent surging of the compressor. Recycle is maintained as long as the temperature of gas, as sensed at the outlet of the unit, remains within allowable limits. At 99 °C a High Outlet Temperature alarm is raised, and at 110 °C the control system initiates shutdown of the unit. The station is designed that if the prevailing pipeline operating conditions dictate that recycling of gas through a compressor would be required to prevent surging, the operating compressor is automatically shut down by the unit anti-surge control logic in a non-lock out condition.

The maximum station discharge pressure and temperature at Gooding is 6895 kPa(g) and 45°C respectively. Gas discharge temperatures in excess of 50°C and pressures in excess of 7200 kPa(g) will initiate a shutdown of all compressor units operating. Units may be restarted, when the alarms have been reset by the operator and the station discharge pressure and temperature fall below respective maximum levels. Units are not available during these automatic shut-downs.

The station is fitted with remote compressor unit start, stop, discharge pressure set point and initiation of a station emergency shutdown via the AEMO Operations Centre. In addition, a remote “reset” function is available to reset the machine status to “ready” in the case of a compressor unit malfunction which shuts down the unit in a “non lock out” condition. Any machine that shuts down and “locks out” requires manual intervention at the station to enable a restart. If a unit lockout fault occurs, APA GasNet shall attend site within 3 hours of notification by AEMO. Also provided is a remotely operated gas turbine driver speed control for the station which allows the AEMO operator to control engine speed for the station from approx. 85% to 100%. The controls interface supports a 24-hr schedule of set points for engine speed, inlet pressure and outlet pressure.

The station is equipped with an Emergency Shutdown System. This system is designed as fail safe and is incorporated in the station control to minimise consequences of disastrous breakdowns or incidents, such as fire, gas leaks and control system failures.

Activation of the Emergency Shutdown System initiates isolation of the station from the transmission pipeline and the blowdown of the

station pipework. Re-pressurisation of the station and its return to the operational status is allowed after appropriate checks are performed on site by the APA GasNet authorised technical staff.

3.3.2 Brooklyn Compressor Station

The compressor station pipe work is configured such that all compressor units may draw gas from the station inlet header and discharge to the Geelong pipeline. The Saturn compressor sets may also draw gas from the station inlet header or the Geelong header and discharge to the Ballarat pipeline. The piping configuration allows for series (double staging) compression into the Ballarat pipeline. Alternate operating configurations are shown in Appendix 7, which provides combinations of units to achieve the objectives set out in clause 8.1(a)(viii) of the Agreement.

The compressor station discharge pipework into the Geelong pipeline and the Ballarat/Bendigo pipeline are connected with an actuated isolation “crossover” valve within the confines of the station pipework. With the crossover valve open the discharge pressure produced by the compressor sets is common to both discharge pipelines.

All compressor units at Brooklyn are fitted with a gas discharge after cooling system. As a result, recycling of gas through the compressors is permissible, although not desirable for periods exceeding half an hour. If the prevailing pipeline operating conditions dictate that recycling of gas through the compressor(s) is required to prevent surging, AEMO must consider reducing the compressor power output from each of the compressor unit(s) operating to avoid any recycling of gas, else consider using a more suitable compressor for the planned conditions within 30 minutes.

The maximum station discharge pressure and temperature into both the Geelong pipeline and Ballarat/Bendigo pipeline is 7390 kPa(g) and 45°C respectively. Gas discharge temperatures in excess of 50°C and pressures in excess of 7390 kPa(g) will initiate a shutdown of all compressor units operating. Units may be restarted when the temperatures and pressures return within permissible limits.

Units are not available during these automatic plant shutdowns.

The station is fitted with remote compressor unit start, stop and initiation of a station emergency shutdown, via the AEMO Operations Centre. In addition, a remote “reset” function is available to reset the compressor unit status to “ready” in the case of a compressor unit malfunction which shuts down the unit in a “non lock out” condition and for which the fault condition no longer exists. This presumes the alarm, which shut the unit down in the first instance, can be cleared. Any compressor unit which shuts down and “locks out” requires manual intervention at the station to enable a restart.

At Brooklyn, one (1) Centaur is provided as spare capacity and may, as and when required, be shifted to other parts of the APA GasNet System or elsewhere in order to enhance the capacity of the APA GasNet System.

3.3.3 Wollert Compressor Station

The Compressor sets are configured to operate in parallel such that the total station flow is divided nominally equally among the operating machines.

As Wollert Compressor Station 'B' is fitted with a unit gas discharge after cooling system, recycling of cooled gas through the compressors via the station recycle valve is permissible. The station is designed that if the prevailing pipeline operating conditions dictate that recycling of gas through the compressor(s) is required to prevent surging, the compressor unit(s) anti-surge valves should not be required to operate.

The maximum station 'B' discharge pressure and temperature at Wollert is 8800 kPa(g) and 45°C respectively. Gas discharge temperature in excess of 50°C and pressures in excess of 8800 kPa(g) will initiate a shutdown of all compressor units operating. Units may be restarted when the temperatures and pressures return within permissible limits.

Units are not available during these automatic plant shut-downs.

Station 'A' is designed for maximum 7,400 kPa(g) discharge and must therefore be isolated at the Station "A" discharge valve to permit operation of Station 'B' above 7400 kPa(g).

The station is fitted with remote compressor unit start, stop, vent and initiation of a station emergency shutdown, via the AEMO Operations Centre. In addition, a remote "reset" function is available to reset the machine status to "ready" in the case of a compressor unit malfunction which shuts down the unit in a "non lock out" condition. Any compressor unit which shuts down and "locks out" requires manual intervention at the station to enable a restart. If a unit lockout fault occurs, APA GasNet shall attend site within 3 hours of notification by AEMO.

Wollert Station A and B is equipped with an Emergency Shutdown System. This system is designed as fail safe and is incorporated in the station control to minimise consequences of disastrous breakdowns or incidents, such as fire, gas leaks and control system failures. Activation of the Emergency Shutdown System initiates isolation of Wollert Station A and B from the transmission pipeline and the blowdown of both station's pipework. Re-pressurisation of the station and its return to the operational status is allowed after appropriate checks are performed on site by the APA GasNet authorised technical staff.

3.3.4 Springhurst Compressor Station

This clause 3.3.4 is subject to clause 2.3.4.

The Springhurst compressor station provides gas compression in the 300mm diameter MAOP 7400 kPa(g) Wodonga to Euroa pipeline and compressing gas in either a southward direction towards Melbourne into the APA GasNet System to Shepparton, Echuca, Ballarat and Wollert, or compressing northwards towards Wodonga and Culcairn.

As Springhurst Compressor Station is fitted with a gas discharge after cooling system, recycling of gas through the compressors is permissible, although not desirable. The station is designed that if the prevailing pipeline operating conditions dictate that partial recycling of gas through the compressor is required to prevent surging, the compressor unit may operate indefinitely in this mode.

The maximum station discharge pressure and temperature at Springhurst is 7400 kPa(g) and 45°C respectively. Gas discharge temperature in excess of 50°C and pressures in excess of 7400 kPa(g) will initiate a shutdown of the compressor unit. It may be restarted when the temperatures and pressures return within permissible limits.

It is not available during these automatic plant shut-downs.

The station is fitted with remote compressor unit start, stop, vent and initiation of a station emergency shutdown, via the AEMO Operations Centre. In addition, a remote "reset" function is available to reset the machine status to "ready" in the case of a compressor unit malfunction which shuts down the unit in a "non lock out" condition. If the compressor unit shuts down and "locks out" this will require manual intervention at the station to enable a restart.

The unit and station actuated valves and control valves are operated using instrument air. The system includes an instrument air receiver capable of supporting the station for up to 2 hours in the event of loss of air compression (or site power), after which the unit and station will fail safe by isolating and venting. A separate air storage provided for the linevalve will ensure adequate air is available to re-open the linevalve.

The PCR and compressor enclosure are fitted with automated fire detection and suppression systems. The compressor enclosure is also fitted with gas detection and suppression systems.

Telemetry facilities support operator changes to set points for suction pressure, discharge pressure and suction flow within allowable limits.

3.3.5 Iona Compressor Station

The Iona Compressor Station provides gas compression from the 500mm diameter 10,000 kPa(g) Lara to Iona Pipeline at Iona into the 150mm diameter 7,400 kPa(g) Paratte to Iona Pipeline, with a capability for compression from 3800 kPa(g) at the compressor suction to 5600 kPa(g) at the station discharge.

The two compressor sets are configured to operate in parallel, although one unit is the designated spare. The second unit may be started while one unit is online in order to facilitate planned changeover of the operating unit.

The control logic will shut down the compressor if the bypass valve is fully opened for more than half an hour.

The maximum station discharge pressure and temperature at Iona is 7400 kPa(g) and 45°C respectively. Gas cooler discharge temperature in excess of 55°C and compressor discharge pressure in excess of 7400 kPa(g) will initiate a shutdown of the operating compressor units. The unit may be restarted when the temperature and pressure return within permissible limits (up to 2 to 3 hours), and the alarms reset.

The station is fitted with remote compressor unit start, stop and initiation of a station emergency shutdown, via the AEMO Operations Centre. In addition, a remote “reset” function is available to reset the machine status to “ready” in the case of a compressor unit malfunction which shuts down the unit in a “non-lockout” condition. Any compressor unit which shuts down and “locks out” requires manual intervention at the station to enable a restart.

The station has been designed as a stop/start facility only and does not support the remote adjustment by AEMO of set points for suction pressure, discharge pressure and discharge temperature.

3.4 Pipeline valves

As part of the major facilities within the APA GasNet System, the following key operating parameters of the pipe line valves in relation to the pressure control of the pipeline system are determined.

- Maximum Allowable Operating Pressure (MAOP)
 - Size and Class of the valve
 - Recorded Valve location
 - Type of the Valve such as ball valve or gate valve
 - Status of each Valve, either “Open” position or “Close” position
- Control of the Valve, either “remote control” or “manual control” and/or “Automatic Line Break”.

Details of the above operating parameters for each valve are summarised in the “APA GasNet’s - Critical TP Valves” in Appendix 4.

3.5 Telemetry

The telemetry system is designed to provide analog and digital data from APA GasNet System pressure locations, injection and delivery points, pipeline transfer points, remotely controllable valves and compressor stations,

and to provide the means to control selected valves, compressors and regulators.

Details of RTU data points available for access by AEMO are listed in the functional specification prepared specifically for each RTU along with details of the defined minimum poll interval for each RTU. The definition of control point, analog and digital data signal names and alarm responses shall be set out in the functional specification for the RTU prepared by APA GasNet and agreed by AEMO.

The data will be for the following conditions:

	Pressure	Temperature	Flow (vol)
Fringe point	Yes	n/a	n/a
Supply point	Yes	Yes	yes ($\pm 1.5\%$)
Compressor stations	Yes	Yes	yes ($\pm 10\%$)

The data shall be fully in accordance with the provisions of the National Gas Rules, including but not limited to gas composition, hydrogen sulphide, total sulphur and moisture content for all supply injection points.

The minimum poll period is 10 seconds.

Valves remotely actuated from within AEMO's Operations Centre are listed in Appendix 9.

APA GasNet have also installed pressure transmitters at the embedded meter sites of Sale (M079), Corio (M065), Ballarat (M054), Bendigo (M057) and Castlemaine (M059). These pressure transmitters have been installed to enable AEMO to monitor the system pressures at these delivery points.

3.6 Longford Odourisation

The design parameter for the odourant plants (at the facilities) is to achieve an odourant concentration level of 7 milligrams per standard cubic metre of natural gas which has been established to meet the requirements of the Gas Safety (Gas Quality) Regulations 2007 (Vic) to ensure gas is detectable at one fifth of the Lower Explosive Limit (LEL). The odourant concentration level is that required by law under the Gas Industry Act 2001 (Vic) and/or the Gas Safety Act 1997 (Vic) and/or the Gas Safety (Gas Quality) Regulations 2007 (Vic) or any other like applicable laws or regulations.

Storage capacity is designed to permit receipt of odourant stock without interruption to gas supply.

Pumps have been designed with redundancy to permit continuous operation in event of pump failure or planned maintenance. Power gas supply is provided by regulators in a redundant configuration from the meter station outlet header and gas is vented to the continuous flare.

The facility is designed to comply with the relevant codes of practice governing the storage and handling of hazardous materials and relevant environmental rules.

Monitoring is achieved by telemetry of the odourant plant operation to the AEMO Operations Centre where alarms for plant failures that may lead to excursions of concentration outside APA GasNet specified limits.

4 Operating Constraints

The availability of the APA GasNet System assets to AEMO shall be:

- (a) limited by the constraints detailed in the following clauses for each of the asset types, and
- (b) shall take into account the requirements of APA GasNet to undertake maintenance works on those assets in accordance with equipment suppliers recommendations, good practice and maintenance schedules developed by APA GasNet and approved by AEMO under this Service Envelope Agreement.

The specified operating constraints within the Service Envelope shall define the limits within which AEMO shall operate the assets in order to obtain the documented capability and availability of each asset.

4.1 Pipelines

The pipelines at various locations, as mentioned in section 2.1 are subject to operating constraints the details of which will be defined in this Schedule to ensure AEMO has all relevant information available to correctly and safely operate the pipelines in accordance with relevant legislative requirements and Codes of Practice and APA GasNet's requirements that apply to the pipelines.

Listed below is a compilation of operating constraints and guidelines that shall be complied with by AEMO in the operation of pipeline system.

- (a) AEMO shall operate the pipelines in compliance with applicable licence conditions.
- (b) The maximum operating pressure of the pipelines shall be limited to the Maximum Allowable Operating Pressure (MAOP) as specified in the pipeline licence condition.
- (c) The inlet pressure to any City Gate or APA GasNet pressure limiter, during periods of peak gas demand shall not fall below the design pressure specified in the "Regulator Capacity Tables" in Appendix 6.
- (d) The maximum flows (in actual cubic metres per hour or kilograms per hour) permitted to flow through any APA GasNet Custody Transfer Meter (CTM) delivery point is specified as Maximum Meter Capacity in the Transfer Point Plans A1-364-1 to 5 in Appendix 1.

- (e) The maximum and minimum allowable temperatures of the gas inside the pipeline shall be limited to 45°C and -10°C respectively, unless stated otherwise.

- (f) The APA GasNet System is not equipped with liquid removal facilities to enable the removal of liquids as may be injected into the system at either the GNS injection points or at each compressor station.

4.2 Pressure Regulators

The Pressure Limiters may be operated up to the maximum inlet pressure, which is the declared MAOP of the inlet pipeline.

The pressure regulator installations at the various locations, as tabulated in section 2.2, are subject to operating constraints, the details of which are defined in this document to ensure AEMO has all relevant information available to correctly and safely operate these facilities in accordance with the original design criteria for each facility and in accordance with the relevant legislative requirements and Codes of practice that apply to these facilities.

In addition, AEMO shall operate the pressure regulator facilities in such a manner that APA GasNet is able to conduct its activities to do with modification, upgrading, maintenance and testing of all of these installations in accordance with the relevant Statutory rules and Codes of practice that apply to these facilities. The operation of valves away from their “normal” operational settings shall require APA GasNet prior approval to avoid damage. The change of pressure regulator unit pressure set points shall require APA GasNet prior approval.

Details of design related constraints for each installation are provided in the “Regulator Capacity Tables” in Appendix 6.

In addition to these constraints, Appendix 9 provides a summary of station valves which are accessible for operation remotely via the AEMO Operations Centre.

4.2.1 Dandenong City Gate

1 off station valve; 7 off regulator run valves; 3 off regulators (set point).

4.2.2 Wollert City Gate

2 off station valves; 4 off regulator run valves; 4 off regulators (set point).

4.2.3 Longford Metering Station

2 off station valves.

4.2.4 Dandenong Terminal Station

nil

4.2.5 Tyers Pressure Limiter

2 off station valves, 1 off regulators (set point).

4.2.6 (Not used)

4.2.7 Wollert Pressure Limiter

Operation of this facility may require operation of inlet valves in Run 1 and Run 2 of the Wollert City Gate P8-016.

4.2.7.1 Regulator Runs

The allowable maximum set point for the regulators is 6890 kPa(g).

The minimum allowable set point (pressure) is governed by the requirement to maintain a minimum outlet temperature above - 10°C. All City Gate sites downstream of this facility are to be maintained above a minimum inlet temperature of 2°C. Outlet temperature of the regulator runs shall not be allowed to fall below -10°C.

Gas can only flow in one direction through the regulator runs - from the Pakenham to Wollert pipeline into the Wollert to Wodonga pipeline.

The regulators are electronically controlled by the station safety PLC. If the PLC fails, the backup pneumatic controller fitted to each regulator will control the regulator to a predetermined set point. The set point for the pneumatic controller can only be adjusted on site.

If the regulator in one of the runs fails open, the inlet valve can be remotely actuated to isolate that run. This will allow the other run to control pressure.

Flow control function is available at this site.

4.2.7.2 Slamshut Valves

The slamshut valves will automatically slam shut when the sensed pressure exceeds the set point. The valves require manual intervention to re open. Once tripped, remote operation function of the valve will be disabled by PLC until the high pressure condition has disappeared and the pressure fallen below a set point to reset the PLC software interlock.

The slamshut valves will also slam shut when the sensed pressure is less than 1,000 kPa(g).

The slamshut valve UV-65 can be remotely operated but shall be restricted to the following operations:

- (a) Safety related operations,
- (b) Isolation of a faulty run, and

- (c) Reopening the slamshut valve after it has been accidentally tripped.

The slamshut valve UV-61 can be remotely operated but shall be restricted to the following operations:

- (a) Open and close the 300mm by pass run,
- (b) Safety related operations,
- (c) Isolation of a faulty run, and
- (d) Re-opening the slamshut valve after it has been accidentally tripped.

Other operations of the slam-shut valves at this facility shall be subject to APA GasNet approval.

The slamshut valves shall not be actuated from close to open position when the differential pressure across the valve is greater than 200 kPa. The pressure across the valve can be equalised by manipulating the regulator set point or sending a APA GasNet crew to site to equalise the pressure using the installed valve by-pass arrangement.

4.2.8 Lara City Gate

4.2.8.1 Regulator Runs

The allowable maximum outlet set point for the regulators is 7390 kPa(g). The allowable minimum upstream (SWP pipeline) set point is 4500 kPa(g).

The allowable minimum outlet set point (pressure) is governed by requirement to maintain a minimum outlet temperature above -10°C. All City Gate sites downstream of this facility are to be maintained above a minimum inlet temperature of 2°C. Outlet temperature of the regulator runs shall not be allowed to fall below -10°C.

The active regulators are electronically controlled via the RTU. The monitor regulators will take over control at a fixed and predetermined set point when the RTU fails to control.

If the regulator in one of the runs fails open, the inlet isolation valve can be remotely actuated to isolate that run. This will allow the other runs to control pressure.

Flow control function is available at this site.

4.2.8.2 Slamshut Valves

The slamshut valves can be remotely operated. The slamshut valve will automatically slam shut when the sensed pressure exceeds the set point. The valves require manual intervention to re open. Once tripped, remote operation function of the valve will be disabled by

RTU until the high pressure condition has disappeared and the pressure fallen below a set point to reset the RTU software interlock.

The slamshut valves will also slam shut when the sensed pressure is less than 1,000 kPa(g).

The slamshut valves can be remotely operated but shall be restricted to the following operations:

- (a) Safety related operations,
- (b) Isolation of a faulty run, and
- (c) Re-opening the slamshut valve after it has been accidentally tripped.

Other operations of the slamshut valves at this facility shall be subject to APA GasNet approval.

The slamshut valves shall not be actuated from close to open position when the differential pressure across the valve is greater than 200 kPa. The pressure across the valve can be equalised by manipulating the regulator set point or sending a APA GasNet crew to site to equalise the pressure using the installed valve by-pass arrangement.

4.2.8.3 Requirement for Heating Gas

The minimum pipework design temperature limit is -10°C. Under no circumstance should this -10°C limit be breached. For delivery obligation reasons the regulator station outlet gas temperature should not fall below 2°C.

When the differential between the set point pressure and the station inlet pressure is expected to produce a temperature below the limit of 2°C, heating is required.

4.2.8.4 Overview of Heater Operation

The heater is automatically controlled by the RTU and does not normally require any action by AEMO, other than adjusting station outlet temperature set point and selecting the operating mode appropriate to transmission system operations. Modes are Off, Idle (only one burner available) and Run (both burners available). The starting cycle comprises 5 minutes purge and 5 minutes to reach idle. In Idle mode, the maximum heater firing rate, and hence water warm up rate and gas flow heating capacity, are about half that of the full rate with both burners.

The water bath temperature set point is controlled by the regulator station gas outlet temperature. The main burners will automatically modulate, including switch on or switch off in order to achieve the set point. If the heater water temperature is low and the heater may soon be required for expected gas flows (eg. for the next peak demand), AEMO can force the heater to fire up to increase the water temperature, in readiness for the heating load, by temporarily

increasing the regulator station outlet gas temperature set point until the water has heated to the desired temperature, then re-setting the gas temperature set point to the normally required value.

4.2.8.5 Operating Envelope

The amount of heat available for heating the gas is limited to the 500KW design capacity of the heater. Therefore, the station must be operated within an operating envelope defined by the heater capacity.

4.2.8.6 (Not used)

4.2.8.7 Emergency Shutdown

In an emergency shutdown of the Lara SWP City Gate:

- AEMO should reduce the pressure set point to force the active regulators to close.
- AEMO should then close each of the slam-shut valves if tight shut-off is required.

4.2.8.8 Loss of Electrical Power

Electrical power is required for the RTU and the heater burner management system. The normal 24 Vdc power supply has a battery back-up. It is estimated that the battery back-up will provide at least 14 hours of electrical power (based on demand from both the heater and the RTU. Note: Heater battery load is approximately 80% of total demand).

AEMO must notify APA GasNet upon loss of electrical power. If electrical power is expected to be off for an extended length of time, APA GasNet will arrange for an alternate electrical power source (eg. mobile generator).

4.2.8.9 Loss of Power Gas

Each valve has its own individual power gas supply taken from the main process gas flow. Loss of a power gas connection will only affect the specific valve that the connection supplies. Loss of power gas will have one of the following effects:

- Failure of an active regulator in the open position. In this case, the monitor regulator will begin controlling at its set point (i.e. slightly above the station set point).
- Failure of a monitor regulator in the open position. In this case, the active regulator will continue to control.
- Failure of the heater bypass valve in last position.
- Failure of a slam-shut valve in the closed position.
- Failure of shut-off valve in open position.

4.2.8.10 Loss of RTU Function

Loss of RTU function will result in AEMO losing all communications with site. Upon loss of RTU function AEMO must notify APA GasNet.

Upon loss of RTU function:

- Monitor regulators will begin controlling at their last registered set points (i.e. approximately 100 kPa above the station set point at time of failure).
- Slam-shut valves will continue to provide overpressure protection.
- Heater will shut down.

Note: When the RTU is powered up again, the RTU will automatically select the station set point pressure equal to the downstream station pressure. AEMO must then change the set point to suit their requirements.

4.2.8.11 APA GasNet Lock-out

- APA GasNet, on approval from AEMO, can isolate one or more regulator runs via a switch in the RTU cabinet. In this case, remote control of the chosen regulator run/s by AEMO is disabled.
- APA GasNet, on approval from AEMO, can switch a slam-shut valve to manual mode at its site located slam-shut panel. In this case, remote control of the chosen slam-shut valve by AEMO is disabled.

4.2.8.12 Safety Critical Operations

- Minimum mechanical design temperature of -10°C must not be breached. This can cause brittle fracture, resulting in catastrophic failure of the pipework.

4.2.9 Brooklyn (BCP) City Gate

4.2.9.1 Regulators Runs

The allowable maximum downstream set point for the regulators is 2760 kPa(g). The allowable minimum upstream (BCP pipeline) set point is 3500 kPa(g).

The allowable minimum downstream set point (pressure) is governed by requirement to maintain a minimum outlet temperature above -10°C. All City Gate sites downstream of this facility are to be maintained above a minimum inlet temperature of 2°C. Outlet temperature of the regulator runs shall not be allowed to fall below -10°C.

The active regulators of runs 1 to 4 are electronically controlled via the RTU. The monitor regulators will take over control at a fixed and predetermined set point when the RTU fails to control.

If the regulator in one of the runs fails open, the inlet isolation valve can be remotely actuated to isolate that run. This will allow the other runs to control pressure.

Run 5 is directly controlled by the station safety PLC, although the active regulator position is determined by the RTU. If this regulator fails the run will be automatically forced closed.

Flow control function is available at this site.

4.2.9.2 Slamshut Valves

The slamshut valves can be remotely operated. The slamshut valve will automatically slamshut when the sensed pressure exceeds the set point. The valves require manual intervention to re open. Once tripped, remote operation function of the valve will be disabled by RTU (or PLC in the case of run 5 and the bypass run slamshut) until the high pressure condition has disappeared and the pressure fallen below a set point to reset the RTU/PLC software interlock.

The slamshut valves will also slam shut when the sensed pressure is less than 1,000 kPa(g).

The slamshut valves can be remotely operated but shall be restricted to the following operators:

- (a) Safety related operations,
- (b) Isolation of a faulty run, and
- (c) Re-opening the slamshut valve after it has been accidentally tripped.

Other operations of the slam-shut valves at this facility shall be subject to APA GasNet approval.

The slamshut valves shall not be actuated from close to open position when the differential pressure across the valve is greater than 200 kPa. The pressure across the valve can be equalised by manipulating the regulator set point or sending a APA GasNet crew to site to equalise the pressure using the installed valve by-pass arrangement.

4.2.9.3 Flow Measurement

The flow meter is shared by both the Brooklyn pressure limiter (P9-11) and this City Gate. It is designed to provide flow measurement through the City Gate only when the Brooklyn pressure limiter is not flowing gas. If both facilities are flowing gas then the meter will measure the combined flow.

The RTU and PLC also calculates estimated flow through the BCP City Gate and BBP Pressure Limiter runs and stations. The selected station flow rate is used for the purposes of flow control.

4.2.9.4 Requirement for Heating Gas

The minimum pipework design temperature limit is -10°C. Under no circumstance should this -10°C limit be breached. For delivery obligation reasons the regulator station outlet gas temperature should not fall below 2°C.

When the differential between the set point pressure and the station inlet pressure is expected to produce a temperature below the limit of 2°C, heating is required.

4.2.9.5 Overview of Heater Operation

The heater is automatically controlled by the PLC and does not normally require any action by AEMO, other than adjusting minimum waterbath temperature setpoint, station outlet temperature set point and stopping or re-starting burners. The starting cycle comprises about 5 minutes purge and 5 minutes to reach "low fire". In "low fire", the heater firing rate, and hence water warm up rate and gas flow heating capacity, is about 10% that of the full rate with both burners.

The water bath temperature is controlled by the regulator station gas outlet temperature. The main burners will automatically modulate, including switch on or switch off in order to achieve the set point. If the heater water temperature is low and the heater may soon be required for expected gas flows (eg. for the next peak demand), AEMO can force the heater to fire up to increase the water temperature, in readiness for the heating load, by temporarily increasing the minimum waterbath temperature set point until the water has heated to the desired temperature, then re-setting the waterbath temperature set point to the normally required value.

4.2.9.6 Operating Envelope

The amount of heat available for heating the gas is limited to the 2050kW design capacity of each heater. Therefore, the station must be operated within an operating envelope defined by the heater capacity.

4.2.9.7 (Not used)

4.2.9.8 Emergency Shutdown of the City Gate Station

In an emergency shutdown of the Brooklyn BCP City Gate Regulator Station:

- AEMO should reduce the regulator station flow set point and the pressure set point to force the active regulators to close.

- AEMO should then close each of the regulator station slam-shut valves to ensure tight shut-off.

4.2.9.9 Loss of Electrical Power

Electrical power is required for the heater combustion air fans and the instrument air compressors and driers. The RTU and PLC are supplied from the secure 24 Vdc batteries in the compressor and city gate areas respectively. The city gates instrument air dry gas receiver will support the city gates for 30 minutes.

Upon loss of electrical power, the compressor station emergency generator will automatically start-up. This is not expected to take longer than a minute to start-up.

The heater will shut down upon loss of electrical power. It may be reset and restarted once the emergency compressor station generator is running.

AEMO must notify APA GasNet upon loss of electrical power.

4.2.9.10 Loss of Power Gas

Each valve in runs 1 to 4 has its own individual power gas supply taken from the main process gas flow. Loss of a power gas connection will only affect the specific valve that the connection supplies. Loss of power gas will have one of the following effects:

- Failure of an active regulator in the open position. In this case, the monitor regulator will begin controlling at its local set point.
- Failure of a monitor regulator in the open position. In this case, the active regulator will continue to control.
- Failure of a slam-shut valve in the closed position.
- Failure of pressure limiter regulator in open position.

Each valve in run 5, the bypass run, station inlet valves, heater isolation and bypass valves and the heater burner actuator use the station instrument air supply taken from the compressor station instrument air system. The city gates instrument air dry gas receiver will support the city gates for 30 minutes. Partial or total loss of instrument air will have one or more of the following effects:

- Failure of an active regulator in the fail-safe closed position. In this case, the station safety PLC will detect that the valve is faulty if it is not in the correct control position, will close the run inlet valve and raise an alarm.
- Failure of the heater bypass or isolation valve in last position.
- Failure of any slam-shut valve in the closed position.

- Failure of station actuated (Brooklyn – Conio Pipeline) inlet isolation valve in last position.
- Failure of the heater.

4.2.9.11 Loss of RTU Function

Loss of BCP RTU (RBKN0) function will result in AEMO losing all communications with site except for BCP heaters, run 5 and the bypass run.

Upon loss of RTU (RBKN0) function:

- AEMO must notify APA GasNet
- BCP CG Monitor regulators (runs 1 -4) will begin controlling at their local set point. Active regulators will fail open.
- BBP Pressure limiter regulator will revert to local pneumatic control.
- Slam-shut valves (runs 1 -4) will continue to provide pneumatic overpressure protection.

Note: When the RTU function is restored, the RTU will automatically select the regulator station set point pressure equal to the downstream regulator station pressure. AEMO must then change the set points to suit their requirements.

Loss of BLP RTU (RBKN1) function will result in AEMO losing all communications with BLP site and BCP City Gate heaters, regulator run 5 and bypass run.

Upon loss of BLP RTU (RBKN1) function AEMO must notify APA GasNet.

Upon loss of RTU (RBKN1) function, AEMO will not be able to control or monitor

- BCP City Gate heaters or actuated valves,
- BCP/BLP station inlet valve BV03C,
- BCP bypass run
- BCP regulator run5,

but the local control system will continue to operate normally using the station safety PLC.

Loss of safety PLC function will result in safe shutdown of both heaters. The active regulator for run 5 will operate pneumatically using the station pneumatic controller. Upon loss of PLC function AEMO must notify APA GasNet.

4.2.9.12 APA GasNet Lock-out

- APA GasNet, on approval from AEMO, can isolate one or more regulator runs via a switch in the RTU cabinet. In this case, remote control of the chosen regulator run/s by AEMO is disabled.
- APA GasNet, on approval from AEMO, can switch a slam-shut valve to manual mode at its site located slam-shut panel. In this case, remote control of the chosen slam-shut valve by AEMO is disabled as well as the overpressure control.
- APA GasNet, on approval from AEMO, can switch one or both pressure limiter runs to manual mode at the RTU. In this case, remote control of the chosen pressure limiter run/s by AEMO is disabled.
- APA GasNet, on approval from AEMO, can switch a cross over pressure limiter inlet isolation valve to manual mode at its site located valve panel. In this case, remote control of the chosen inlet isolation valve by AEMO is disabled.

4.2.9.13 Safety Critical Operations

- Minimum mechanical design temperature of -4°C must not be breached. This can cause brittle fracture of the BCP heater inlet header, resulting in catastrophic failure of the pipework.

4.2.10 Brooklyn (BBP) Pressure Limiter

4.2.10.1 Regulators Runs

The allowable maximum set point for the regulators is 7390 kPa(g).

The allowable minimum set point (pressure) is governed by requirement to maintain a minimum outlet temperature above -10°C. All City Gate sites downstream of this facility are to be maintained above a minimum inlet temperature of 2°C. Outlet temperature of the regulator runs shall not be allowed to fall below -10°C.

Gas can only flow in one direction through the regulator runs - from the Brooklyn to Corio pipeline to Brooklyn to Ballan pipeline.

The regulators are electronically controlled by the RTU. If the RTU fails, the backup pneumatic controller fitted to each regulator will control the regulator to a predetermined set point. The set point for the pneumatic controller can only be adjusted on site.

Note: When the RTU is powered up again, the RTU will automatically select the regulator station set point pressure equal to the downstream regulator station pressure. AEMO must then change the set points to suit their requirements.

If the regulator in one of the runs fails open, the inlet isolation valve can be remotely actuated to isolate that run. This will allow the other

run to control pressure. Flow control function is not available at this stage.

4.2.10.2 Isolation Valves

Isolation valves shall not be actuated from close to open position when the differential pressure across the valve is greater than 200 kPa. The pressure across the valve can be equalised by manipulating the regulator set point or sending a APA GasNet crew to site to equalise the pressure using the installed valve by-pass arrangement.

4.2.10.3 Flow Measurement

The flow meter is shared by both the Brooklyn BCP City Gate (P8-28) and this pressure limiter. It is designed to provide flow measurement through the pressure limiter only when the Brooklyn BCP City Gate is not flowing gas. If both facilities are flowing gas then the meter will measure the combined flow.

Estimated flow through each run and the Pressure Limiter station is calculated from regulator position and process conditions for indicative purposes only.

4.2.10.4 Emergency Shutdown of the BBP Pressure Limiter Station

In an emergency shutdown of the Brooklyn BBP Pressure Limiter Station:

- AEMO should reduce the pressure limiter regulator station set point to force the pressure regulators to close.
- AEMO should then close each of the actuated inlet isolation valves.

4.2.11 Barnawartha City Gate

4.2.11.1 Regulators Runs

The allowable maximum set point for the regulators is 7400 kPa(g).

The allowable minimum set point (pressure) is governed by the requirement to maintain a minimum outlet temperature above -10°C. All City Gate sites downstream of this facility are to be maintained above a minimum inlet temperature of 2°C. Outlet temperature of the regulator runs shall not be allowed to fall below -10°C.

Gas can only flow in one direction through the regulator runs - from the Interconnect (Barnawartha North to Culcairn) pipeline to the Wollert to Wodonga pipeline.

The active regulators are electronically controlled via the RTU. The monitor regulators will take over control at a fixed and predetermined set point when the RTU fails to control. Note: When the RTU is powered up again, the RTU will automatically select the regulator

station set point pressure equal to the downstream regulator station pressure. If the active regulator in one of the runs fails open, the slam-shut valve can be remotely actuated to isolate that run. This will allow the second run to control pressure.

Flow control function is not available for operation at this stage.

4.2.11.2 Slamshut Valves

The slamshut valves will automatically slamshut when the sensed pressure exceeds the set point. The valves require manual intervention to re open. Once tripped, remote operation function of the valve will be disabled by RTU until the high pressure condition has disappeared and the pressure fallen below a set point to reset the RTU software interlock.

The slamshut valves can be remotely operated but shall be restricted to the following operations:

- (a) Safety related operations,
- (b) Isolation of a faulty run, and
- (c) Re-opening the slamshut valve after it has been accidentally tripped.

Other operations of the slam-shut valves at this facility shall be subject to APA GasNet approval.

The slamshut valves shall not be actuated from close to open position when the differential pressure across the valve is greater than 200 kPa. The pressure across the valve can be equalised by manipulating the regulator set point or sending a APA GasNet crew to site to equalise the pressure using the installed valve by-pass arrangement.

The slamshut valves will also slamshut when the sensed pressure is less than 1,000 kPa(g).

4.2.12 Wandong PRS

4.2.12.1 Regulators Runs

The allowable maximum set point for the regulators is 7390 kPa(g).

The allowable minimum set point (pressure) is governed by requirement to maintain a minimum outlet temperature above -10°C. All city gate sites downstream of this facility are to be maintained above a minimum inlet temperature of 2°C. Outlet temperature of the regulator runs shall not be allowed to fall below -10°C.

Gas can only flow in one direction through the regulator runs - from the Wollert to Wodonga pipeline into the Wandong to Kyneton pipeline.

The regulators are electronically controlled by the RTU. If the RTU fails, the backup pneumatic controller fitted to each regulator will control the regulator to a predetermined set point. The set point for the pneumatic controller can only be adjusted on site.

If the regulator in one of the runs fails open, the inlet valve can be remotely actuated to isolate that run. This will allow the other run to control pressure. Flow control function is not available for operation at this stage.

4.2.12.2 Isolation Valves

Isolation valves shall not be actuated from close to open position when the differential pressure across the valve is greater than 200 kPa. The pressure across the valve can be equalised by manipulating the regulator set point or sending a APA GasNet crew to site to equalise the pressure using the installed valve by-pass arrangement.

4.2.13 Iona City Gate

4.2.13.1 Regulators Runs

The allowable maximum set point for the regulators is 7400 kPa(g).

The allowable minimum set point (pressure) is governed by requirement to maintain a minimum outlet temperature above - 10°C. All City Gate sites downstream of this facility are to be maintained above a minimum inlet temperature of 2°C. Outlet temperature of the regulator runs shall not be allowed to fall below - 10°C.

The active regulators are electronically controlled via the RTU. The monitor regulators will take over control at a fixed and predetermined set point when the RTU fails to control.

If the regulator in one of the runs fails open, the inlet isolation valve can be remotely actuated to isolate that run. This will allow the other runs to control pressure.

Flow control function is not available for operation at this stage.

4.2.13.2 Slamshut Valves

The slamshut valves can be remotely operated. The slamshut valve will automatically slamshut when the sensed pressure exceeds the set point. The valves require manual intervention to re open. Once tripped, remote operation function of the valve will be disabled by RTU until the high pressure condition has disappeared and the pressure fallen below a set point to reset the RTU software interlock. The slamshut valves will also slamshut when the sensed pressure is less than 1,000 kPa(g).

The slamshut valves can be remotely operated but shall be restricted to the following operations:

- (1) safety related operations,

- (2) isolation of a faulty run, and
- (3) re opening the slamshut valve after it has been accidentally tripped.

Other operations of the slam-shut valves at this facility shall be subject to APA GasNet approval.

The slamshut valves shall not be actuated from close to open position when the differential pressure across the valve is greater than 200 kPa. The pressure across the valve can be equalised by manipulating the regulator set point or sending a APA GasNet crew to site to equalise the pressure using the installed valve by-pass arrangement.

4.2.13.3 Emergency Shutdown

In an emergency shutdown of the Iona City Gate:

- AEMO should reduce the pressure set point to force the active regulators to close.
- AEMO should then close each of the slam-shut valves to ensure tight shut-off.

4.2.13.4 Loss of Electrical Power

Electrical power is required for the RTU. The normal power supply has a battery back-up. It is estimated that the battery back-up will provide at least 4 hours of electrical power.

AEMO must notify APA GasNet upon loss of electrical power. If electrical power is expected to be off for an extended length of time, APA GasNet will arrange for an alternate electrical power source (eg. mobile generator).

4.2.13.5 Loss of Power Gas

Each valve has its own individual power gas supply taken from the main process gas flow. Loss of a power gas connection will only affect the specific valve that the connection supplies. Loss of power gas will have one of the following effects:

- Failure of an active regulator in the open position. In this case, the monitor regulator will begin controlling at its local set point.
- Failure of a monitor regulator in the open position. In this case, the active regulator will continue to control.
- Failure of a slam-shut valve in the closed position.
- Failure of shut-off valve in open position.

4.2.13.6 Loss of RTU Function

Loss of RTU function will result in AEMO losing all communications with site. Upon loss of RTU function AEMO must notify GasNet.

Upon loss of RTU function:

- Monitor regulators will begin controlling at their local set point.
- Slam-shut valves will continue to provide overpressure protection.

Note: When the RTU is powered up again, the RTU will automatically select the station set point pressure equal to the downstream station pressure. AEMO must then change the set point to suit their requirements.

4.2.13.7 APA GasNet Lock-out

- APA GasNet, on approval from AEMO, can isolate one or more regulator runs via a switch in the RTU cabinet. In this case, remote control of the chosen regulator run/s by AEMO is disabled.
- APA GasNet, on approval from AEMO, can switch a slam-shut valve to manual mode at its site located slam-shut panel. In this case, remote control of the chosen slam-shut valve by AEMO is disabled.

4.2.13.8 Description of Facilities for Gas Flow To / From WUGS

Emergency Shutdown Valve UV-71

Normal Operation of UV-71

UV-71 is part of the WUGS emergency shutdown system. Normally UV-71 is fully open.

The site located run/text panel has a run/test selector hand valve. Run mode is the normal operating mode. Test mode is only available to APA GasNet on approval by AEMO. The actuated valve will remain open during test mode.

Shutdown of UV-71

Remote closure of UV-71 by AEMO should be reserved for emergency situations or situations where there is a concern for safety.

UV-71 will close automatically when activated by the WUGS emergency shutdown system. AEMO also have the ability to remotely close UV-71.

UV-71 can only be reopened locally by a WUGS operator. AEMO do not have the ability to reopen UV-71. Therefore, remote closure of UV-71 by AEMO should be reserved for emergency situations or situations where there is a concern for safety.

4.2.13.9 Loss of Power Gas

Each valve has its own individual power gas supply taken from the main process gas flow. UV-71 will fail in the closed position upon loss of its dedicated power gas supply.

4.2.13.10 Loss of RTU Function

Loss of RTU function will result in AEMO losing all communications with site. Upon loss of RTU function AEMO must notify APA GasNet.

Upon loss of RTU function, AEMO will lose the ability to close UV-71. However, the valve position will remain unchanged and UV-71 will continue to function as part of the WUGS emergency shutdown system (due to hard wiring).

4.2.13.11 APA GasNet Lock-Out

APA GasNet, on approval from AEMO, can switch UV-71 to test mode at its site located run/test panel. In this case, remote closure of UV-71 by AEMO is disabled.

4.2.13.12 Safety Critical Operations

- MAOP (Maximum Allowable Operating Pressure) must not be breached. If MAOP is breached, catastrophic failure of the pipework can occur.
- Minimum mechanical design temperature of -10°C must not be breached. This can cause brittle fracture, resulting in catastrophic failure of the pipework.

4.2.13.13 Pig Launcher/Receivers

The pig launcher/receivers are normally isolated. When line pigging is required, APA GasNet will advise AEMO, and the pig launcher/receivers will be operated locally by GasNet.

4.2.14 Brooklyn (BLP) City Gate

4.2.14.1 Regulators Runs

The allowable maximum set point for the regulators is 7390 kPa(g) (discharge). The allowable minimum upstream (BLP pipeline) set point is 4500 kPa(g).

The allowable minimum outlet set point (pressure) is governed by requirement to maintain a minimum outlet temperature above -10°C. All city gate sites downstream of this facility are to be maintained

above a minimum inlet temperature of 2°C. Outlet temperature of the regulator runs shall not be allowed to fall below -10°C into the BCP pipeline, or -4°C into the BCP CG heaters.

The regulators of runs 1 to 5 are electronically controlled via the station safety PLC.

The station does not use monitor regulators but instead utilises diagnostic monitoring of the active regulator to provide discrimination at a run level. If the regulator in one of the runs fails open, the inlet isolation valve (slamshut) will be automatically actuated to isolate that run. This will allow the other runs to control pressure.

Flow control function is available at this site.

4.2.14.2 Slamshut Valves

The slamshut valves can be remotely operated. The slamshut valve will automatically slam shut when the sensed pressure exceeds the set point 7830 kPa(g). The valves require manual intervention to re open. Once tripped, remote operation function of the valve will be disabled by PLC until the high pressure condition has disappeared and the pressure fallen below a set point to reset the PLC software interlock.

The slamshut valves will also slam shut when the sensed pressure is less than 1,000 kPa(g) (downstream).

The slamshut valves can be remotely operated but shall be restricted to the following operators:

- (a) Safety related operations,
- (b) Isolation of a faulty run, and
- (c) Re-opening the slamshut valve after it has been accidentally tripped.

Other operations of the slam-shut valves at this facility shall be subject to APA GasNet approval.

The slamshut valves shall not be actuated from close to open position when the differential pressure across the valve is greater than 200 kPa. The pressure across the valve can be equalised by manipulating the regulator set point or sending an APA GasNet crew to site to equalise the pressure using the installed valve by-pass arrangement.

4.2.14.3 Flow Measurement

The flow meter is designed to provide flow measurement through the City Gate.

The PLC also calculates estimated flow through the BLP City Gate. The selected station flow rate is used for the purposes of flow control.

4.2.14.4 Requirement for Heating Gas

The minimum pipework design temperature limit is -10°C. Under no circumstance should this -10°C limit be breached. For delivery obligation reasons the regulator (BLP City Gate) station outlet gas temperature should not fall below 2°C.

When the differential between the set point pressure and the station inlet pressure is expected to produce a temperature below the limit of 2°C, heating is required.

Additionally, the minimum allowable temperature at the BCP waterbath heaters inlet is -4°C. Each heater is protected with a low temperature trip which will close the associated isolation valve if this limit is reached. To avoid unwanted trips, BLP City Gate has discharge temperature controls which will start to limit flow rate through the station between -2 and -4°C,

4.2.14.5 Overview of Heater Operation

The heater is automatically controlled by the PLC and does not normally require any action by AEMO, other than adjusting minimum waterbath temperature setpoint, station outlet temperature set point and stopping or re-starting burners. The starting cycle comprises about 5 minutes purge and 5 minutes to reach "low fire". In "low fire", the heater firing rate, and hence water warm up rate and gas flow heating capacity, is about 20% that of the full rate.

The water bath temperature is controlled by the regulator station gas outlet temperature. The main burners will automatically modulate, including switch on or switch off in order to achieve the set point. If the heater water temperature is low and the heater may soon be required for expected gas flows (eg. for the next peak demand), AEMO can force the heater to fire up to increase the water temperature, in readiness for the heating load, by temporarily increasing the minimum waterbath temperature set point (between 2 to 20 degC) until the water has heated to the desired temperature, then re-setting the waterbath temperature set point to the normally required value.

4.2.14.6 Operating Envelope

The amount of heat available for heating the gas is limited to the 625kW design capacity of each heater. Therefore, the station must be operated within an operating envelope defined by the heater capacity.

Bath temperature not to exceed 85 degC, flow not to exceed 375 kscmh per heater. Gas outlet temperature setpoint 2 to 20 degC.

4.2.14.7 (Not used)

4.2.14.8 Emergency Shutdown of the City Gate Station

In an emergency shutdown of the Brooklyn BLP City Gate Regulator Station:

- AEMO should reduce the regulator station flow and pressure set points to force the active regulators to close.
- AEMO should then close each of the regulator station slam-shut valves to ensure tight shut-off.

4.2.14.9 Loss of Electrical Power

Electrical power is required for the heater combustion air fan and the instrument air compressors and driers. The RTU and PLC are supplied from the secure 24Vdc batteries in the compressor and city gate areas respectively. The city gates instrument air dry gas receiver will support the city gates for up to 30 minutes.

Upon loss of electrical power, the compressor station emergency generator will automatically start-up. This is not expected to take longer than a minute to start-up.

The heater will shut down upon loss of electrical power. It may be reset and restarted once the emergency compressor station generator is running. A maximum of three consecutive remote reset attempts are possible.

AEMO must notify APA GasNet upon loss of electrical power.

4.2.14.10 Loss of Power Gas or Instrument Air

Power gas is only used in BLP City Gate on the station inlet isolating valve UV62011. Loss of power gas will leave the valve in its last position and raise an alarm. This valve also has a storage bottle permitting up to three valve strokes, even in absence of the power gas connection.

Each valve in runs 1-5, the bypass run, station inlet valves, heater isolation and bypass valves and the heater burner actuator use the station instrument air supply taken from the compressor station instrument air system. The city gates instrument air dry gas receiver will support the city gates for up to 30 minutes. Partial or total loss of instrument air will have one or more of the following effects:

- Failure of an active regulator in the fail-safe closed position. In this case, the station safety PLC will detect that the valve is faulty if it is not in the correct control position, will close the run inlet valve and raise an alarm.
- Failure of the heater bypass or isolation valve in last position.
- Failure of any slam-shut valve in the closed position.
- Failure of station actuated (Brooklyn – Conio Pipeline) isolation valve 1221UV62001 in last position.
- Failure of the heaters.

4.2.14.11 Loss of RTU or PLC Function

The BLP City Gate automated infrastructure is controlled and monitored through BLP_PLG and BLP RTU (RBKN1) respectively. The infrastructure includes 2 heaters, regulator runs 1 to 5, and the bypass run.

Loss of BLP RTU (RBKN1) function will result in AEMO losing all communication with BLP CG. Upon loss of BLP RTU (RBKN1) function AEMO must notify APA GasNet

Upon loss of BLP RTU (RBKN1) AEMO will not be able to control or monitor

- BLP City Gate heaters
- BLP Regulator runs 1-5
- BCP City Gate heaters,
- BLP Station actuated valves,
- BCP regulator run 5

But the local control system will continue to operate normally (based on the last setpoint) using the station PLC.

station actuated valves When the RTU is reinstated, AEMO will need to confirm setpoints.

Loss of safety PLC function will result in safe shutdown of both heaters. The active regulator for runs 1 to 5 will operate pneumatically using the station pneumatic controller. Upon loss of PLC function AEMO must notify APA GasNet.

When the PLC is reinstated, AEMO will need to confirm setpoints, manually re-open any closed runs and re-start heaters.

4.2.14.12 APA GasNet Lock-out

- APA GasNet, on approval from AEMO, can isolate one or more regulator runs. In this case, remote control of the chosen regulator run/s by AEMO is disabled.
- APA GasNet, on approval from AEMO, can switch a slam-shut valve to manual mode at its site located slam-shut panel. In this case, remote control of the chosen slam-shut valve by AEMO is disabled as well as the overpressure control.

4.2.14.13 Safety Critical Operations

- Minimum mechanical design temperature of -4°C must not be breached. This can cause brittle fracture of the BCP heater inlet header, resulting in catastrophic failure of the pipework.

4.2.15 Euroa Pressure Reduction Station

4.2.15.1 Regulator Run

- The allowable maximum set point for the regulators is 7400 kPa(g).
- The discharge pressure set point is fixed to maintain a minimum outlet temperature above -10°C. All City Gate sites downstream of this facility are to be maintained above a minimum inlet temperature of 2°C. Outlet temperature of the regulator runs shall not be allowed to fall below -10°C.
- Gas can only flow in one direction through the regulator runs - from the Wollert to Euroa (8800 kPa(g) MAOP) pipeline to the Euroa to Wodonga (7400 kPa(g) MAOP) pipeline.
- The active regulator is electronically controlled via the RTU. The pneumatic pressure controller will take over control at a fixed and predetermined set point when the RTU fails to control.
- If the active regulator fails open, the slam-shut valve can be remotely actuated to isolate that run. The linevalves bypassing the station may be remotely opened when the pipeline pressure south of the station falls below 7400 kPa(g).

4.2.15.2 Slamshut Valves

- The slamshut valve will automatically slamshut when the sensed pressure exceeds the set point. The valve requires manual intervention to re-open. Once tripped, remote operation function of the valve will be disabled by RTU until the high pressure condition has disappeared and the pressure fallen below a set point to reset the RTU software interlock.
- The slamshut valves can be remotely operated but shall be restricted to the following operations:
 - (a) Safety related operations,
 - (b) Isolation of a faulty run, and
 - (c) Re-opening the slamshut valve after it has been accidentally tripped.
- Other operations of the slam-shut valves at this facility shall be subject to APA GasNet approval.
- The slamshut valve shall not be actuated from close to open position when the differential pressure across the valve is greater than 200 kPa. The pressure across the valve can be equalised by manipulating the regulator set point or sending an APA GasNet crew to site to equalise the pressure using the installed valve by-pass arrangement.
- The slamshut valve will also slam shut when the sensed pressure is less than 1,000 kPa.

4.2.15.3 Line Valves and Loading Valves

- The line valves and loading valves will automatically close when the sensed pressure exceeds the set point set at MAOP + 2%. The valves require manual intervention to re-open. The valves should be re-opened in response to a pressure differential reaching 200 kPa (northern pressures higher) to permit southerly flows, but should be remotely closed by AEMO if Wollert CS station B compressors are operating above 7400 kPa(g).

4.3 Compressor Stations

AEMO shall operate each compressor within the manufacturer's published compressor performance curves and engine performance data identified in the Compressor Stations Key Data Plan in Appendix 3.

Compressors within the Service Envelope will be available to AEMO within the meaning of availability as defined in clause 1.2 of this schedule.

AEMO shall be responsible for determining the actual compressor driver (turbine) power required for each site. However the actual gas supply capacity of the compressor stations shall be limited by the site specific conditions at the time of operation, but within the recommended equipment suppliers specifications referenced in this agreement and available to AEMO. These conditions include, but are not limited by, such factors as site elevation, inlet and outlet pressure losses, shutdown, fuel gas specification, friction, non-ideal compression and expansion and typical ambient atmospheric conditions.

All Saturn compressor packages are fitted with wet seals and from time to time these seals permit the release of oil into the APA GasNet System.

The average annual compressor utilisation rate is less than 10%. Accordingly unit and station reliability may be less than optimal after long periods of shut down.

APA GasNet reserves the right to relocate, replace, substitute, modify or re-stage compressor equipment and associated drivers, control systems or any other systems affecting compressor performance provided the capability of Nominal Power and associated compressor performance (deduced from compressor performance curves) are not reduced below the declared levels for each station as specified within this Agreement.

The redundant unit which is provided at each compressor station (except for Springhurst) may be operated in place of a unit provided within the design capability of each station, when the operating unit fails to perform to the required capability. However the compressor stations are not designed to allow a redundant unit to be operated in addition to the units within the design capability. Operation of the redundant unit in this way may lead to failure of the entire station and the Service Envelope Capacity will be reduced accordingly.

4.3.1 Gooding Compressor Station

Listed below is a compilation of operating constraints and guidelines that shall be complied with by AEMO unless expressly stated to be APA GasNet's obligation, in which case APA GasNet must comply

with the specified obligation, in the operation of Gooding Compressor Station:

4.3.1.1 The station should be operated below the maximum operating pressure of 6895 kPa(g). The overpressure protection system of the compressor unit will raise an alarm, if the discharge pressure exceeds 6895 kPa(g), and will shut down the unit, if the discharge pressure exceeds 7200 kPa(g).

4.3.1.2 (a) The minimum station inlet gas pressure should not be allowed to drop below 3,500 kPa(g).

(b) The under pressure protection system of a compressor station will raise an alarm, if the suction pressure falls below 4500 kPa(g), and will shutdown that any operating unit if the suction pressure falls below 1380 kPa(g).

(c) For the avoidance of doubt a unit, and not the station, will shut down where the suction pressure of that unit is below 1700 kPa(g).

4.3.1.3 (a) The maximum station discharge gas temperature shall be limited to 45°C. Gas discharge temperatures in excess of 50°C will initiate a shutdown on all compressor units operating.

(b) For the avoidance of doubt the Gooding compressor station is not fitted with a discharge gas cooling system.

4.3.1.4 Whenever gas compression is deemed to be required, a minimum of one (1) compressor unit and a maximum of three (3) compressor units shall be operated on a continuous basis. The fourth available compressor unit shall remain on standby status such that three (3) machines only are available for operation within the service envelope.

4.3.1.5 The time interval between starting successive compressor units shall be a minimum of two (2) minutes. Compressor units may be stopped at any time. The control system of the compressor unit allows for a cool down pre-shutdown period of time (3 minutes), which is initiated by activation of Normal Stop pushbutton of the respective unit. During this pre-shutdown period the engine speed is decreased to idle, and the unit is ready to be loaded again.

4.3.1.6 If a compressor unit shuts down via the station/compressor unit controls or is remotely stopped, a remote restart of the compressor unit must comply with the following:

<u>Time Period</u> <u>After Shutdown</u>	<u>AEMO Operator Action</u>
0-10 minutes	Remote restart may be initiated.
10 mins - 1 hour	Remote restart may not be initiated.

1 hour or more Remote restart may be initiated.

4.3.1.7

Gooding is fitted with a station recycle valve under station control. Recycling of gas through the station recycle valve shall be limited to a maximum of 30 minutes continuous recycle operation, otherwise the affected compressor units shall be shut down, or engine power reduced to minimum allowable loads. In addition, the control system of the compressor unit will allow initiation of gas recycle, if, due to the pipeline operating conditions, recycle is required to prevent surging of the compressor. Recycle is maintained as long as the temperature of gas, as sensed at the outlet of the unit, remains within allowable limits. At 99°C a High Temperature alarm is raised, and at 110°C the control system initiates shutdown of the unit.

4.3.1.8 If a gas compressor or a series of compressors are determined to be no longer required, the subject operating units shall be shut down within 15 minutes after this determination is made.

4.3.1.9 The compressor station discharge set point by agreement between APA GasNet and AEMO shall be set to match, as close as practicable, the pipeline operating requirements.

The compressor station is controlled by adjustment of the following station operational parameters:

- Suction pressure
- Discharge pressure
- Engine speed

Appropriate table is provided on the control screen for the operator to enter set points for the above parameters for every hour of the day. The control system will only allow inputting values within permissible range.

These parameters are used by the control system to calculate required engine speed signal, which is sent to the compressor units, operating at the time.

4.3.1.10 AEMO operators must allow at least eight (8) minutes for completion of the cold start sequence of a compressor unit from compressor start initiation to the point where the unit is on line and compressing gas.

4.3.1.11 Pressure differential across the compressor units of more than 700 kPa is required to ensure satisfactory seal gas differential pressures exist within the compressor. AEMO shall shut down any unit operating with less than 300 kPa (or as agreed from time to time) for a period of 15 minutes (or as agreed from time to time).

4.3.1.12 APA GasNet will ensure that each compressor unit at Gooding is fitted with an inlet liquids knock out drum or separator with an automatic liquid dump control to a station liquid storage tank maintained in accordance with APA GasNet procedures. If the separator liquid storage reservoir reaches a pre-determined maximum level then this condition will initiate a compressor unit shutdown.

4.3.1.13 AEMO shall ensure that compressors are not required to operate outside the manufacturer's published performance curve, including an allowance for surge control margin (as agreed from time to time). The surge margin setpoint on the station recycle valve is 15%. The unit anti-surge valve setpoint is 10%.

4.3.1.14 The control system of the compressor unit will limit the minimum engine speed of the unit if the power turbine speed falls below 10,000 rpm (64.5% NPT).

4.3.2 Wollert Compressor Station

Listed below is a compilation of operating constraints and guidelines that shall be complied with by AEMO and APA GasNet, as appropriate, in the operation of Wollert Compressor Station:

4.3.2.1 The maximum station discharge gas pressure shall be limited to 8800 kPa(g). The overpressure protection system of the Compressor Station controller will raise an alarm, if the discharge pressure exceeds 8,880 kPa(g), and will shut-down any running units, if the discharge pressure exceeds 9,240 kPa(g).

4.3.2.2 (a) The minimum station inlet gas pressure should not be allowed to drop below 3,000 kPa(g).

(b) The under pressure protection system of the Compressor Station Controller will raise an alarm, if the suction pressure falls below 3,000 kPa(g), and will shut-down any running units if the station suction pressure falls below 2,760 kPa(g).

4.3.2.3 The maximum station discharge gas temperature shall be limited to 45°C. The temperature control system shall limit outlet temperature by reducing engine speed and therefore flow throughput when outlet temperature exceeds the control setpoint of 45 degC. The outlet setpoint is not operator adjustable but will increase to 50 degC in high ambient temperatures. To permit periodic operation up to the 50 degC trip limit under unusually hot conditions, the temperature trip switch shall operate only if the limit is exceeded on a continuous basis for several minutes.

4.3.2.4 . APA GasNet allow AEMO unrestricted access to operate one or both units as required by system conditions.

4.3.2.5 The time interval between starting successive compressor units shall be a minimum of two (2) minutes. Compressor units may be stopped at any time.

4.3.2.6 If a compressor unit shuts down via the station/compressor unit controls or is remotely stopped, a remote restart of the compressor unit must comply with the following:

<u>Time Period</u> <u>After Shutdown</u>	<u>AEMO Operator Action</u>
0-10 minutes	Remote restart may be initiated.
10 mins - 1 hour	Remote restart may not be initiated.
1 hour or more	Remote restart may be initiated.

4.3.2.7 Wollert is fitted with a discharge gas cooling system. Recycling of gas through the station recycle valve is permitted. APA GasNet allow AEMO unrestricted use of recycle to meet system requirements.

4.3.2.8 If a gas compressor or a series of compressors are determined to be no longer required, the subject operating units shall be shut down within 15 minutes after this determination is made.

4.3.2.9 The compressor station discharge set point by agreement between APA GasNet and AEMO shall be set to match, as close as practicable, the pipeline operating requirements.

4.3.2.10 AEMO operators must allow at least eight (8) minutes for completion of the cold start sequence of a compressor unit from compressor start initiation to the point where the unit is on line and compressing gas.

4.3.2.11 AEMO must close Eurua PRS line valves LV13A and LV13B and the respective loading valves LV13AB and LV13BC prior to starting any of the compressors at Wollert compressor station B. In the event line valves cannot be operated remotely at the Eurua PRS, APA GasNet site attendance is required.

4.3.2.12 Pressure differential across the compressor units of more than 700 kPa is required to ensure satisfactory buffer gas differential pressures exist within the compressor. AEMO shall shut down any unit operating with less than 300 kPa (or as agreed from time to time) for a period of 15 minutes (or as agreed from time to time).

4.3.2.13 Wollert Compressor Station 'B' is fitted with two (2) filter-separators located in the station inlet header each with a manual liquids dump system. Each filter is nominally sized for one compressor.

4.3.2.14 AEMO shall ensure that compressors are not required to operate outside the manufacturer's published performance curve, including an allowance for surge control margin (as agreed from time to time).

4.3.2.15 Wollert Compressor Station 'A' (comprising 3 Saturn compressor sets) is inhibited and locked out with the station 'A' outlet valve closed when Station 'B' operates above 7400 kPa(g) discharge pressure.

4.3.2.16 In the event Station 'B' is unavailable, APA GasNet may operate Station 'A' at the request of AEMO on a best endeavours basis.

4.3.3 Brooklyn Compressor Station

Listed below is a compilation of operating constraints and guidelines in the remote operation of Brooklyn Compressor Station by AEMO:

4.3.3.1 The maximum station discharge gas pressure shall be limited to 7390 kPaG in both the Ballarat/Bendigo pipeline and the Geelong pipeline. The overpressure protection system of the Compressor Station Controller will raise an alarm, if the discharge pressure exceeds 7,390 kPa(g), and will shut-down any running units, if the discharge pressure exceeds 7,640 kPa(g).

4.3.3.2 (a) The minimum station inlet gas pressure shall not be allowed to fall below 1800 kPa(g).

(b) The under pressure protection system of the Compressor Station Controller will raise an alarm, if the suction pressure falls below 1800 kPa(g), and will shut-down any running units if the station suction pressure falls below 1200 kPa(g).

4.3.3.3 The maximum station discharge gas temperature shall be limited to 45°C.

4.3.3.4 The operation by AEMO of the compressors will be in accordance with configurations as set out in Appendix 7.

4.3.3.5 The time interval between starting successive compressor units shall be a minimum of two (2) minutes. Compressor units may be stopped at any time.

4.3.3.6 If a compressor unit, either a Saturn or Centaur, shuts down via the station/compressor unit controls or is remotely stopped, a remote restart of the compressor unit must comply with the following:

<u>Time Period</u>	<u>AEMO Operator Action</u>
<u>After Shutdown</u> 0-10 minutes	Remote restart may be initiated.
10 mins - 1 hour	Remote restart may not be initiated.
1 hour or more	Remote restart may be initiated.
4.3.3.7 Each compressor set at Brooklyn is fitted with a discharge gas cooling system. Recycling of gas through any of the operating gas compressors shall be limited to a maximum of 30 minutes continuous 100% recycle operation, otherwise the affected compressor units shall be shut down.	
4.3.3.8 As Compressor #12 is fitted with a gas discharge after cooling system, recycling of gas through the compressors is permissible, although not desirable. The compressor is designed that if the prevailing pipeline operating conditions dictate that partial recycling of gas through the compressor is required to prevent surging, the compressor unit may operate indefinitely in this mode	
4.3.3.9 If a gas compressor or a series of compressors are determined to be no longer required, the subject operating units shall be shut down within 15 minutes after this determination is made.	
4.3.3.10 The compressor station discharge set point by agreement between APA GasNet and AEMO shall be set to match, as close as practicable, the pipeline operating requirements.	
4.3.3.11 AEMO operators must allow at least eight (8) minutes for completion of the cold start consequence of a compressor unit from compressor start initiation to the point where the unit is on line and compressing gas.	
4.3.3.12 Pressure differential across the compressor units of more than 300 kPa is required to ensure satisfactory buffer gas differential pressures exist within the Saturn compressor sets to prevent seal oil leakage into the compressor. Pressure differential across the Centaur compressor units of more than 700 kPa is required to ensure satisfactory seal gas differential pressures exist within the Centaur compressor sets. AEMO shall shut down any unit operating with less than 300 kPa (or as agreed from time to time) for a period of 15 minutes (or as agreed from time to time).	
4.3.3.13 Each compressor unit at Brooklyn is fitted with an inlet liquids separator with a manual liquids dump system maintained by APA GasNet in accordance with APA GasNet procedures.	

4.3.3.14 AEMO shall ensure that compressors are not required to operate outside the manufacturer's published performance curve, including an allowance for surge control margin (as agreed from time to time).

4.3.3.15 Compressor #11 has been fitted with unit discharge pressure controls designed to prevent premature failure of bearings due to rotodynamic instability which may occur in "series" mode. Maximum discharge pressure (P2) is a function of inlet pressure (P1) described by the function $P2*(P2-P1) < 47.6 \text{ MPa}^2$ where P1 and P2 are expressed in MPaA.

4.3.3.16 When compressor #11 is operating in "series" mode under rotodynamic pressure control, and with compressor #12 in conjunction, station controls will limit compressor #12 engine speed to achieve load sharing.

4.3.3.17 Compressors are inhibited from starting if the outlet pressure is materially lower than the inlet pressure.

4.3.4 Springhurst Compressor Station

This section 4.3.4 is subject to section 2.3.4.

Listed below is a compilation of operating constraints and guidelines that shall be complied with by AEMO in the remote operation of Springhurst Compressor Station:

4.3.4.1 The maximum station discharge gas pressure shall be limited to 7400 kPa(g). The overpressure protection system of the Compressor Station controller will raise an alarm, if the discharge pressure exceeds 7,400 kPa(g), and will shut-down the running unit, if the discharge pressure exceeds 7,650 kPa(g).

4.3.4.2 (a) The minimum station inlet gas pressure should not be allowed to drop below 2,300 kPa(g).

(b) The under pressure protection system of the Compressor Station Controller will raise an alarm, if the suction pressure falls below 2,300 kPa(g), and will shut-down the running unit if the station suction pressure falls below 2,100 kPa(g).

4.3.4.3 The maximum station discharge gas temperature shall be limited to 45°C.

4.3.4.4 Whenever gas compression is "on line", the main line valve on the Wollert to Wodonga pipeline at Springhurst is automatically closed. Following compression, the valve will be automatically re-opened upon pressure equalisation (< 350 kPa). In the event system conditions do not permit

equalisation, AEMO will need to dispatch APA GasNet to site to manually equalise.

4.3.4.5 The compressor unit may be started at any time and may be stopped at any time.

4.3.4.6 If the compressor unit shuts down via the station/compressor unit controls or is remotely stopped, a remote restart of the compressor unit must comply with the following:

<u>Time Period</u> <u>After Shutdown</u> 0-10 mins	<u>AEMO Operator Action</u> Remote restart may be initiated.
10 mins - 1 hour	Remote restart may not be initiated.
1 hour or more	Remote restart may be initiated.

4.3.4.7 The Springhurst compressor is fitted with a discharge gas cooling system. Recycling of gas through any of the operating gas compressors shall be limited to a maximum of 30 minutes continuous 100% recycle operation, otherwise the affected compressor units shall be shut down, or process parameters (outlet pressure, inlet pressure or inlet flow) adjusted to reduce or avoid recycle..

4.3.4.8 If a gas compressor is deemed to be no longer required, the subject operating unit shall be shut down within 15 minutes after this determination is made.

4.3.4.9 The compressor station discharge set point, by agreement between APA GasNet and AEMO, shall be set to match as close as practicable the pipeline operating requirements.

4.3.4.10 AEMO operators must allow at least fifteen (15) minutes for completion of the cold start sequence of a compressor unit from compressor start initiation to the point where the unit is on line and compressing gas.

4.3.4.11 Pressure differential across the compressor unit of more than 700 kPa is required to ensure satisfactory buffer gas differential pressures exist within the compressor. AEMO shall shut down any unit operating with less than 300 kPa (or as agreed from time to time) for a period of 15 minutes (or as agreed from time to time).

4.3.4.12 Springhurst Compressor Station is fitted with a single liquids filter-separator located in the unit inlet header with a manual hydrocarbon drain.

4.3.4.13 AEMO shall ensure that compressors are not required to operate outside the manufacturer's published performance curve, including an allowance for surge control margin (as agreed from time to time).

4.3.4.14 Springhurst Compressor Station is fitted with two station isolation skids to support compression either north or south. AEMO shall maintain a default station mode of North flow unless the compressor station needs to be configured for South flow.

4.3.4.15 The oil and gas fin-fan cooler has been designed for an ambient temperature of 30 degC to achieve 50 degC outlet temperature. The control system shall limit outlet temperature by reducing engine speed and therefore flow throughput when outlet temperature exceeds the control setpoint of 45 degC. The outlet setpoint is not operator adjustable but will increase to 50 degC in high ambient temperatures. To permit periodic operation up to the 50 degC trip limit under unusually hot conditions, the temperature trip switch shall operate only if the limit is exceeded on a continuous basis for several minutes.

4.3.5 Iona Compressor Station

Listed below is a compilation of operating constraints and guidelines in the remote operation of Iona Compressor Station by AEMO:

4.3.5.1 The maximum station discharge gas pressure shall be limited to 7400 kPa(g).

4.3.5.2 The minimum design station inlet gas pressure is 3800 kPa(g). If the suction pressure falls below this value, the performance of the unit may not be achieved.

4.3.5.3 The minimum unit engine speed is 1260 rpm.

4.3.5.4 The maximum station discharge gas temperature shall be limited to 45°C.

4.3.5.5 The time interval between starting successive compressor units shall be a minimum of fifteen (15) minutes. Compressor units may be stopped at any time. The unit may not be able to be re-started for 2 to 3 hours following a stop since a high engine temperature alarm will inhibit unit reset.

4.3.5.6 Two units may be run in parallel for up to 30 minutes only to facilitate unit changeover.

4.3.5.7 Under certain pipeline operating conditions, i.e. relatively low flow and high head, recycling of gas through the compressor may be required. The control system of the compressor unit will allow initiation of gas recycle, if, due to the pipeline system demand, recycle is required to prevent excessive discharge pressure. Excessive recycling of gas will typically cause the station discharge temperature to increase and, if allowed to continue, will result in the unit tripping at 55°C.

4.3.5.8 If a gas compressor is determined to be no longer required, the subject operating units shall be shut down within 15 minutes after this determination is made.

4.3.5.9 deleted.

4.3.5.10 AEMO operators must allow at least eight (8) minutes for completion of the cold start sequence of a compressor unit from compressor start initiation to the point where the unit is on line and compressing gas.

4.3.5.11 Pressure differential across the compressor units of more than 300 kPa is required to ensure satisfactory lubrication of the compressor rod bearings. AEMO shall shut down any unit operating with pressure differential less than 300 kPa for a period of 15 minutes.

4.3.5.12 Each compressor unit at Iona is fitted with an inlet liquids separator and discharge coalescer with a manual liquids dump system maintained by APA GasNet in accordance with APA GasNet procedures.

4.3.5.13 AEMO shall ensure that compressors are not operated with unit alarms active unless authorised by GasNet.

4.3.5.14 Refer to Cause and Effects drawings 1700-IC-001 and 1700-IC-002 (as amended by the parties from time to time), for details of alarm and trip settings.

4.4 Pipeline valves

The pipeline valves at various locations, as mentioned in section 2.5 are subject to operating constraints the details of which are defined in this document to ensure AEMO has all relevant information available to correctly and safely operate the pipeline system in accordance with relevant Statutory rules and Codes of practice and the APA GasNet's requirements that apply to the pipeline valves. Listed below is a compilation of operating constraints and guidelines that shall be complied with by AEMO operators in the operation of pipeline system.

4.4.1 AEMO shall operate the pipeline valves in compliance with applicable licence conditions, APA GasNet procedures (as in Appendix 2) and the requirements of Australian Standard AS2885. The licence conditions and APA GasNet requirements will precede the Australian Standard. The maximum operating pressure of the pipeline valves shall be limited to the Maximum Allowable Operating Pressure (MAOP) as specified in the pipeline licence condition.

The valve status/position depends on its location in the pipeline system listed on the "APA GasNet's Critical TP Valves" in Appendix 4. The valve positions shown reflect the initial setting. The parties agree that operational positions and the relevant AEMO database will be under AEMO control in accordance with the AEMO Valve

Change Procedure, a copy of which will be developed and maintained in consultation with APA GasNet.

Additional description of operational parameters for remotely controlled on off line valves:

4.4.2 Operation of manually controlled valves within the APA GasNet System shall be performed only by personnel approved by APA GasNet.

4.4.3 Line valves and line valve bypass valve at Ballan - may be closed at any time to facilitate AEMO's operation of the pipeline system. However, opening of the line valve shall only be allowed with the pressure differential across the valve less than or equal to 350 kPa. The transmission pipeline from Morwell to Dandenong (Pipeline T01, namely "Lurgi Line") may be manually opened anytime. There is no restriction on the 80mm bypass valve at Ballan.

4.4.4 Branch valves - may not be opened with pressure differential more than 350 kPa unless approved by APA GasNet.

4.4.5 Pig trap valves - may not be opened when the pressure differential is more than 350 kPa unless approved by APA GasNet.

4.4.6 Pig trap kicker valves - may be opened or closed to facilitate the pigging operation.

4.4.7 Blow down valves - may be opened or closed to facilitate pipeline blowdown, flaring, purging and pipeline equalisation prior to main line valve operation.

4.4.8 Tie Valves - may not be opened with pressure differential more than 350 kPa unless approved by APA GasNet.

4.5 Telemetry

4.5.1 The AEMO Gas Transmission Operations Centre receives data on the status of systems including designated regulator stations and City Gates, compressor stations, Longford Metering Station and Odourant Facilities from the APA GasNet communications system

4.5.2 The communications system availability is 99.5% on annual basis.

4.5.3 The following are critical sites:

4.5.3.1 Compressor Stations

- Brooklyn Compressor Station
- Gooding Compressor Station
- Iona Compressor Station
- Springhurst Compressor Station
- Wollert Compressor Station B

4.5.3.2 Injection Points into the GNS

- BassGas

- Culcairn
- Iona (WUGS)
- Longford
- LNG
- SEAGas/Mortlake
- VicHub

4.5.3.3 Fringe Points in the GNS

- Ballarat
- Bendigo
- Brooklyn
- Carisbrook
- Dandenong Terminal Station (Lurgi)
- Geelong
- Portland
- Shepparton
- Sunbury

4.5.3.4 Pressure Regulating Stations

- Brooklyn BBP Pressure Limiter
- Brooklyn BCP City gate
- Brooklyn BLP City Gate
- Barnawartha City Gate
- Dandenong City Gate
- Iona City Gate
- Lara SWP City Gate
- Morwell City Gate
- Tyers Pressure Limiter
- Wollert City Gate
- Wollert Pressure Limiter

4.5.3.5 Gas Powered Generation

- Jeeralang
- Laverton North
- Loy Yang B
- Newport Power Station
- Somerton

4.6 Longford Odourisation

The operating constraints for the Longford facility are stated as follows for the purpose of AEMO information and monitoring of odourant injection operations through data telemetered to the AEMO Operations Centre.

The odourant injection dose rate set point is 7 milligrams of odourant per standard cubic metre of natural gas with a process variance of +/- 1 milligram. The odourant is a blend of 70% tetrahydrothiophene (THT) and 30% tertiary butyl mercaptan (TBM).

The process operation has alarm settings for dose rates of < 6 milligrams and > 8 milligrams per cubic metre of natural gas. AEMO shall monitor and advise APA GasNet when average hourly concentrations exceed these limits.

The availability of the system is 99.9% with a maximum of 10 hours non-availability per annum and a single event non-availability not exceeding 3 hours.

Appendix 1 – Key Plan Drawings

Drawing No	Title
A4-363-1	APA GasNet System: Longford - Dandenong - Wollert Key Plan
A4-363-2	APA GasNet System: 750 Dandenong - West Melbourne - Brooklyn Key Plan
A4-363-3	APA GasNet System: Brooklyn - Geelong Key Plan
A4-363-4	APA GasNet System: Ballarat - Bendigo Key Plan
A4-363-5	APA GasNet System: Wollert - Albury - Echuca - Koonoomoo - Culcairn Key Plan
A4-363-6	Western Transmission System: Paaratte - Allansford - Portland, Cobden and Hamilton Key Plan
A4-363-7	APA GasNet System: South West Pipeline 500mm Lara - Iona - Nth Paaratte Key Plan
A4-364-1	APA GasNet System: Longford - Dandenong - Wollert Transfer Point Plan
A4-364-2	APA GasNet System: 750 Dandenong - West Melbourne - Brooklyn Transfer Point Plan
A4-364-3	APA GasNet System: Brooklyn - Geelong Transfer Point Plan
A4-364-4	APA GasNet System: Ballarat - Bendigo Transfer Point Plan
A4-364-5	APA GasNet System: Wollert - Albury - Echuca - Koonoomoo - Culcairn Key Plan
A4-364-6	APA GasNet System: Paaratte - Allansford - Portland, Cobden and Hamilton Transfer Point Plan
A4-364-7	APA GasNet System: South West Pipeline 500mm Lara - Iona - Nth Paaratte Transfer Point Plan

Appendix 2 – APA GasNet Operational Procedures Index

This list is a set of APA GasNet procedures that are available to AEMO to ensure security and safe operation of the APA GasNet System, and compliance with APA GasNet's and AEMO's obligations under the National Gas Rules and National Gas Law and the Service Envelope Agreement.

Company Manuals

Document Number	Document Name
Health & Safety Manual	
SP-APAT-101-OP-0003	Isolation and Tagging Procedure
SP-APAT-101-OP-0001	Gas Transmission Permit to Work Procedure
OHS400	Hazard Reporting
OHS217	Safety Inspection Procedure
OHS239	Protective Clothing and Equipment
OHS240	Confined Spaces Entry Procedures
Environment Manual	
ENV014	Purging & Venting Natural Gas
ENV015	Fuel Handling
ENV348	Waste Disposal
Management Manual	
MAN232	Change Management`
EME020	Emergency Management
MAN368	Safety Case
MAN297	Management of Incidents

Departmental Manuals

Document Number	Document Name
Engineering Services	
CSP326	Operational Guidelines For Standby Generator
EME286 Att A	Emergency Evacuation & Bomb Threat
CSP335	Fire Services
CSP336	Security Guard And Patrol Services*
CSP337	Operating Guidelines For Mobile Telephones
MAN368 att 1	Facility Description

MAN621	Security Plan
PIP181	Transmission Pipeline Damage Management
PIP181wi 01	Field Defect Assessment
PIP250	Purging And Commissioning TP Pipeline Policy
PIP254	Development of Fracture Control Plan for Pipelines
ESD296	Project Hand Over Documentation
PIP299	Purging & Commissioning TP Pipelines
PIP300	Pipeline Marking
PIP342	Pipeline Design and Construction Standard
PIP346	Connections to APA GasNet Assets
PIP357	Pipeline Integrity Monitoring Plan
PLA380	Purging of Gas Plant
FAC202	Supply/Install of Mechanical Plant & Equipment
SEC189	Security Fencing
STD027	Selection and Installation of Electrical Equipment
STD222	Standard for Pressure Regulating Facility - Design & Construction
STD246	Cable Installation and Wiring
VLV352	Control Valves
VLV387	Valve Numbering System

Operations

Document Number	Document Name
BCS544	Brooklyn Compressor Station Operators Manual
GCS023	Gooding Compressor Station operating and Maintenance Manual
LNG230	LNG Facility Process Summary
LNG288	De-Pressurisation & Purging of 2800 & 700 kPa Natural Gas Pipelines From BOC
LNG289	LNG Facility Programmable Electronic System (PES) Operations
LNG344	PLC Software Change Management

LNG Facility Dandenong

Document Number	Document Name
LNG353	CITECT System Technical Reference Manual
MEA001	Measuring Agency Laboratory Quality Manual
EME004	Longford Metering Agency Emergency Plan
MEA006	Longford Measuring Agency Manual
MEA245	Custody Transfer Metering - Accuracy Verification Testing

ODO001	Odorant Handling
ODO002	Odorant Storage, Handling, Safety & Fire Fighting
ODO003	Maintenance of Odorant Equipment
ODO004	Natural Gas Odourisation
OHS198	Site Visitors Compliance Orientation
OHS242	Safety Rules For Contractors and Consultants
PIP197	Transmission Pipeline valve Positions
PPL231	External Interference Protection Pipelines
PPL231 wi01	Processing 'One Call' Notifications
PIP268	Pipe line valves - Inspection, Operation and Maintenance
PIP268 wi01	Pipe line valves - Inspection, Operation and Maintenance
PIP269	Regulator & Over Pressure Protection Systems Inspection, Operation & Maintenance
PIP269 wi01	Regulator & Over Pressure Protection Systems Inspection, Operation & Maintenance
PIP270	Pipeline Syphons - Inspection, and Liquid Withdrawal
PIP270 wi01	Pipeline Syphons - Inspection, and Liquid Withdrawal
PIP271	Heaters - Inspection, Operation and Maintenance
PIP271 wi01	Heaters - Inspection, Operation and Maintenance
PIP272	Pipeline Maintenance Compliance Audit
PIP273	Pipeline Excavation
PIP274	Public Awareness
WCG276	Wollert Compressor Station - Operating and Maintenance Manual

Appendix 3 – Compressor Stations

Drawing A1-301-1 lists all Compressor units within each Compressor Station, illustrating the power, capability and capacity of each unit when operated remotely by AEMO.

The following list of installations identifies each facility by an asset reference number and a Key Plan drawing number, and identifies relevant P&IDs.

ASSET TITLE	Reference Number	Key Plan Drawing No.	P&ID Drawing No.
Brooklyn CS	CI-0-39	A4-363-2 A4-363-3	1200-PB-006 to 1200-PB-026
Gooding CS	C4-2-4	A4-363-1	1100-PB-001 to 1100-PB-010
Wollert CS	C7-0-23	A4-363-1	1300-PB-120 to 1300-PB-187
Iona CS	N/A	N/A	4630-PB-001, 4630-PB-004, 4630-PB-005, 4630-PB-006, and 4630-PB-011
Springhurst CS	N/A	A4-363-5	1600-PL-001 1600-PB-001 to 1600-PB-006

Appendix 4 – APA GasNet's Critical TP Valves

Note: Only APA GasNet valves are shown on this list. At shared sites the positions of Distribution Company valves are not shown.

By Pass Valves: Unless stated otherwise, where bypass valves are fitted, and the bypass pipework is connected, both bypass valves are open.

Cross Tie Valves: Unless stated otherwise, where cross tie valves are installed, and the pipeline is duplicated, the cross tie vales are open. Where cross tie valves are installed, but the pipeline is not duplicated, the cross tie valves are shut.

Custody Transfer Meter Valves: Unless stated otherwise, the bypass valve for the meter skid/pit and the bypass valve on the skid, in or near the pit and the proving valves are shut. Refer to the appropriate flow diagram for full details.

Embedded sites are described below.

A4.1 Longford - Dandenong TP

Crosstie Valves -
Line valve 1 Upstream Closed

By Pass Valves	Northern Pipeline		Southern Pipeline	
Valve	Upstream	Downstream	Upstream	Downstream
Line valve 3B	N/A	N/A	Open	Shut
Line valve 5	Shut	Open	N/A	N/A
Line valve 7	Shut	Open	N/A	N/A

A4.1.1 Sale City Gate

Valves 5, 8, 9, 10, 11, 801 & 802 are closed. Refer to flow diagram 4105-PA-001 for full details.
Melway: 528 F7 Vicroads: 99 B5

A4.1.2 Tyers Pressure Limiter

The 300 mm branch valve (T060-BV04N on flow diagram, the supply from the northern pipeline to Tyers PL) is closed. This valve was closed as it was thought that pipeline liquids may be present in the off take from the northern pipeline.
Valves 1, 2, 3, 362 & 364 are also shut. Refer to flow diagram 2130-PA-001 for full details.
Melway: 528 D7 Vicroads 98 A4

A4.1.3 Line valve 4 - Yallourn North

Valves 402, 404, 411, 412, 413, 421, 422, 423, 452, 471, 472 & 473

are shut. Refer to flow diagram 5104-PA-001 for full details.
Melway: 528 D7 Vicroads: 97 J4

A4.1.4 Gooding Compressor Station

LV05N and the downstream by pass valve 05NB are both closed. A non-return valve must open to permit normal gas flow via the two (2) 600 mm branch valves. Refer to flow diagram 1100-PA-002 for full details.
Melway: 528 C7 Vicroads: 97 F4

A4.1.5 Pakenham T060-LV09 Dore Rd

Valves 09NA, 921, 922, 924, 936, 954, 095A, 961, 963, 965 & 966 are shut. Refer to flow diagram 5109-PA-001 for full details.
Melway: 318 E4 Vicroads: 96 A2

A4.2 Morwell - Dandenong TP

A4.2.1 Morwell Regulating Station and Pig Trap Station

Valves 1, 3, 4, 5, 6, 7, 8, 10, 11, 12, 15, 17, 18, 20, 802, 804, 805, T001-BV21 & T001 - BV22, T005-BV01 & T005-BV02 are shut. Refer to flow diagrams 4205-PA-001 and 5200-PA-001 for full details.
Melway: 528 C7 Vicroads: 97 H6

A4.2.2 Dandenong Terminal Station

Valves 4, 6, 8, 9, 11, 18, 19, 38, 63, 64, 65A, 65B, 70, 72, 73, 75, 93, 94, 95, 97, 802, 804, 805, 813, 814, 823, 821, 822 and T016-BV02 are all shut. Refer to 3241-PA-001 for full details.
Melway: 95 C3 Vicroads 95 E2

A4.3 Dandenong - West Melbourne / Brooklyn TP

A4.3.1 Dandenong Terminal Station

Refer to the entry under Morwell - Dandenong TP.

A4.3.2 Dandenong Henty St

T065-LV02 is shut. T018-LV01 and both bypasses T018-01A & T018-01B are shut. T018-LV01 is the meter bypass for M003. Refer to flow diagram 4303-PA-001 for full details.
Melway: 91A C4 Vicroads: 79 E9

A4.3.3 Melbourne Queenswharf Rd

T016-BV21 and valves 804 & 805 are shut. T06-BV21 is the meter bypass for M011. Refer to flow diagram 4345-PA-001 for full details.
Melway: 1A B11 Vicroads: 78 H7

A4.3.4 Metering Station Docklands

Valves 3, 4, 7, 8, 10, 11, 802 & 822 are shut. Refer to flow diagram 4348-PA-002 for full details.
Melway: 2E H7 Vicroads: 78 H7

A4.3.5 Spotswood

T033-BV08 (on T33) is shut. This valve is the meter bypass for

M013. Refer to flow diagram 4360-PA-001 for full details.
Melway: 41 H12 Vicroads: 78 F7

A4.3.6 Brooklyn Compressor Station
Refer to the entry under Brooklyn - Corio (A4.5.1).

A4.4 Brooklyn-Ballararat-Bendigo TP

A4.4.1 Brooklyn Compressor Station
Refer to the entry under Brooklyn - Corio (A4.5.1).

A4.4.2 Rockbank Offtake Hopkins Rd
Valves 3, 4, 5 and the bypass valves T062-01B and T062-BV02 are shut. Refer to flow diagram 5561-PA-001 for full details.
Melway: 511 H2 Vicroads: 78 D6

A4.4.3 Sunbury City Gate
Valves 9, 10, 11, 12, 802, 804, 805 & 814 are shut. Refer to flow diagram 4558-PA-001 for full details.
Melway: 382 C6 Vicroads: 78 D3

A4.4.4 Melton City Gate
Valves 1, 802, 804 & 805 are shut. Refer to flow diagram 4562-PA-001 for full details.
Melway: 511 G2 Vicroads: 78 C6

A4.4.5 Ballan Bifurcation
T056-LV07 & the downstream bypass T056-07B. Valves 1, 2, 3, 4, 8, 10, 11, 12, 13 and 16 are shut. Refer to flow diagram 5510-PA-001 for full details.
Melway: 511 D1 Vicroads: 77 D3

A4.4.6 Ballarat City Gate
Valves 3, 4, 5, 6, 8, 11, 13, 14, 15 & 16 are shut. Refer to flow diagram 4574-PA-001 for full details.
Melway: 509 A12 Vicroads: 79 G3

A4.4.7 Guildford - Offtake
At the Guildford Offtake, valves 1, 2, 3 & 4 are shut. Refer to flow diagram 5550-PA-001 for full details.
Melway: 509 C8 Vicroads: 59 D4

A4.4.8 Clunes Rd
At Clunes Rd, line valve 3 & both bypass valves 3A & 3B are Open. Branch valves 1 & 2 are shut. This bypasses the decommissioned pressure limiter. Refer to flow diagram 5553-PA-001 for full details.
Melway: 520 K11 Vicroads: 58 G3

A4.4.9 Maryborough City Gate
T067-LV04 and both bypasses T067-04A & T067-04B, & valves 3, 5, 6, 7, 802, 804 & 805 are shut. Refer to flow diagram 4588-PA-001 for full details.
Melway: 520 K11 Vicroads: 58 F2

A4.4.10 Castlemaine City Gate

Valves 14, 27, 804 & 805 are shut. Refer to flow diagram 4582-PA-001 for full details.
Melway: 509 C7 Vicroads: 59 D2

A4.4.11 Bendigo City Gate

Valves 4, 5, 6, 8, 11, 17, 18, 25, 26 & 27 are shut. Refer to flow diagram 4586-PA-001 for full details.
Melway: 509 D4 Vicroads: 44 E7

A4.4.12 Ballan Actuated Valve

At the Ballan Actuated Valve Station, line valve T070-LV02W and both bypass valves T070-02WA and T070-02WB are all shut. Refer to flow diagram 5522-PA-001 for full details.
Melway: N/A Vicroads: 59 B9

A4.5 Brooklyn - Corio TP

A4.5.1 Brooklyn Compressor Station

Valves 2, 3, 5, 6, 12, 14, 15, 17, 6228, 6229, 6230, 6232, 6234, 6236, 6237, 6238, 6201, 6203, 802, 804 & 805 are shut. Refer to flow diagram 1200-PA-005 for full details.
Melway: 40 H9 Vicroads: 78 F7

A4.5.2 Corio City Gate

Valves 2, 18, 19, 20, 21, 25, 26, 28, 29, 31, 32, 33, 34 & 35 are shut. Refer to flow diagram 4544-PA-001 for full details.
Melway: 224 G5 Vicroads: 93 H3

A4.5.3 Brooklyn City Gates

Valves 50, 51, 53, 60, 61, 63, 64, 65, 66, 69, 71, 72, 74, 75, 77, 78, 79, 80, 81, 82, 83, 84, 85, 91, 92, 93, 94, 95, 96, 98, 99, 101, 102, 106 and 108, 116, 201, 201, 203, 204, 120, 158, 160, 258, 260, 358, 360, 458, 460, 558, 560, 658, 660, 662, 653, 755, 766, 902, 919 are all shut. Refer to flow diagram 1222-PA-001 for details.
Melway: 40 H10 Vicroads: N/A

A4.6 Wollert - Wodonga - Echuca TP

A4.6.1 Keon Park

T018-LV15B & T018-LV16, both branch valves T018-BV40 & T018-BV41 & both bypasses T018-16A & T018-16B are shut. These are the meter by passes for M115 (LV15B) and M116 (LV16). Refer to flow diagram 4415-PA-001 for full details.
Melway: 7 K10 & 8 B11 Vicroads: 78 H5

A4.6.2 Wollert (City Gate)

Line valves T074-LV02 & both bypasses (on T74) 02A & 02B, valves 7, 11, 19, 21, 29, 30, 31, 42, 43, 52, 53, 55, 56, 59, 61, 64, 66, 72, 75, 76, 122A, 122B, 222A, 222B, 322A, 322B, 422A, 422B, 401, 402, 507, 510, 511, 514, 537, 631, 633, 952, 954 & 955 are shut. Refer to diagram 1321-PA-001 for full details.
Melway: 512 C1 Vicroads: 98 H3

A4.6.3 Euroa City Gate

Valves 1, 2, 3, 4, 5, 6, 9, T074-09A, T074-09B, 10, 12, 12A, 12B 13, 15, 16, 18, 19, T074-BV11, T074-11A, T074-BV12, T074-12A, 802, 804 & 805 are all shut. Refer to flow diagram 4442-PA-001 for full details.

Melway: 510 R3 Vicroads: 47 A5

A4.6.4 Euroa P R S

All valves are actuated. Refer to flow diagram 1400-PA-122 for full details.

Melway: 510 R3 Vicroads: 47 A5

A4.6.5 Shepparton City Gate

Valves 6, 7, 802, 804 & 805 are shut. Refer to flow diagram 4470-PA-001 for full details.

Melway: 521 J7 Vicroads: 32 H8

A4.6.6 Toolamba Rd

L V4 is open. Both bypass valves are open.

Melway: 521 H6 Vicroads: 32 F7

A4.6.7 Kyabram City Gate

Valves 1, 7, 8, 10, 15, 16, 17, 18, 802, 804, 805 & T071-BV07 are shut. Refer to flow diagram 4476-PA-001 for full details.

Melway: 521 H6 Vicroads: 32 B7

A4.6.8 Echuca City Gate

Valves 1, 2, 6, 7, 13, 802, 804 & 805 are shut. Refer to flow diagram 4480-PA-001 for full details.

Melway: 521 F6 Vicroads: 31 E5

A4.6.9 Wodonga City Gate

Valves 2, 3, 7, 13, 14, 15, 802, 804 & 805 are shut. Refer to flow diagram 4465-PA-001 for full details.

Melway: 522 E5 Vicroads: 35 D3

A4.6.10 Wandong PRS

Branch valve T074-BV04 and valves 1, 2, 3, 6, 15, 16, 17, 19 and 20 are all shut. Refer to flow diagram 2451-PA-001 for full details.

Melway: 510 M Vicroads: 61 B7

A4.6.11 Wollert Compressor Station.

Valves 7, 11, 12, 402, 561, 562, 564, 565, 802, 804 and 805 are all shut. . Refer to flow diagram 1300-PA-010 for full details.

Melway: 510 M Vicroads: 61 B7

A4.6.12 Barrawartha City Gate And Offtake Station

Branch valve T074-BV16E and valves 2, 20, 30, 42, 43, 44, 112, 113, 114, 115, 200, 202, 203, 205, 206, 207, 210 and 211 are all shut.

Refer to flow diagram 6650-PA-001 for full details.

Melway: N/A Vicroads: 315

A4.7 Murray Valley (Chiltern - Koonoomoo)

A4.7.1 Chiltern Valley Offtake

Valves 1, 2, 4, 5 & 6 are shut. Refer to flow diagram 5470-PA-001 for full details.
Melway: 522 E6 Vicroads: 35 A4

A4.7.2 Rutherglen City Gate

Valves 802, 804 and 805 are closed. Refer to flow diagram 4486-PA-001 for full details.
Melway: 522 D6 Vicroads: 34 J3

A4.7.3 Yarrawonga City Gate

Valves 802, 804 and 805 are closed. Refer to flow diagram 4488-PA-001 for full details.
Melway: 522 B6 Vicroads: 34 B2

A4.7.4 Cobram City Gate

Valves 802, 804 and 805 are closed. Refer to flow diagram 4490-PA-001 for full details.
Melway: 521 K5 Vicroads: 23 B9

A4.7.5 Koonoomoo City Gate

Valves 1, 2, 3, 5, 802, 804 and 805 are closed. Refer to flow diagram 4492-PA-001 for full details.
Melway: 521 K4 Vicroads: 23 B7

A4.8 Interconnect (Barnawartha Culcainn)

Line valves are fitted with Automatic Line Break detection (ALB). Both bypass valves are closed.

A4.9 South West Pipeline (Lara To Iona)

A4.9.1 Iona City Gate and Compressor Station

Valves 2, 3, 4, 5, 6, 7, 9, 14, 15, 17, 20, 21, 24, 25, 27, 30, 32, 33, 35, 36, 37, 38, 41, 42, 43, 44, 45, 47, 48, 50 and 51 are all shut. Refer to flow diagram 4630-PA-001 for full details.
Melway: N/A Vicroads: N/A

A4.9.2 Lara (SWP) City Gate (Hovells Creek Reserve)

Valves T112-04A, 112-04B, 3, 4, 10, 11, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 32, 34, 35, 37, 38, 42, 43, 45, 47, 53, 54, 55, 57, 60, 802, 830, 831, 832 are all shut. Refer to flow diagram 92631-PA-001 for full details.
Melway: 221 D10 Vicroads: 93 H2

A4.9.3 Brooklyn (BLP) City Gate (Jones Road)

See A.5.4.3. Refer to flow diagram 1222-PA-001 for full details.
Melway: 221 D10 Vicroads: 93 H2

Appendix 5 – APA GasNet Pipelines Specifications Summary

Pipeline Licence No.	DWG No.	Licence Name	Line Name	Recorded Length (km)	Pipe Dia. O.D. (mm)	MAOP (kPa(g))	Coating	Steel Grade	Wall Thickness	
									Min	Max
36	T16	Dandenong to West Melbourne	Dandenong to West Melbourne	36.2	762.0	2760	C.T.E.	API 5L Grade X42	9.52	9.52
36	T15	Dandenong to West Melbourne	Princes Hwy to Regent St.	0.8	219.1	2760	C.T.E.	API 5L Grade A	6.40	6.40
50	T1	Morwell to Dandenong	Morwell to Dandenong	127.0	457.0	2760	Bitu.	SAA A.33 Class D	7.94	9.94
50	T1	Morwell to Dandenong	Supply to Jeeralang	0.4	323.9	2760	P.E.	API 5L Grade B	6.35	6.35
67	T37	Maryvale	Supply to APM Maryvale	5.4	168.3	6890	C.T.E.	API 5L Grade B	6.35	6.35
68	T38	Pakenham	Healesville-Koo-Wee-Rup Road	1.2	88.9	2760	C.T.E.	API 5L Grade B	5.48	5.48
68	T38	Pakenham	Healesville-Koo-Wee-Rup Road	0.7	168.3	2760	P.E.	API 5L Grade X42	7.11	7.11
68	T38	Pakenham	Healesville-Koo-Wee-Rup Road	0.5	168.3	2760	DLFBE.	API 5L Grade X42	5.48	5.48
75	T60	Longford to Dandenong	Longford to Dandenong	174.2	762.0	6890	C.T.E.	API 5L Grade X60	10.31	12.7
78	T56	Brooklyn-Ballarat-Bendigo	Brooklyn to Ballan	66.6	219.1	7390	C.T.E.	API 5L Grade B	6.35	7.04
78	T57	Brooklyn-Ballarat-Bendigo	Ballan to Ballarat	22.7	168.3	7390	C.T.E.	API 5L Grade B	4.78	6.35
78	T70	Brooklyn-Ballarat-Bendigo	Ballan to Bendigo	90.8	168.3	7390	C.T.E.	API 5L Grade B	4.78	6.35
81	T24	Brooklyn to Corio	Brooklyn to Corio	50.7	350.0	7390	C.T.E.	API 5L Grade X60	5.56	6.35
91	T44	Warragul	Supply to Anderson St., Warragul	4.8	114.3	2760	C.T.E.	API 5L Grade B	6.02	6.02
101	T74	Melbourne-Wodonga-Shepparton	Wollert to Euroa PRS	124.2	323.9	8800	P.E.	API 5L Grade X46	6.35	7.55
101	T74	Melbourne-Wodonga-Shepparton	Euroa PRS to Wodonga	145.2	323.9	7400	P.E.	API 5L Grade X46	6.35	7.55
101	T74	Melbourne-Wodonga-	Keon Park to Wollert	14.1	610.0	2760	P.E.	API 5L Grade	7.92	7.92

Pipeline Licence No.	DWG No.	Licence Name	Line Name	Recorded Length (km)	Pipe Dia. O.D. (mm)	MAOP (kPa(g))	Coating	Steel Grade	Wall Thickness	
									Min	Max
		Shepparton						X42		
101	T59	Melbourne-Wodonga-Shepparton	Euroa to Shepparton	34.5	219.1	7400	P.E.	API 5L Grade X42	5.59	5.59
107	T32	Clyde North	Pound Rd. to Tuckers Rd.	2.0	114.3	2760	P.E.	API 5L Grade B	6.02	6.02
108	T33	South Melbourne to Brooklyn	South Melbourne to Brooklyn	12.8	762.0	2760	C.T.E.	API 5L Grade X42	9.52	9.52
117	T60	Rosedale to Tyers	Rosedale to Tyers	34.3	762.0	7070	C.T.E.	API 5L Grade X60	10.9	13.1
120	T60	Longford to Rosedale	Longford to Rosedale	30.5	762.0	7070	C.T.E.	API 5L Grade X60	10.9	13.1
121	T63	Tyers to Morwell	Tyers to Morwell	15.7	508.0	7070	C.T.E.	API 5L Grade X60	8.72	10.59
122	T62	Derrimut to Sunbury	Derrimut to Sunbury	24.0	168.3	7390	P.E.	API 5L Grade B	6.35	6.35
124	T64	Newport	Newport Power Station	1.0	457.0	2760	P.E.	API 5L Grade X42	7.90	9.70
125	T67	Maryborough	Guildford to Maryborough	31.4	168.3	7390	P.E.	API 5L Grade B	6.35	6.35
128	T66	Mt Franklin to Kyneton	Mt Franklin to Kyneton	24.5	323.9	7390	P.E.	API 5L Grade X46	6.35	7.55
129	T65	Dandenong to Princes Hwy	Dandenong to Princes Hwy	5.0	762.0	2760	C.T.E.	API 5L Grade X42	9.52	9.52
129	T65	Dandenong to Princes Hwy	Princes Hwy to Henty St	0.2	508.0	2760	P.E.	API 5L Grade B	7.92	7.92
131	T70	Mt Franklin to Bendigo	Mt Franklin to Bendigo	50.8	323.9	7390	P.E.	API 5L Grade X46	6.35	7.55
132	T71	Tatura	Shepparton to Tatura	16.2	219.1	7390	P.E.	API 5L Grade B	6.35	7.00
134	T57	Ballan to Ballarat	Ballan to Ballarat	22.8	323.9	7390	P.E.	API 5L Grade X46	6.35	7.6
135	T60	Bunyip to Pakenham	Bunyip to Pakenham	18.7	762.0	7070	C.T.E.	API 5L Grade X60	10.9	13.1
136	T71	Tatura to Kyabram	Tatura to Kyabram	21.3	219.1	7390	P.E.	API 5L Grade B	6.35	7.00

Pipeline Licence No.	DWG No.	Licence Name	Line Name	Recorded Length (km)	Pipe Dia. O.D. (mm)	MAOP (kPa(g))	Coating	Steel Grade	Wall Thickness	
									Min	Max
141	T61	Pakenham to Wollert	Pakenham to Wollert	93.1	762.0	6890	C.T.E.	API 5L Grade X60	10.6	12.7
143	T75	Wandong to Kyneton	Wandong to Kyneton	59.5	323.9	7390	P.E.	API 5L Grade X46	6.35	7.60
145	T81	Paaratte to Allansford	Western Transmission Pipeline (part)	33.3	168.3	7,400	P.E.	API 5L Grade B	4.80	6.35
152	T85	Kyabram to Echuca	Kyabram to Echuca	30.7	168.3	7390	P.E.	API 5L Grade B	4.80	6.35
155	T86	Allansford to Portland	Western Transmission Pipeline (part)	100.4	168.3	9,890	P.E.	API 5L Grade X42	4.80	6.35
162	T88	Laverton to BHP	Laverton to BHP	1.6	168.3	2760	P.E.	API 5L Grade X42	6.35	6.35
164	T89	Bay St to Unichema	Bay St to Unichema	0.4	168.3	2760	P.E.	API 5L Grade X42	6.35	6.35
168	T91	Curdievale to Cobden	Western Transmission Pipeline (part)	27.7	168.3	9,890	P.E.	API 5L Grade X42	4.8	6.35
171	T93	Codrington to Hamilton	Western Transmission Pipeline (part)	54.6	168.3	9,890	P.E.	API 5L Grade X42	4.8	6.35
176	T96	Chiltern to Rutherglen	Chiltern to Koonoomoo (part)	14.7	219.1	7400	P.E.	API 5L Grade X60	4.00	4.80
178	T99	Barnawartha Nth to Murray River	Barnawartha Nth to Culcairn (part)	5.5	457.0	10200	P.E.	API 5L Grade X70	6.80	9.70
NSW 24	T99	Murray River to Culcairn	Barnawartha Nth to Culcairn (part)	57.0	457.0	10200	P.E.	API 5L Grade X70	6.80	9.70
182	T98	Rutherglen to Koonoomoo	Chiltern to Koonoomoo (part)	88.8	219.1	7400	P.E.	API 5L Grade X52 API 5L Grade X42	4.32 8.20	5.20 8.20
202	T18	Dandenong to West Melbourne	Keon Park East - Keon Park West	0.6	457.0	2760	C.T.E.	API 5L Grade A	7.92	7.92
231	T92	Iona to Lara	Iona to Lara	143.9	508	10,000	FBE	API 5L Grade X60 & X70	9.00	12.70
227	T100	Iona to Paaratte North	Iona to Paaratte	7.8	168.3	7,400	P.E. and	API 5L Grade	5.5	7.11

Pipeline Licence No.	DWG No.	Licence Name	Line Name	Recorded Length (km)	Pipe Dia. O.D. (mm)	MAOP (kPa(g))	Coating	Steel Grade	Wall Thickness Min Max	
							Heatshrink sleeves	X52		
238	T102	Somerton Pipeline	Epping to Somerton	3.4	250	2,760	P.E.	API 5L Grade X42	6.40	6.40
252	T109	Supply to Iluka Resources, Hamilton	Supply to Iluka Resources, Hamilton	1.1	114.3	9,890	P.E.	API 5L Grade B	6.00	8.60
253	T110	Supply to Snowy Hydro Plant, Laverton North	Supply to Snowy Hydro Plant, Laverton North	1.6	355.6	10,200	Trilaminate	API 5L Grade X56	9.50	9.50
266	T112	Brooklyn to Lara	Brooklyn to Lara	58.0	508	10,200	FBE	API 5L Grade X70	9.00	12.70
			Total Length (km)	1994.2						

Note: Morwell to Dandenong (Lic 50), Murray Valley (Lic 176 & 182) and Interconnect (Lic 178 & NSW 24) pipelines are internally unlined. All others are internally epoxy lined.

Service Envelope Agreement

Appendix 6 – Regulator Capacity Table

CONTENT

P10-02	Barnawartha City Gate
P9-11	Brooklyn BBP Pressure Limiter
P8-28	Brooklyn BCP CG
P10-04	Brooklyn BLP CG
P8-004	Dandenong CG
P8-007	Dandenong PL (DTS to Lurgi backup)
P10-07	Eura PRS
P10-03	Iona CG
P10-01	Lara CG
P8-013	Morwell CG
P8-027	Nth Laverton CG
P9-003	Tyers PL
P9-13	Wandong PRS
P8-016	Wollert CG
P9-012	Wollert Pressure Limiter

REGULATOR LOCATION			
Regulator no	P10-02	Regulator Name	Barnawartha City Gate & Offtake Station
Location	Barnawartha - Howlong Road		
Suburb	Barnawartha	Melway	Vic Roads 315

DESIGN PARAMETERS	
Design Inlet Pressure Range (kPa(g))	7,400 - 10,000
Design Outlet Pressure (kPa(g))	7,400
Outlet MAOP (kPa(g))	7,400
Design Capacity per run (scm/h)	60,000
Station Design Capacity (scm/h)	60,000
Number of "Standby" runs	1
Number of "Duty" runs	1

REGULATOR SET POINTS	
Runs 1 & 2 Active set point	Adjustable up to 7,250 kPa(g)
Runs 1 & 2 Monitor set point	Fixed at 7,620 kPa(g)

SLAMSHUT CONTROL SET POINTS	
Runs 1 & 2 Slamshut Valve Closes at low pressures of (kPa(g))	1,000
Runs 1 & 2 Slamshut Valve Closes at high pressures of (kPa(g))	8,065
Once tripped Slamshut valves are automatically reset for remote operation below a pressure of (kPa(g))	6,955
Remote Set point Capability (Y/N)	Y

REGULATOR DETAILS				
RUN	MODE	SIZE	TYPE	
1 & 2	Active / Monitor	100mm	Fisher ET/657	
				C _g 6,050 C _i 35.8

REGULATOR LOCATION

Regulator no	P9-11	Regulator Name	Brooklyn BBP PL
Location	Jones Road		
Suburb	Brooklyn	Melway 40 H10	Vic Roads N/A

DESIGN PARAMETERS

Design Inlet Pressure (kPa(g))	5,000 - 7,390
Design Outlet Pressure (kPa(g))	2,500 -4,500
Outlet MAOP (kPa(g))	7,390
Design Capacity per run (scm/h)	45,700
Station Design Capacity (scm/h)	30,000
Number of "Standby" runs	1
Number of "Duty" runs	1

REGULATOR SET POINTS

Runs 1 & 2 Active set point	Adjustable between
One set point for split range type control for all runs	2,500 - 7,240 kPa(g)

SLAMSHUT CONTROL SET POINTS

Not Available

Remote Set point Capability (Y/N)	Y
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REGULATOR DETAILS

RUN	MODE	SIZE	TYPE	C _g	C ₁
1 & 2	Active	80	Fisher ED 3 W1, 657 SZ 40	3,700	38.1

REGULATOR LOCATION

Regulator no	P8-28	Regulator Name	Brooklyn BCP City Gate
Location	Jones Road		
Suburb	Brooklyn	Melway	40 H10 Vic Roads N/A

DESIGN PARAMETERS

Design Inlet Pressure Range (kPa(g))	3,000 - 7,390
Design Outlet Pressure Range (kPa(g))	2,000 - 2,760
Outlet MAOP (kPa(g))	2760
Design Capacity for run 1 (scm/h)	41,000
Design Capacity for runs 2,3, & 4 (scm/h)	118,000
Design Capacity for run 5 (scmh)	118,000
Station Design Capacity (scmh)	400,000
Number of "Standby" runs	1
Number of "Duty" runs	4

REGULATOR SET POINTS

Runs 1-5 Active set point pressure (kPa(g)) between One set point for the split range type control being used on all the runs	Adjustable 2,000 & 2,700
Runs 1-4 Monitor set point pressure (kPa(g))	2898

SLAMSHUT CONTROL SET POINTS FOR ALL RUNS

Runs 1-5 Slamshut Valve Closes at low pressures of (kPa(g)) 1,000
Runs 1-5 Slamshut Valve Closes at high pressures of (kPa(g)) 2,925
Slamshut valves can be reset for remote operation at (kPa(g)) 2,595

Remote Set point Capability (Y/N)

Y

REGULATOR DETAILS

RUN	MODE	SIZE	TYPE	C _r	C ₁
1	Active / Monitor	200	Fisher EWD 8x6 W3, 471-16 SZ 60	10,400	29.8
2,3 & 4	Active / Monitor	300	Fisher EWD 12x8 W1, 657-4 SZ 70	31,900	31.9
5	Active	300	Mascot G-FLO 8x5	16,730	34.6

REGULATOR LOCATION			
Regulator no	P10-04	Regulator Name Brooklyn BLP City Gate	
Location	Jones Road		
Suburb Brooklyn	Melway 40 H10	Vic Roads N/A	

DESIGN PARAMETERS	
Design Inlet Pressure Range (kPa(g))	4500 - 10,200
Design Outlet Pressure Range (kPa(g))	2500 - 7,390
Outlet MAOP (kPa(g))	7390
Design Capacity for run 1 (scm/h)	40,000
Design Capacity for runs 2,3,4 & 5 (scm/h per run)	115,000
Station Design Capacity (scm/h)	400,000
Number of “Standby” runs	1
Number of “Duty” runs	4

REGULATOR SET POINTS	
Runs 1-5 Active set point pressures	Adjustable between 2500 - 7390 kPag
One set point for cascade type control for all runs.	

SLAMSHUT CONTROL SET POINTS FOR ALL RUNS	
Slamshut Valve Closes at low pressures of (kPa(g))	1,000
Slamshut Valve Closes at high pressures of (kPa(g))	7,833
Slamshut Valves can be reset for remote operation at (kPa(g))	6,947
Remote Set point Capability (Y/N)	Y

REGULATOR DETAILS					
RUN	MODE	SIZE	TYPE	C _g	C _i
1	Active	200	Mascot G-FLO, 6x4	6,493	35.1
2-5	Active	300	Mascot MEGAFLO, 8x5	17,087	34.2

REGULATOR LOCATION

Regulator no	P8-004A	Regulator Name	Dandenong City Gate (R1 & R2)
	P8-004C		(R3 & R4)
	P8-004E		(R5 & R6)
	P8-004G		(R7)
Location	Frankston Road		
Suburb	Dandenong	Melway 95 D4	Vic Roads

DESIGN PARAMETERS

Minimum Inlet Pressure (kPa(g))	3000
Minimum Outlet Pressure (kPa(g))	2700
Outlet MAOP (kPa(g))	2760
Design Capacity per run (scm/h)	177 x 10 ³
Total Station Capacity (scm/h) (At minimum inlet pressure)	1.062 x 10 ⁶
Number of "Standby" runs	1
Number of "Duty" runs	6

REGULATOR SET POINTS

Runs 1,3,4 Active set point	2760
Runs 2, 5, 7 Active set point	2760
Runs 1-7 Monitor (pneumatic) set point	2800
<i>Note: All runs have identical set points</i>	
<i>Set point shall not be changed without prior consultation with APA GasNet</i>	

SLAMSHUT CONTROL SET POINTS

Runs 1-7 Slamshut Close (kPa(g))	2900
Runs 1-7 Slamshut Open (kPa(g))	Manual Reset
Slamshut Valves can be reset for remote operation at (kPag)	
<i>Note: All seven runs have identical set points</i>	
Remote Set point Capability (Y/N)	N

REGULATOR DETAILS

LEG	MODE	SIZE	TYPE	C _g	C _i
R1	Monitor	200	V25 Hiball	37,300	16
	Active	200	Jetstream J8-60	23,390	16.4

(Note: All runs have identical regulators)

REGULATOR LOCATION			
Regulator no	P8-007	Regulator Name	Dandenong Pressure Limiter (DTS to Lurgi backup regs)
Location	Greens Road		
Suburb	Dandenong	Melway	95 C3 Vic Roads

DESIGN PARAMETERS			
Minimum Inlet Pressure (kPa(g))		2700	
Minimum Outlet Pressure (kPa(g))		1400	
Outlet MAOP (kPa(g))		2760	
Design Capacity per run (scm/h)		85,500	
Total Station Capacity (scm/h) (At minimum inlet pressure)		85,500	
Number of "Standby" runs		1	
Number of "Duty" runs		1	

REGULATOR SET POINTS		
Runs 1-2 Active set point		1700
Runs 1-2 (pneumatic backup) set point		1700
<i>Note: Set point shall not be changed without prior consultation with APA GasNet</i>		

SLAMSHUT CONTROL SET POINTS		
Run 1 Slamshut Close (kPa(g))		None
Run 1 Slamshut Open (kPa(g))		None
Run 2 Slamshut Close (kPa(g))		None
Run 2 Slamshut Open (kPa(g))		None
Remote Set point Capability (Y/N)		N

REGULATOR DETAILS				
RUN	MODE	SIZE	TYPE	C _g C ₁
1&2	Active	150	Valtek Megastream 100%	7,500 34.4

REGULATOR LOCATION

Regulator no	P10-07	Regulator Name	Euroa PRS
Location	Shepparton Road		
Suburb	Euroa	Melway 510 R3	Vic Roads 47 A5

DESIGN PARAMETERS

Design Inlet Pressure Range (kPa(g))	4,000 – 8,800
Design Outlet Pressure Range (kPa(g))	3,885 - 7,400
Outlet (North) MAOP (kPa(g))	7,400
Design Capacity per run (scm/h)	138,000
Station Design Capacity (scm/h)	138,000
Number of “Standby” runs	0
Number of “Duty” runs	1

REGULATOR SET POINTS

Run 1 Active set point (kPa(g))	Fixed at 7,400
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SLAMSHUT CONTROL SET POINTS

Run 1 Slamshut Close (kPa(g))	1,000 dec
Run 1 Slamshut Close (kPa(g))	7,830 inc
Once tripped Slamshut valves are automatically reset for remote operation below a pressure of (kPa(g))	7,400

Remote Set point Capability (Y/N)	N
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REGULATOR DETAILS

LEG	MODE	SIZE	TYPE	C _g	C ₁
1	Active	250	Valtek Mega Stream Mark 1	25,477	34.9

REGULATOR LOCATION			
Regulator no	P10-03	Regulator Name Iona City Gate	
Location	Waarre Road		
Suburb Iona	Melway	Vic Roads 100 B3	

DESIGN PARAMETERS		
Minimum Design Inlet Pressure (kPa(g))	6,000	Adjustable between 5,000 - 7,400
Design Outlet Pressure (kPa(g))		
Outlet MAOP (kPa(g))	10,200	
Design Capacity for run 1 (scm/h)	20,000	
Design Capacity for run 2 (scm/h)	64,000	
Station Design Capacity (scm/h)	20,000	
Number of "Standby" runs	1	
Number of "Duty" runs	1	

REGULATOR SET POINTS	
Runs 1 & 2 Active set point	Adjustable between 5,000 to 7,250 kPa(g)
Runs 1 & 2 Monitor set point	Fixed at 7,696 kPa(g)
One set point for the split range type control being used on all the runs	

SLAMSHUT CONTROL SET POINTS FOR ALL RUNS			
Run 1 Slamshut Close (kPa(g))	1,000		
Run 1 Slamshut Close (kPa(g))	7,844		
Slamshut Valves can be reset for remote operation at (kPa(g))			
Remote Set point Capability (Y/N)	Y		

REGULATOR DETAILS					
RUN	MODE	SIZE	TYPE	C _g	C ₁
1	Active / Monitor	100mm	Fisher ED 4 600RF, 657 SZ 50	2,050	30
2	Active / Monitor	150mm	Fisher ED 6 W1 600RF, 657 SZ 50	11,000	32.5

OTHER OPERATIONAL LIMITATIONS	
1	The 300mm station by-pass valve differential pressure limit on opening shall be less than 200 kPa.
2	Pressure control valve set point limits between 3002 kPa(g) and 5600 kPa(g).
3	Deadband of the pressure set point is about 1 % of the set point pressure.

REGULATOR LOCATION

Regulator no	P10-01	Regulator Name	Lara SWP City Gate
Location	Hovells Creek Reserve		
Suburb	Lara	Melway	93 H2 Vic Roads 221 D10

DESIGN PARAMETERS

Design Inlet Pressure Range (kPa(g))	4500 - 10,000
Design Outlet Pressure Range (kPa(g))	2500 - 7,390
Outlet MAOP (kPa(g))	7390
Design Capacity for run 1 (scm/h)	53,000
Design Capacity for runs 2,3,4 & 5 (SCHM per run)	133,000
Station Design Capacity (scm/h)	400,000
Number of "Standby" runs	1
Number of "Duty" runs	4

REGULATOR SET POINTS

Runs 1-5 Active set point pressures	Adjustable between 2500 -
One set point for cascade type control for all runs.	7390 kPa(g)
Runs 1-5 Monitor set point pressures	Variable between 2500 -
Variable and constantly tracking set point pressures of the active regulators	7686 kPa(g)

SLAMSHUT CONTROL SET POINTS FOR ALL LEGS

Slamshut Valve Closes at low pressures of (kPa(g))	1,000
Slamshut Valve Closes at high pressures of (kPa(g))	7,833
Slamshut Valves can be reset for remote operation at (kPa(g))	6,947

Remote Set point Capability (Y/N)

Y

REGULATOR DETAILS

RUN	MODE	SIZE	TYPE	C _g	C ₁
1	Monitor	200	Fisher EWD 8x6 W3, 471-16 SZ 60	10,400	29.8
1	Active	200	Valek Megastream 8x3.5	10,599	34.6
2 to 5	Monitor	300	Fisher EWD 12x8 W1, 657-4 SZ 70	31,900	31.9
2 to 5	Active	300	Fisher EWD 12x8 W1, 657-4 SZ 70	31,900	31.9

REGULATOR LOCATION

Regulator no	P8-013	Regulator Name Morwell City Gate
Location	Fifth Ave. (Gafcor Road)	
Suburb Morwell	Melway	Vic Roads

DESIGN PARAMETERS

Minimum Inlet Pressure (kPa(g))	3500
Minimum Outlet Pressure (kPa(g))	2700
Outlet MAOP (kPa(g))	2760
Design Capacity	Run 1 300 x 10 ³
	Run 2 300 x 10 ³
Total Station Capacity (scm/h) (At minimum inlet pressure)	300 x 10 ³
Number of "Standby" runs	1
Number of "Duty" runs	1

REGULATOR SET POINTS

Run 1 Active set point	2760
Run 1 Active (pneumatic backup) set point	2700
Run 1 Monitor (pneumatic) set point	2800
Run 2 Active (pneumatic backup) set point	2700
Run 2 Monitor(pneumatic backup) set point	2850

SLAMSHUT CONTROL SET POINTS

Run 1 Slamshut Close (kPa(g))	2900 inc
Run 1 Slamshut Close (kPa(g))	1000 dec
Run 2 Slamshut Close (kPa(g))	2950 inc
Run 2 Slamshut Close (kPa(g))	1000 dec

Slamshut Valves can be reset for remote operation at (kPa(g))

Remote Set point Capability (Y/N)

N

REGULATOR DETAILS

RUN	MODE	SIZE	TYPE	C _e	C _i
Run 1	Active	300	Fisher EWD WIII A3	28780	34.1
Run 1	Monitor	300	Fisher EWD W1	32099	32.1
Run 2	Active	300	Fisher EWD WIII A3	28780	34.1
Run 2	Monitor	300	Fisher EWD W1	32099	32.1

REGULATOR LOCATION			
Regulator no	P8-027	Regulator Name North Laverton City Gate (Fitzgerald Rd TTP)	
Location	Fitzgerald Road		
Suburb Laverton	Melway 53 G2	Vic Roads	

DESIGN PARAMETERS			
Minimum Inlet Pressure (kPa(g))	2200		
Minimum Outlet Pressure (kPa(g))	1900		
Outlet MAOP (kPa(g))	2760		
Design Capacity per run (scm/h)	11.7 x 10 ³		
Total Station Capacity (scm/h) (At minimum inlet pressure)	11.7 x 10 ³		
Number of "Standby" runs	1		
Number of "Duty" runs	1		

REGULATOR SET POINTS			
Run 1 Active set point	1880		
Run 1 Monitor set point	1950		
Run 2 Active set point	1900		
Run 2 Monitor set point	1950		

SLAMSHUT CONTROL SET POINTS			
Run 1 Slamshut Close (kPa(g))	2100		
Run 1 Slamshut Open (kPa(g))	1800		
Run 2 Slamshut Close (kPa(g))	2150		
Run 2 Slamshut Open (kPa(g))	1750		
Remote Set point Capability (Y/N)	N		

REGULATOR DETAILS					
RUN	MODE	SIZE	TYPE	C _g	C _i
1,2	Monitor	50	Welkerlet WJ-2N	2,044	19.1
1,2	Active	50	Welkerlet WJ-2N	2,044	19.1
(Note: All runs have identical regulators)					

REGULATOR LOCATION			
Regulator no	P9-003	Regulator Name Tyers Pressure Limiter	
Location	Tyers-Glengarry Road		
Suburb Tyers	Melway	Vic Roads 98 J4	

DESIGN PARAMETERS			
Minimum Inlet Pressure (kPa(g))	4650		
Maximum Outlet Pressure (kPa(g))	4460		
Minimum Outlet Pressure (kPa(g))	3600		
Outlet MAOP (kPa(g))	7070		
Design Capacity per run (scm/h)	246 x 10 ³		
Total Station Capacity (scm/h) (At minimum inlet pressure)	246 x 10 ³		
Number of "Standby" runs	0		
Number of "Duty" runs	1		

REGULATOR SET POINTS	
Run 1 Active regulator set point	4400
<i>Note: Set point shall not be changed without prior consultation with APA GasNet</i>	

SLAMSHUT CONTROL SET POINTS	
Run 1 Slamshut Close (kPa(g))	None
Run 1 Slamshut Open (kPa(g))	None
Remote Set point Capability (Y/N)	Y

REGULATOR DETAILS				
RUN	MODE	SIZE	TYPE	
1	Active	200	Jetstream J8-60	C _g 23,390 C ₁ 16.4
(Note: All runs have identical regulators)				

REGULATOR LOCATION

Regulator no	P9-13	Regulator Name	Wandong PRS
Location	Scanlons Road		
Suburb	Wandong	Melway	510 M10 Vic Roads 61 B7

DESIGN PARAMETERS

Design Inlet Pressure Range (kPa(g))	3,700 - 8,800
Design Outlet Pressure Range (kPa(g))	3,500 - 5,500
Outlet MAOP (kPa(g))	7,400
Design Capacity per run (scm/h)	60,000
Station Design Capacity (scm/h)	60,000
Number of "Standby" runs	1
Number of "Duty" runs	1

REGULATOR SET POINTS

Runs 1 & 2 Active set point (kPa(g))	Variable between 3,500 - 7,240
--------------------------------------	--------------------------------

SLAMSHUT CONTROL SET POINTS

Run 1 Slamshut Close (kPa(g))	8065 inc
Run 1 Slamshut Close (kPa(g))	1000 dec
Run 2 Slamshut Close (kPa(g))	8065 inc
Run 2 Slamshut Close (kPa(g))	1000 dec
Slamshut Valves can be reset for remote operation at (kPa(g))	6,955

Remote Set point Capability (Y/N)	Y
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REGULATOR DETAILS

RUN	MODE	SIZE	TYPE	C _R	C ₁
1 & 2	Active	150mm	Fisher ET W1 657	8,383	25.8

(Note: All runs have identical regulators)

REGULATOR LOCATION			
Regulator no	P8-016	Regulator Name	Wollert City Gate
Location	Summerhill Road		
Suburb	Wollert	Melway	Vic Roads: 79 A3

DESIGN PARAMETERS	
Minimum Inlet Pressure (kPa(g))	3000
Minimum Outlet Pressure (kPa(g))	2700
Outlet MAOP (kPa(g))	2760
Design Capacity per run (scm/h)	183 x 10 ³
Total Station Capacity (scm/h) (At minimum inlet pressure)	549 x 10 ³
Number of "Standby" runs	1
Number of "Duty" runs	3

REGULATOR SET POINTS	
Active set point	2760
Pneumatic backup set point	2400
<i>Note: All runs have identical set points</i>	
<i>Set point shall not be changed without prior consultation with APA GasNet</i>	
Outlet Pressure Set-point Range (Normal Operation)	2000 - 2760 kPa(g)

SLAMSHUT CONTROL SET POINTS	
Slamshut Close (kPa(g))	2925
Slamshut Open (kPa(g))	2765
<i>Note: All four runs have identical set points</i>	
Remote Set point Capability (Y/N)	Y

REGULATOR DETAILS				
RUN	MODE	SIZE	TYPE	
1 to 4	Active	250	Mascot MEGAFLO	C _g 32,498 C ₁ 33.47
(Note: All runs have identical regulators)				

REGULATOR LOCATION

Regulator no	P9-12	Regulator Name	Wollert Pressure Limiter
Location	Summerhill Road		
Suburb	Wollert	Melway	Vic Roads 78 H3

DESIGN PARAMETERS

Design Inlet Pressure Range (kPa(g))	Adjustable between 3,200 & 6,890
Design Outlet Pressure Range (kPa(g))	Adjustable between 3,000 & 5,000
Outlet MAOP (kPa(g))	6,890
Design Capacity per run (scm/h)	150,000
Station Capacity (scm/h)	150,000
Number of "Standby" runs	1
Number of "Duty" runs	1

REGULATOR SET POINTS

Runs 1 & 2 Active set point	Variable between 3,000 to 6,890 kPa(g)
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Note: Set point shall not be changed without prior consultation with APA GasNet

SLAMSHUT CONTROL SET POINTS

Not Available

Remote Set point Capability (Y/N)	Y
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REGULATOR DETAILS

LEG	MODE	SIZE	TYPE	C _g	C ₁
1 & 2	Active	200mm	Fisher ET 8x6 W1 657	21,300	35.0

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Appendix 7 – Compressors Operational Data

Brooklyn - Melbourne to Geelong or Ballarat pipeline compression modes are,

Mode	Available Power	Compressors Required
Mode G ₁	0 to 500 kW	No compression required Any Saturn (8,9) Any 2 Saturns (8,9) Centaur 11 in parallel internally Centaur 11 in series internally or Centaur 12 Centaur 11 in parallel internally and any Saturn (8,9) Centaur 11 in parallel internally and 2 Saturns (8,9) Centaur 12 and 11 in series internally
Mode G ₂	500 to 900 kW	
Mode G ₃	1000 to 1800 kW	
Mode G ₄	1400 to 2850 kW	
Mode G ₅	1400 to 3750 kW	
Mode G ₆	1900 to 3750 kW	Centaur 11 in parallel internally and 2 Saturns (8,9)
Mode G ₇	2400 to 4650 kW	
Mode G ₈	2800 to 5700 kW	

Which is to be reflected in the BCS418 BCS Automation Functional Specifications look up table as follows:

KW* / / kPa(g)***	<500 kW	>500 <900	>900 <1800	>1800 <2850	>2850 <3750	>3750 <4650	<5700
<7000 kPa(g)	G1	G1	G1	G5	G8	G8	G8
<6500	G1	G1	G1	G5	G8	G8	G8
<5500	G1	G1	G1	G5	G8	G8	G8
<4500	G1	G2	G3	G4	G6	G7	G8
<3500	G1	G2	G3	G4	G6	G7	G8
<2700	G1	G2	G3	G4	G6	G7	G8

* 4 hour averaged pipeline power set point

** Actual pipeline pressure

*** Assuming suction inlet pressure greater than 2100 kPa(g).

Brooklyn – Melbourne or Geelong to Ballarat pipeline compression modes are,

Mode	Available Power	Compressors Required
Mode B1	0 to 500 kW	No compression required, cross-over valve open or closed
Mode B2	500 to 900 kW	
Mode B3	500 to 900 kW	Any Saturn (8,9), cross-over valve closed, suction from Geelong
Mode B4	900 to 2850 kW	Any Centaur (11,12), crossover valve closed.

Which is to be reflected in the BCS418 BCS Automation Functional Specifications
look up table as follows:

KW* / / kPa(g)**	<500 kW	>500 <900	>500 <900	>900 <2850
<7000 kPa(g)	B1	B2	B1	N/A
<6500	B1	B2	B1	N/A
<5500	B1	B2	B1	N/A
<4500	B1	B2	B3	N/A
<3500	B1	B2	B3	N/A
<2700	B1	B2	B3	B4

* 4 hour averaged pipeline power set point
** Actual pipeline pressure

Mode	Gooding	Brooklyn	Springhurst	Wollert	Iona
Station Control Station ESD Compressor Start Compressor Stop Compressor Vent Compressor Reset	Y Y Y Y Y	Y Y Y Y Y,N	Y Y Y Y Y	Y Y Y Y Y	Y Y Y Y Y
Process Control Engine speed Outlet Pressure Inlet Pressure Outlet Temperature Engine Power Inlet Flow	S S S N N N	S S Y N N N	N Y Y N N Y	N Y Y N N Y	S S S N N N
Design Parameters Min Inlet Pressure (kPa(g)) Max Outlet Pressure (kPa(g)) Outlet MAOP (kPa(g)) Min Inlet Temp (degC) Max Outlet Temp (degC) Seal system Number of "standby" units Number of "duty" units	3500 6890 6890 -10 45 Wet 1 x C40 3 x C40	1800 7390 7390 -10 45 Dry/Wet Nil 2 x C40, 2 x S10	2300 7400 7400 -10 45 Dry Nil 1 x C50	3000 8800 8800 -10 45 Dry Nil 2 x C50	3800 7400 7400 -10 45 Wet 1 x R 1 x R
Station Design Limits Max Outlet Pressure (kPa(g)) Max Outlet Temp (degC)	6890 50	7390 50	7400 50	8800 50	7400 55

Alarms

Refer to relevant Cause & Effects Diagrams and P&IDs

Legend:

Process Control	Engines
S = 24 hourly schedule of set points Y = Control available to AEMO N = Control not available to AEMO	S10 = Saturn turbine engine (T1202 or T1302) C40 = Centaur turbine engine (T4002 or T4702) C50 = Centaur turbine engine (T6102) R = Caterpillar reciprocating engine

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Appendix 8 – Regulators Drawing Index

The asset reference number, a Key Plan drawing number, and relevant P&IDs are identified below.

ASSET TITLE	Reference Number	Key Plan Drawing No.	Site Layout Drawing No.	Assembly Drawing No.	P&ID Drawing No.
Tyers Pressure Limiter Glengarry Road	P9-3	A4 - 363 - 1	P9-3-24	P9-3-5 P9-3-8	2130-PB-001
Morwell City Gate Porters Road	P8-13	A4 - 363 - 1	N3-076-6	P8-13-4 P8-13-5	Not Applicable Not Automated
Dandenong City Gate Frankston-Dandenong Road	Q31-3	A4 - 363 - 1 A4 - 363 - 2	Q31-3-29 Q31-3-36	Q31-3-5 Q31-3-22 Q31-3-26 Q31-3-27 Q31-3-40 Q31-3-41 Q31-3-42	3221-PB-001 3221-PB-002 3221-PB-003 3221-PB-004 3221-PB-005 3221-PB-006 3221-PB-007
Wollert City Gate and Pressure Limiter Summerhill Road	P8-16 P9-12	A3-363-1 A3-363-5	1321-MA-001 L1-37-25 L1-37-48	1321-MB-002 1321-MB-003 1321-MG-009 1321-MG-012 1321-MI-001 1321-MI-002	1321-PB-001 1321-PB-002 1321-PB-003 1321-PB-004 1321-PB-005 1321-PB-006 1321-PB-007 1321-PB-008 1321-PB-009 1321-PB-010 1321-PB-011 1321-PB-012 1321-PB-013 1321-PB-014
Laverton North City Gate Fitzgerald Road	P8-27	A4 - 363 - 3	L1-49-1 L1-49-4 N3-028-6	P8-27-3 P8-27-9	Not Applicable Not Automated
Dandenong Pressure Limiter, Greens Road (Morwell Backup Regulators)	P8-7	A4 - 363 - 1 A4 - 363 - 2	N3-005-2 N3-005-5 N3-005-26	P6-3-1	3241-PB-001
Clonbaine Pressure Limiter, Clonbaine	P9-10	A4 - 363 - 5	P9-10-5		5405-PB-001 5405-PB-002 5405-PB-003
Lara SWP City Gate Princes Freeway, Lara	P10-01	A4 - 363 - 3	2631-MA-001	2631-MB-001 2631-MB-002 2631-MB-003 2631-MB-004 2631-MB-005	2631-PB-001 2631-PB-002 2631-PB-003 2631-PB-004

ASSET TITLE	Reference Number	Key Plan Drawing No.	Site Layout Drawing No.	Assembly Drawing No.	P&ID Drawing No.
Brooklyn (BCP)City Gate Jones Road	P8-28	A4 - 363 - 3	1221-MA-001		1221-PB-001 1221-PB-002 1221-PB-003 1221-PB-004 1221-PB-005 1221-PB-006 1221-PB-007 1221-PB-008
Brooklyn (BLP)City Gate Jones Road	P10-04	A4 - 363 - 3	1221-MA-001		1222-PB-001 1222-PB-002 1222-PB-003 1222-PB-004 1222-PB-005 1222-PB-006 1222-PB-007 1222-PB-008 1222-PB-012 1222-PB-013 1222-PB-014
Brooklyn Pressure Limiter Jones Rd	P9-11	A4-363-3			1223-PB-001 1223-PB-002
Barnawartha City Gate & Offtake Station Barnawartha- Howlong Road	P10-02	A4-363-5	6650-MA-001	6650-MB-002 6650-MB-003 6650-MB-004 6650-MB-009 6650-MB-012	6650-PB-001 6650-PB-002 6650-PB-003 6650-PB-004
Wandong PRS Scanlons Road	P9-13	A4 - 363 - 5	2451-MA-001 2451-MA-012	2451-MB-002 2451-MB-009 2451-MB-013 T75-11-71 T75-11-72	2451-PB-001 2451-PB-002 2451-PB-003
Iona SWP City Gate & WUGS Waurre Rd	P10-03	A4 - 363 - 7	25105-SKP-024	4630-MB-001 4630-MB-002 4630-MB-003 4630-MB-004	4630-PB-001 4630-PB-004 4630-PB-005 4630-PB-006 4630-PB-007 4630-PB-008 4630-PB-011
Eura Pressure Regulator Station	P10-07	A4 - 363 - 5			1600-PB-001

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Appendix 9 – Valves remotely actuated from within AEMO's Operations Centre

Location	Description	Open Control	Close Control	Comment
Ballan Line valve	UV04	Y	Y	High dp interlock on open
	UV08 Bypass	Y	Y	
Barnawartha	UV001 Line valve	Y	Y	
	UV055 Run 1	Y	Y	
	UV060 Run 2	Y	Y	
	UV053 Bypass	Y	Y	
Birregurra SWP	LV03	Y	Y	
Brooklyn Comp Station	CrossOver Valve	Y	Y	Auto sequences using the associated loading valve
Brooklyn BLP CG	UV62011 Inlet	N	Y	
	UV62904 KO drum	Y	Y	
	UV62001 KO bypass	Y	Y	
	UV62151 Run 1	Y	Y	
	UV62251 Run 2	Y	Y	
	UV62351 Run 3	Y	Y	
	UV62451 Run 4	Y	Y	
	UV62551 Run 5	Y	Y	
	UV62753 Bypass	Y	Y	
	UV62005 Htr bypass	Y	Y	
	UV62100 Htr#1	Y	Y	
	UV62200 Htr#2	Y	Y	
	BCP-UV62001 Station outlet	N	Y	
Brooklyn BCP CG	UV62002 Inlet	N	Y	
	UV62055 Run 1	Y	Y	
	UV62062 Run 2	Y	Y	
	UV62069 Run 3	Y	Y	
	UV62076 Run 4	Y	Y	
	UV62551 Run 5	Y	Y	
	UV62753 Bypass	Y	Y	
	UV62054 Htr bypass	Y	Y	
	UV62100 Htr#1	Y	Y	
	UV62200 Htr#2	Y	Y	
Brooklyn BBP PL	UV87 Run 1	Y	Y	
	UV90 Run 2	Y	Y	
Clonbinane PL	UV02 Run 1	Y	Y	
	UV03 Run 2	Y	Y	
	UV01 Bypass	Y	Y	
Dandenong CG	Reg 1	Y	Y	
	Reg 2	Y	Y	
	Reg 3	Y	Y	
	Reg 4	Y	Y	
	Reg 5	Y	Y	
	Reg 6	Y	Y	
	Reg 7	Y	Y	
	V1101 Station Inlet	Y	Y	
Dandenong LNG	V324	N	Y	Valve closes on ESD

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	V325 V477 V326	N N N	Y Y Y	Valve closes on ESD Valve closes on ESD Valve closes on ESD
Euroa PRS	LV-013A LV-013B UV13AC UV13BC UV62001	Y Y Y Y Y	Y Y Y Y Y	Closes on high pressure Closes on high pressure Closes on high pressure Closes on high pressure ESD on high pressure
Gheringhap SWP	LV01	Y	Y	
Iona CG	UV13 Run 1 UV31 Run 2 UV40 Bypass UV71 TXUGS Branch	Y Y Y N	Y Y Y ESD	
Iona SEA Gas	UV04 Branch	N	ESD	Valve closes on ESD
Brooklyn Lara Pipeline	LV01 LV02 LV03 LV04	Y Y Y Y	Y Y Y Y	
Lara SWP	UV13 Run 1 UV31 Run 2 UV40 Run 3 UV49 Run 4 UV58 Run 5 UV09 Bypass UV06 Heater bypass	Y Y Y Y Y Y Y	Y Y Y Y Y Y Y	
Longford	V030 North V031 South	Y Y	Y Y	
Mirne SWP	LV02	Y	Y	
Pakenham BassGas	UV08 Branch	N	ESD	Valve closes on ESD
Pakenham LV9	BV932 BV931 LV901 North LV951 South	Y Y Y Y	Y Y Y Y	
Tyers	Valve BV130 North Valve BV131 South	Y Y	Y Y	
Wandong PRS	UV02 Run 1 UV04 Run 2	Y Y	Y Y	
Wollert CG	V503 - V512 Inlet V102 Run 1 inlet SSV V202 Run 2 inlet SSV V302 Run 3 inlet SSV V403 Run 4 inlet SSV	- Y Y N N N N	- Y Y Y Y Y Y	
Wollert PL	V2 Bypass V111 Run 1 inlet V112 Run 1 branch V113 Run 2 inlet V114 Run 2 branch V61 Bypass	Y Y Y Y Y Y	Y Y Y Y Y Y	

Legend

Y = Remote control available to AEMO

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N = not available to AEMO

ESD = Remote ESD close available to AEMO (and other affected parties)

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Schedule 2 – Applicable Operating Conditions

1 Introduction

This Schedule 2 replaces Schedule 2 of the TPA Service Envelope Agreement dated 22 January 1999, as amended 2 June 1999, November 2006 and December 2007.

1.1 Service Envelope Capacity

The Service Envelope Capacity takes into account the APA GasNet assets which are available to AEMO, and the relevant limiting specifications of those assets, availability and physical constraints on the operation of those assets. By means of these assets AEMO can make capacity available to gas users for transportation through the APA GasNet System.

The available capacity of the APA GasNet System will depend on the applicable operating conditions of the day. That is, a different set of operating conditions on the day may enable a different quantity of gas to be transported through the APA GasNet System.

The deliverability of the system is determined by use of the agreed common computer model referenced in clause 5.2(d), in conjunction with each attribute numbers 1-4 as follows:

- (1) The description of the facilities which comprise the APA GasNet System contained in Schedule 1, and modified from time to time as assets are added to or removed from the APA GasNet System.
- (2) The limiting specifications and availabilities of those assets, and as required by the protocols of the agreed common computer model in order to characterise the system to be modelled.
- (3) The operating constraints, as specified in this Agreement. These represent limitations on the manner in which the assets can be used, and are relevant to the extent that they influence the modelling of the system capabilities.
- (4) The applicable operating conditions of the day, which include the following parameters which can individually affect the operation of the system model:
 - gas quality and the heating value (by zone);
 - the linepack configuration at the beginning of the day;
 - the scheduling and rescheduling of supply;

- load curtailment and/or other emergency measures that impact pressures and flows;
- the hourly profiles of flows at each injection point into the system;
- the hourly flows and/or pressures at a selection of key system delivery points, which do not completely specify the system, but which are selected for the purposes to which the calibrated model is to be used;
- any other variable that is not a fixed parameter already included as part of the calibration process of the system model.

The applicable operating conditions must be specified for the following two purposes:

(a) MDQ Authorisation

(b) Liabilities for Uplift under the National Gas Rules

The Common Computer Model calculates pressures at all nodes of the APA GasNet System for the gas flows occurring on a peak day in a typical winter and on representative days at other times of the year. This Model utilises internationally recognised 'Gregg Engineering Software' that is individually licenced to the Parties as an agreed facility.

MDQ Authorisation

For the initial allocation of MDQ Authorisations, the applicable operating conditions have been specified and are incorporated in the agreed common computer model. A copy of this model is held by both APA GasNet and AEMO. The applicable operating conditions that are relevant to the authorisation process, and the MDQ capacity that is derived from the model, may not be changed without the agreement of both parties.

Based on the agreed common computer model, and the use of the agreed set of applicable operating conditions, the initial capacity of the system for injections at the Longford Receipt Point was determined to be 990 TJ/day.

Liabilities for Uplift under the National Gas Rules

For the determination of liabilities of APA GasNet under Rule 240(9) of the National Gas Rules, an agreed common computer model as referred to in clause 5.2(d) will be used, in conjunction with the applicable operating conditions. The operating conditions to be used in assessing the extent of the failure of APA GasNet to perform its obligations will be those that are applicable to the conditions over the period of the failure, and where relevant they will reflect a fair assessment of the operating responsibilities of AEMO. The agreed

common computer model may be amended from time to time with the agreement of both parties.

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Schedule 3 – Gas Transportation Services provided by APA GasNet

Section 1: Non-Terminable

Specific Services		
1	Provide a certified list of 'Parameters' and specifications limiting performance for each major item of gas plant, equipment and auxiliary facilities within the APA GasNet Service Envelope pipeline assets, for the proper care and integrity of each asset. Frequency: Monthly	Measure: All assets defined
2	Provide 'Plant Availability and Maintenance' programs for the APA GasNet Service Envelope. APA GasNet maintains the right on a 24 hour basis (or circumstances of extreme plant outage) the right to amend the current program accordingly. Frequency: <ul style="list-style-type: none"> annual program for 5 years 3 month rolling program for 1 year weekly program 	Measure: All assets defined
3	Provide 'Staff Location Registration' through notification and scope of work, duration and ramification for the APA GasNet Service Envelope in meeting system performance. Frequency: Daily	Measure: Compliance audit
4	Provide 'Documentation Updating' service for all operational and technical specifications, performance data, plans and other relevant materials required for effective control management of transmission pipeline system's assets, plant and equipment. Frequency: On each amendment	Measure: Compliance audit
5	Provide 'Control Room Operators' access to participate with field work crews during the enhancement, modification and maintenance of assets owned by APA GasNet Assets. Frequency: Monthly	Measure: Competency
6	Submit 'Design Variation' documentation for all existing, new or proposed enhancement of existing APA GasNet gas plant, equipment, systems, or operational procedures by to obtaining acceptance prior to implementation. Frequency: On request	Measure: Response time
7	Provide copies of 'Safety Case' documentation as and when approved by the Energy Safe Victoria of all gas plant, equipment and associated with either the APA GasNet Service Envelope. Frequency: As amended	Measure: Compliance audit
8	Implement and maintain a 'Change Management' policy, procedures and associated control documentation to ensure all enhancement, modifications and amended performance specifications for gas plant, equipment, hardware and software systems have traceable documentation at all times. Frequency: Daily	Measure: Random compliance audit
9	Provide use of 'State Mobile Radio (SMR) Communication' fully maintained facilities for APA GasNet use in emergencies comprising of 2 base stations and 3 mobile handsets. Frequency: Daily	Measure: Reliability

Section 2: Terminable

- | | |
|---|--|
| 1 | Provide 'Data and Voice Communication' facilities including direct RTU telephone lines between all control, monitoring and metering APA GasNet site facilities |
|---|--|

Section 3: Non-Terminable Services Provided by AEMO

The following services are provided to APA GasNet pursuant to Clause 12 and clause 8 of this Agreement:

1	Implement and maintain a 'Change Management' policy, procedures and associated control documentation to ensure all enhancement, modifications and amended performance specifications for SCADA host hardware and software systems having potential to affect Service Envelope Capacity have traceable documentation at all times. Frequency: Daily Measure: Random compliance audit
2	Provide copies of 'Safety Case' documentation as and when approved by Energy Safe Victoria. Frequency: As amended Measure: Compliance audit
3	Provide 'Documentation Updating' service for all operational agreements and procedures affecting the APA GasNet Service Envelope Capacity. Frequency: On each amendment Measure: Compliance audit
4	Provide access to historical operational data through remote access Frequency: Daily Measure: Random compliance audit

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Schedule 4 – APA GasNet Data Requirements

RTUs

- Live and historical alarms, performance indicators and system monitors
- Access to sufficient data to enable the remote determination of the health of associated field equipment controlled and monitored by the RTU.

CTMs (as Responsible Person)

- Live, historical, hourly averaged and daily averaged flows, pressure, temperature and gas quality data
- Maximum hourly flow
- Top of hour pressure
- Live and historical alarms, performance indicators and system monitors

Chromatographs

- Live, historical, hourly averaged and daily averaged gas composition, heating value and relative density data
- Live and historical alarms, performance indicators and system monitors

Compressor Stations

- Station configuration information including valve positions, compressors availability and usage status, etc
- Live and historical turbine and compressor operating information including speeds, temperatures, pressures, vibration and flows
- Live and historical station information including pressures, temperatures and flows
- Station safety and security of supply system data including gas and fire systems, power systems, etc

Injection Points

- Live, historical, hourly averaged and daily averaged flow, pressures, differential pressures, temperatures and gas quality data
- Maximum hourly flow
- Top of hour pressure
- Alarms, performance indicators and system monitors
- Odorant system data including odorant concentration, pump selected, etc

Line valves and major offtakes/interconnects

- Live and historical pressure, temperature, flow and valve positions

City Gates and pressure limiters

- Live and historical pressures, temperature, flow, set point and valve positions

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Schedule 5 – General Form of Amendment under
Clause 18.3

- 1

APA GasNet Australia (NSW) Pty Ltd, APA GasNet Australia (Operations) Pty Ltd and Australian Energy Market Operator agree to amend the Service Envelope Agreement made between them in the following manner:
- 2

{ refer to attachments, as required }
- 3

The amendment shall commence operation on the following date:
- 4

Each party is bound by the Service Envelope Agreement as amended by this document.

Signed
By **APA GasNet Australia (NSW) Pty Ltd** by its authorised representative in the presence of:

Witness

Representative

Print Name

Print Name

Date

Date

Signed
By **APA GasNet Australia (Operations) Pty Ltd** by its authorised representative in the presence of:

Witness

Representative

Print Name

Print Name

Date

Date

Signed
By **Australian Energy Market Operator Limited** by its authorised representative in the presence of:

Witness

Representative

Print Name

Print Name

Date

Date

Service Envelope Agreement

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