AMDQ TRANSFER ALGORITHMS

(a) Authorised MDQ and

(b) AMDQ Credit Certificates

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AMDQ Credit Certificate Site Assignment Algorithm

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1.0	1 June 02	Bobby Tomasevic	First issue.
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AMDQ Transfer Algorithm

Version	Date	Author	Comments
1.0	3 July 01	Bobby Tomasevic	First issue.
2.0	1 June 02	Bobby Tomasevic	Various changes for inclusion of lateral and system spare capacities.
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2.2	1 Apr 04	Bobby Tomasevic	Introduction of BassGas and Longford (VicHub) AMDQ Nodes.
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This document has been created by Planning Department and will be reviewed from time to time.

Any queries or suggestions for improvement should be addressed to Joe Spurio at joe.spurio@aemo.com.au.

Contents

GLOSSARY

In this document, capitalised words or phrases or acronyms have the meaning set out opposite those words, phrases, or acronyms in the table below:

TERM	MEANING
AMDQ	Authorised Maximum Daily Quantity.
AMDQ credit certificate	Means a certificated right to a quantity measured in GJ and issued under NGR Part 19, Division 4, Subdivision 3.
AMDQ node	A node to which the demand of a tariff D customer is assigned (see Table 1).
authorised MDQ	Means in respect of a Customer, the maximum daily quantity of gas, expressed in GJ/day, which is authorised by AEMO to be withdrawn by or on behalf of that Customer from the declared transmission system, in accordance with an allocation under NGR rule 328, 329 or 330.
Diversity (D)	The diversity for an individual site being the ratio of the average site load on five valid coincident peak days and the average of the five individual site peak days.
Lateral Spare Capacity	The spare capacity at a node based on supply from an injection point other than Longford (“near” site supply path).
Locational Factor (L)	A factor that recognises the locational effect of demand on the system - used when transferring authorised MDQ and when calculating spare capacity.
Melbourne Supply Path	A supply path to an AMDQ node from Longford or the Melbourne hub.
MDQ	Maximum Daily Quantity.
Node	A point on the gas DTS where gas is injected or withdrawn and where authorised MDQ and AMDQ credit certificates can be assigned.
Other Supply Path	A supply path to an AMDQ node from a direction opposite the Melbourne Supply Path.
Reference Hub	The Melbourne AMDQ Node
Site	A tariff D customer location.
System Spare Capacity	Spare capacity at a node based on supply from Longford (“near” site supply path).

1 Introduction

This document describes the AMDQ Transfer Algorithms for

- transfer of authorised MDQ and
- transfer of AMDQ credit certificates,

within the declared transmission system.

AMDQ credit certificates can only be transferred to a site in the declared gas transmission system provided the system has adequate capacity to transport gas to meet all existing authorised demand (including the newly authorised demand) given the expected diversity of the new demand.

The total combined quantity of authorised MDQ and AMDQ credit certificates should continue to equate to the capacity of the declared transmission system taking into account load diversity (where applicable).

It should be noted that:

- either authorised MDQ or AMDQ credit certificates can be transferred to a site
- if both share the same flow path, then transfer of one will limit the transfer of the other

2 Purpose

The purpose of this document is to set out the AMDQ Transfer Algorithms used by AEMO to determine the amount of authorised MDQ to be transferred to a party or the amount of AMDQ credit certificates to be transferred to a party.

3 Related Policies and Procedures

Wholesale Market AMDQ Transfer Procedures (Victoria)

4 Algorithm for the Transfer of Authorised MDQ

This algorithm should be read in conjunction with the Algorithm for transfer of AMDQ credit certificates, outlined in section 5, as they are closely related.

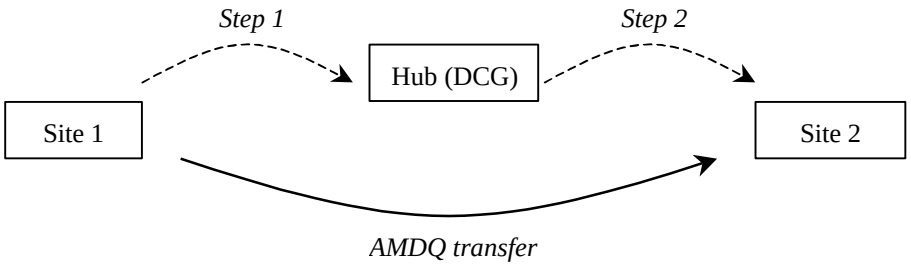

Figure 1 - AMDQ transfer diagram

There are four types of authorised MDQ transfers:

1. Site authorised MDQ between any two tariff D gas Customer sites
2. Site authorised MDQ to Reference Hub[1] authorised MDQ
3. Reference Hub authorised MDQ to Site authorised MDQ, and
4. Reference Hub authorised MDQ to Reference Hub authorised MDQ

[1] The Reference Hub is the Melbourne AMDQ node.

Site to Site authorised MDQ transfers involve two logical steps:

1. Step 1, from Site to Reference Hub, and
2. Step 2, from Reference Hub to Site

Site to Reference Hub, Reference Hub to Site, or Reference Hub to Reference Hub transfers are simpler, each being a single step.

Adequate System Spare Capacity at the AMDQ Node must be available to enable the transfer step from Reference Hub to Site.

4.1 Site to Site Authorised MDQ Transfers

Assume the proposed transfer of authorised MDQ quantity of Q_1 from Site 1 on AMDQ Node N_1 translating to an authorised MDQ of Q_2 at Site 2 on AMDQ Node N_2.

Assume the Diversity and Locational Factors are D_1, L_1 and D_2, L_2 at the respective Sites. These factors have been determined for the particular case by AEMO. The default diversity of 1.0000 is assigned to a site where a diversity has not been determined. The initial and final authorised MDQ quantities allocated to the Site 1 and Site 2 are S_{1i}, S_{2i}, and S_{1f}, S_{2f}. The subscript "i" signifies the initial value and "f" the final value. Similarly, C_1 and C_{L1} are the System Spare Capacity and Lateral Spare Capacity on AMDQ Node N_1, respectively.

1. Test that Site 1 holds the proposed quantity for transfer

   If $Q_1 <= S_{1i}$ proceed, else reject transfer

2. Convert Q_1 to Reference Hub authorised MDQ H_1

   $H_1 = Q_1 \times D_1 / L_1$

3. Recalculate the System Spare Capacity C on AMDQ Node N_1

   $C_{1f} = C_{1i} + H_1$

4. Recalculate the Lateral Spare Capacity C_L on AMDQ Node N_1

   $C_{L1f} = C_{L1i} + H_1$

5. Recalculate and update the System Spare Capacity on any interdependent AMDQ Nodes N_k, assuming Q_1 has been transferred to the Reference Hub

   $C_{k\,f} = C_{k\,i} \times C_{1f} / C_{1i}$ for the k^{th} node

   Note: C_k will not change unless it is in a group of interdependent AMDQ Nodes that include N_1.

6. Test for adequate system and lateral spare capacities on N_2

   If $H_1 <= C_2$ and $H_1 <= C_{L2}$ proceed, else reject transfer

7. Calculate the authorised MDQ quantity Q_2 transferred to Site 2

   $Q_2 = H_1 / D_2 \times L_2$

8. Update the authorised MDQ allocated to Site 1 and Site 2

   $S_{1f} = S_{1i} - Q_1$

$S_{2f} = S_2 + Q_2$

9. Recalculate the System Spare Capacity C on AMDQ Node N_2

   $C_{2f} = C_{2i} - H_1$

10. Recalculate the Lateral Spare Capacity C_L on AMDQ Node N_2

    $C_{L2f} = C_{L2i} – H_1$

11. Recalculate and update the System Spare Capacity C of all interdependent AMDQ Nodes N_m

    $C_{mf} = C_{mi} \times C_{2f} / C_{2i}$ for the m^{th} node

4.2 Site to Reference Hub Transfers

Assume the proposed transfer of authorised MDQ quantity Q from the Site on AMDQ Node N to the Hub.

Assume the Diversity and Locational Factors for the Site are D and L, respectively.

The initial and final authorised MDQ quantities allocated to the Site and the Reference Hub are S_i, H_i, and S_f, H_f, respectively. C_1 and C_{L1} are the System Spare Capacity and Lateral Spare Capacity on AMDQ Node N_1, respectively.

1. Test that Site 1 holds the proposed quantity for transfer

   If $Q <= S_i$ proceed, else reject transfer

2. Convert Q to Reference Hub authorised MDQ H

   $H = Q \times D / L$

3. Update the authorised MDQ allocated to the Site

   $S_f = S_i – Q$

4. Update authorised MDQ allocated to the Reference Hub

   $H_f = H_i + H$

5. Recalculate the System Spare Capacity C on Node N

   $C_f = C_i - H$

6. Recalculate the Lateral Spare Capacity C_L on Node N

   $C_{Lf} = C_{Li} - H$

7. Recalculate the spare capacity C of all interdependent AMDQ Nodes

   $C_{k\,f} = C_{ki} \times C_f / C_i$ for the k^{th} node

4.3 Reference Hub to Site Transfers

Assume the proposed transfer of authorised MDQ quantity H from the Reference Hub to the Site on AMDQ Node N.

Assume the Locational and Diversity Factors for the Site are L and D.

The initial and final authorised MDQ quantities allocated to the Site and the Reference Hub are S_i, H_i, and S_f, H_f, respectively. C_1 and C_{L1} are the System Spare Capacity and Lateral Spare Capacity on AMDQ Node N_1, respectively.

1. Test that the person at the Reference Hub holds sufficient Reference Hub authorised MDQ

   If $H < H_i$ proceed, else reject transfer

2. Test for adequate spare capacity on N

   If H <= C proceed, else reject transfer

3. Convert Reference Hub authorised MDQ H to Q at the Site

   $Q = H / D \times L$

4. Update the authorised MDQ allocated at the Site

   $S_f = S_i + Q$

5. Update authorised MDQ allocated at the Reference Hub

   $H_f = H_i - H$

6. Recalculate the System Spare Capacity C on AMDQ Node N

   $C_f = C_i - H$

7. Recalculate the Lateral Spare Capacity C_L on AMDQ Node N

   $C_{Lf} = C_{Li} - H$

8. Recalculate the System Spare Capacity C of all interdependent AMDQ Nodes

   $C_{k\,f} = C_{ki} \times C_f / C_i$ for the k^{th} node

4.4 Reference Hub to Reference Hub Transfers

Assume the proposed transfer of authorised MDQ quantity H from Company 1 holding Hub authorised MDQ to Company 2.

Note: These transfers are processed on a one for one basis.

The initial and final authorised MDQ allocated to Company 1 and Company 2, at the Reference Hub, are H_{i1}, and H_{f1} and H_{i2}, and H_{f2} respectively.

1. Test that the Company 1 transferring holds sufficient Reference Hub authorised MDQ

   If $H<H_{i1}$ proceed, else reject transfer

2. Update authorised MDQ allocated at the Reference Hub for Company 1

   $H_{f1} = H_{i1} - H$

3. Update authorised MDQ allocated at the Reference Hub for Company 2

   $H_{f2} = H_{i2} - H$

5 Algorithm for Transfer of AMDQ Credit Certificates

This algorithm should be read in conjunction with the algorithm for transfer of authorised MDQ, outlined in section 4, because they are closely related.

Locational Factor L_2 of 1.0000 is applied for transfer of AMDQ credit certificates to all sites when calculating the site values.

However, when recalculating the spare capacity at the Lurgi AMDQ Node, the AMDQ credit certificates transferred to a site is divided by the Locational Factor (L) used for AMDQ trading. Spare capacities are calculated as a hub value.

5.1 Spare Capacities and Supply Paths

Transfer of AMDQ credit certificates to a Site requires, in principle, verification of adequate spare capacity at the AMDQ Node where the Site is located. Given that the injection points in the Declared Transmission System can be located upstream or downstream relative to the particular AMDQ Node and Melbourne AMDQ Node, the spare capacity of that AMDQ Node will have two components:

- "System Spare Capacity" (C), and
- "Lateral Spare Capacity" (C_L).

Maintaining these two spare capacities separately in the Algorithm is essential because of two simultaneous processes supported by AEMO:

- Registration of AMDQ Transfers, and
- Registration of AMDQ credit certificate Site Nominations (ie site assignments), both of which impact the spare capacities at AMDQ Nodes.

For example, the Shepparton AMDQ Node's System Spare Capacity depends on the supply from the Melbourne Supply Path shown in Figure 2, which delivers gas from Longford and/or Iona. Therefore an AMDQ credit certificate (at Iona) transfer to/from the site on the Shepparton AMDQ Node reduces/increases its System Spare Capacity in the same way that the Longford AMDQ Transfer does. Once the Melbourne ("Upstream" from Site) Supply Path is fully utilised, the Shepparton AMDQ Node's System Spare Capacity is also filled-up, consequently no additional Iona AMDQ credit certificates nor Authorised MDQ could be transferred to that Site. However, the Lateral Spare Capacity of the Shepparton AMDQ Node may still not be fully used, providing there is injection from any Other ("Near the Site) Supply Path, such as from Culcairn.

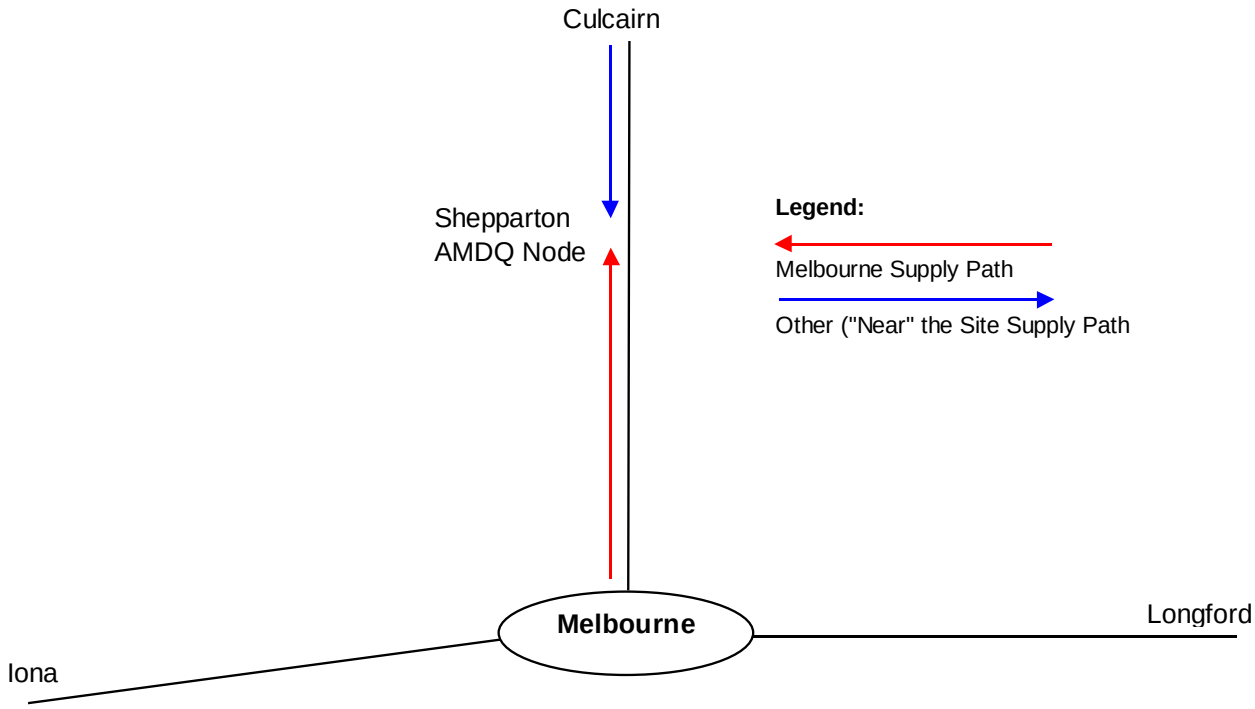

Figure 2 Supply Paths

This spare capacity allows the transfer of Culcairn AMDQ credit certificates to the Customer's Site in Shepparton AMDQ Node.

Another example is the situation where there is plenty of System Spare Capacity available at, for example, Shepparton AMDQ Node but its Lateral Spare Capacity is completely filled in by Culcairn AMDQ credit certificates. This means that no additional Culcairn AMDQ credit certificates can be assigned to a Site in the Shepparton AMDQ Node.

Note that there is no interdependency of the Lateral Spare Capacities. This is due to the local pipeline pressure limits being the constraint for Lateral Spare Capacity determination.

5.2 AMDQ Credit Certificate Transfer Procedure

This section covers AMDQ Credit Certificates transferred to a Site.

1 Test that Market Participant holds sufficient AMDQ credit certificates[2] from Non-Longford supply source "s", H_{si}

If $H_s \leq H_{si}$ proceed, else reject the transfer,

where H_s is an AMDQ credit certificate quantity to be transferred

Note: The AMDQ credit certificate quantities must be differentiated by source (Culcairn or Iona) and updated respectively.

2 Identify the supply path of the AMDQ credit certificates in respect to the location of its source and location of AMDQ Node to which the Site belongs, relative to Melbourne. Refer toTable 3 for more details.

[2] For the purposes of this document AMDQ Credits means the whole or part of an AMDQ credit certificate which is available for assignment to site(s).

If Melbourne Supply Path

3 Test for adequate System Spare Capacity on AMDQ Node *N*

If H_s / L ≤ C proceed, else reject the transfer.

4 Test for adequate Lateral Spare Capacity on AMDQ Node *N*

If H_s / L ≤ C_L proceed, else reject the transfer.

5 Update the respective component of AMDQ credit certificates Site allocation

$S_{sf} = S_{si} + H_s \times L_2 / D$

where L_2=1

Note: The AMDQ credit certificates Site allocations must be differentiated by source (Culcairn or Iona) and updated respectively.

6 Update the Market Participant's AMDQ credit certificates holdings

$H_{sf} = H_{si} - H_s$

7 Recalculate the System Spare Capacity on AMDQ Node *N*

$C_f = C_i - H_s / L$

Note: L = 1 except for Lurgi AMDQ Node (where it has the default value of 2.7)

8 Recalculate the Lateral Spare Capacity on *N*

$C_{Lf} = C_{Li} - H_s / L$

Note: L = 1 except for Lurgi AMDQ Node (where it has the default value of 2.7)

9 Recalculate and update the System Spare Capacities of all interdependent AMDQ Nodes N_k

$C_{kf} = C_{ki} \times C_f / C_i$ for the k^{th} node

If Other Supply Path ("Near" the Site)

3 Test for adequate Lateral Spare Capacity on AMDQ Node *N*

If $H_s \leq C_L$ proceed, else reject the transfer.

4 Update the respective component of AMDQ Site allocation

$S_{sf} = S_{si} + H_s \times L_2 / D$

where L_2=1

Note: The AMDQ credit certificates holdings and AMDQ credit certificates Site allocations must be differentiated by source (Culcairn or Iona) and updated respectively.

5 Update the Market Participant's AMDQ credit certificates holdings

$H_{sf} = H_{si} - H_s$

6 Recalculate the Lateral Spare Capacity on AMDQ Node *N*

$C_{Lf} = C_{Li} - H_s / L$

Note: L = 1 except for Lurgi AMDQ Node (where it has the default value of 2.7)

There is no interdependency of the Lateral Spare Capacities.

Reversion of AMDQ Credit Certificates Transfer

The transfer of AMDQ credit certificates to a Site is effectively reversed by nominating zero AMDQ credit certificates at a Site.

The process described in Section 5 is repeated, except that the following steps are not performed:

- Test that Market Participant holds sufficient AMDQ credit certificates from source "s", H_{Si},
- Test for adequate System Spare Capacity on AMDQ Node N, and
- Test for adequate Lateral Spare Capacity on AMDQ Node N.

6 Definitions

6.1 Diversity Factors

Diversity Factor D for an authorised Tariff D load is determined as follows:

- D = Collective AMDQ / Site AMDQ, where
- Collective AMDQ[3] = Actual quantity of coincident authorised load used by a customer on peak days[4]
- Site AMDQ = AMDQ transferred to a Site

The Default Diversity Factor for authorised tariff D loads is set to 1.0000. The Default AMDQ Diversity Factors are given to all Sites that do not hold any AMDQ (ie all new Sites).

6.2 Locational Factors

A Locational Factor L of 1.0000 is applied for all Sites downstream from Pakenham (based on supply from Longford). The modelling indicates that these factors vary between 0.8000 and 1.3000 depending on load profile and location but the weighted average is very close to 1.0000. Upstream from Maryvale, a standard Gippsland Tariff D profile[5] has been used to determine the Locational Factors. The Locational Factors for each AMDQ Node are shown in Table 1.

[3] Collective AMDQ cannot be greater than Site AMDQ, by definition.
[4] Refer to VENDocs #81008 "DEV-104-006 DETERMINATION OF AMDQ DIVERSITY FACTORS" for more detail.
[5] This excludes the very large load at Maryvale which would be treated individually.

Table 1: Default AMDQ Locational Capacity Factors and Default AMDQ Diversity Factors by AMDQ Node

AMDQ Node Group No	AMDQ Node Group	AMDQ Node	Description	Default Locational Factor L, L_1	Locational Factor L_2	Default AMDQ Diversity Factor D
1	Northern[6]	Wodonga		1.00	1.00	100%
		Ballarat	Brooklyn - Ballarat- Carisbrook- Bendigo- Kilmore lateral pipeline	1.00	1.00	100%
		Benalla		1.00	1.00	100%
		Culcairn	Export to NSW	1.00	1.00	100%
		Murray Valley	Chiltern to Koonoomoo	1.00	1.00	100%
		Seymour	Seymour to Wallan to Broadford	1.00	1.00	100%
		Shepparton	Euroa to Echuca	1.00	1.00	100%
		Wangaratta		1.00	1.00	100%
2	Geelong	Geelong	Geelong and Colac	1.00	1.00	100%
		Iona	Iona	1.00	1.00	100%
3	Lurgi	Lurgi	Tyers to Morwell to Warragul Pakenham to Cranbourne to Dandenong[7]	2.70	1.00	100%
4	Melbourne	Melbourne	Greater Melbourne and Peninsula incl. Outer and inner ring mains	1.00	1.00	100%
		BassGas	BassGas injection/withdrawal point near Pakenham	1.00	1.00	100%
5	Gippsland	Rosedale		3.00	1.00	100%
		Sale		3.35	1.00	100%
		Traralgon		2.75	1.00	100%
		Longford	VicHub injection/withdrawal point	30.00	1.00	100%

[6] The Lateral Spare Capacities in Northern AMDQ Group depend on injection from NSW at Culcairn.
[7] The Lurgi zone includes an area around Dandenong defined by the following postcodes: 3163, 3170, 3171, 3173, 3174, 3175 and 3177, however there are some exclusions (eg Dandenong Hospital). Please note that AEMO's definition of the Lurgi zone in this document is not the same as the transmission zone defined by APA Group. When in doubt, please consult AEMO.

7 Appendix

Table 2: Spare Capacities[8] by AMDQ Node

AMDQ Node Group No.	AMDQ Node Group	AMDQ Node	Description	Lateral Spare Capacity [as Hub GJ]	System Spare Capacity [as Hub GJ]
1	Northern[9]	Wodonga		50,000	7,200
		Ballarat	Brooklyn - Ballarat- Carisbrook - Bendigo- Kilmore lateral pipeline	25,000	20,000
		Benalla		50,000	8,600
		Culcairn	Import from/export to NSW	50,000	0[10]
		Murray Valley	Chiltern to Koonoomoo	29,000	7,300
		Seymour	Seymour - Broadford - Wallan	50,000	15,300
		Shepparton	Euroa to Echuca	14,000	10,800
		Wangaratta		50,000	7,700
2	Geelong	Geelong	Geelong (Melbourne to Geelong and Colac)	353,000[11]	40,000
		Iona	Iona and WTS[12]	10,528	0[13]
3	Lurgi	Lurgi	Tyers to Morwell to Warragul to Pakenham to Cranbourne lateral pipeline	5,000	5,000
4	Melbourne	Melbourne	Greater Melbourne and Peninsula incl. Outer and inner ring mains	null[14]	null
		BassGas	BassGas injection/withdrawal point near Pakenham	null	null
5	Gippsland	Rosedale		null[15]	null
		Sale		null	null
		Traralgon		null	null
		Longford	VicHub injection/withdrawal point	4,500	4,500

NOTE: Laterals other than those listed above may be included in the 'AMDQ Transfer Algorithm' subsequent to a request for a higher site allocation or if a new large customer connection is received on one of these previously unlisted laterals.

Table 3: Supply Path look-up Table

	Supply path (source "s")	
AMDQ Node Group	Melbourne	Other (eg "Near" the Site)
Gippsland	Iona, Culcairn, BassGas, VicHub	N/a
Lurgi	Iona, Culcairn, BassGas, VicHub	N/a
Northern	Iona, BassGas, VicHub	Culcairn
Geelong	Culcairn, BassGas,	Iona
Melbourne	N/a	N/a

[8] System and Lateral Spare Capacities will change as a consequence of AMDQ Transfers and AMDQ credit certificate transfers
[9] The Lateral Spare Capacities in Northern AMDQ Group depend on injection from NSW at Culcairn.
[10] Export capacity is constrained on the NSW side of the Interconnect. Persons seeking AMDQ for export should approach GasNet.
[11] Assumed injection at Iona.
[12] Western Transmission System comprises of the pipelines that supply the Western District Towns (eg. Portland)
[13] System cannot be guaranteed to meet the minimum pressure requirements of 3,800 kPa at Iona, for any additional load.
[14] Not calculated, as these quantities are large and currently unaffected by transfers.
[15] Ibid.

8 Abbreviations and Variables

C	System Spare Capacity
C_k	System Spare Capacity of an interdependent AMDQ Node
C_L	Lateral Spare Capacity
D	Diversity Factor
H_s	AMDQ Credit quantity for transfer, from the supply source "s"
L (or L_1 or L_2)	Locational Factor
Index "i"	"Initial"
Index "f"	"Final"
Index "s"	Source of supply
S	The quantity of authorised MDQ at a site
AMDQ Credits	The whole or part of an AMDQ credit certificate which is available for assignment to site(s)