ACCESS ARRANGEMENT INFORMATION

FOR

GREAT SOUTHERN ENERGY GAS NETWORKS PTY LIMITED

NATURAL GAS DISTRIBUTION SYSTEM IN WAGGA WAGGA

Drafted and Approved by
the Independent Pricing and Regulatory Tribunal of NSW
under Section 2.20(a) of the National Third Party Access Code for Natural Gas Pipeline Systems

INDEPENDENT PRICING AND REGULATORY TRIBUNAL
OF NEW SOUTH WALES

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Gas 99-5-2 **September 1999**

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1 INTRODUCTION

This Access Arrangement Information for Great Southern Energy Gas Networks Pty Limited's ACN 083 199 839 (GSN) is prepared by the Independent Pricing and Regulatory Tribunal of NSW (the Tribunal) for access to GSN's natural gas distribution system in Wagga Wagga, NSW. It should be read in conjunction with the Access Arrangement for GSN.[1]

This Access Arrangement Information for GSN is prepared based on the Tribunal's final decision on GSN's Access Arrangement and the following documents submitted by GSN since the commencement of the access review in March 1998.

- Proposed Access Arrangement Information submitted by GSN on 24 March 1998.
- Revised Access Arrangement Information submitted by GSN on 31 March 1999.
- Revised Access Arrangement Information submitted by GSN on 25 May 1999
- Other submissions by GSN and interested parties.

This Access Arrangement Information for GSN contains information as in the opinion of the Tribunal would enable Users and Prospective Users to understand the derivation of the elements of the Access Arrangement for GSN and to form an opinion as to compliance of the Access Arrangement for GSN with the provisions of the National Third Party Access Code for Natural Gas Pipeline Systems (Code). The information is presented under the following sections:

Section 2	-	Access and pricing principles
Section 3	-	Capital costs
Section 4	-	Operations and maintenance costs
Section 5	-	Overheads & marketing costs
Section 6	-	System capacity & volume assumptions
Section 7	-	Key performance indicators

Further detailed information is provided in the following appendices:

Attachment 1	-	Five year financial summary
Attachment 2	-	Sales growth
Attachment 3	-	Allocation of costs
Attachment 4	-	Five year capital expenditure forecast
Attachment 5	-	Five year operating costs
Attachment 6	-	Map of the Wagga Wagga Network

Unless stated otherwise, words and terms in this Access Arrangement Information for GSN have the same meaning set out in the Glossary in Appendix 1 of the Access Arrangement for GSN.

[1] Under section 2.20 of the Code, if the service provider does not submit a revised Access Arrangement by the date specified by the Relevant Regulator under section 2.16(b) or submits a revised Access Arrangement which the Relevant Regulator is not satisfied incorporates the amendments specified by the Relevant Regulator in its final decision, the Relevant Regulator must, in the case of an Access Arrangement submitted under section 2.2, draft and approve its own Access Arrangement, instead of the Access Arrangement proposed by the Service Provider.

2 ACCESS AND PRICING PRINCIPLES

Section 8.1 of the Code states that the service provider's reference tariff and reference tariff policy should be designed with a view to achieving the following objectives:

> (a) providing the Service Provider with the opportunity to earn a stream of revenue that recovers the efficient costs of delivering the Reference Service over the expected life of the assets used in delivering that Service;
> (b) replicating the outcome of a competitive market;
> (c) ensuring the safe and reliable operation of the Pipeline;
> (d) not distorting investment decisions in Pipeline transportation systems or in upstream and downstream industries;
> (e) efficiency in the level and structure of the Reference Tariff; and
> (f) providing an incentive to the Service Provider to reduce costs and to develop the market for Reference and other Services.
>
> To the extent that any of these objectives conflict in their application with a particular Reference Tariff determination, the Relevant Regulator may determine the manner in which they can be reconciled or whether a particular objective should prevail.

Factors about which the regulator must be satisfied in determining to approve a reference tariff and reference tariff policy are set out in section 8.2 of the Code:

> (a) the revenue to be generated from the sales (or forecast sales) of all Services over the Access Arrangement Period (the ***Total Revenue***) should be established consistently with the principles and according to one of the methodologies contained in section 8;
> (b) to the extent that the Covered Pipeline is used to provide a number of Services, that portion of Total Revenue that a Reference Tariff is designed to recover (which may be based upon forecasts) is calculated consistently with the principles contained in this section 8;
> (c) a Reference Tariff (which may be based upon forecasts) is designed so that the portion of Total Revenue to be recovered from a Reference Service (referred to in paragraph b) is recovered from the Users of that Reference Service consistently with the principles contained in this section 8;
> (d) incentive Mechanisms are incorporated into the Reference Tariff Policy wherever the Relevant Regulator considers appropriate and such Incentive Mechanisms are consistent with the principles contained in this section 9; and
> (e) any forecasts required in setting the Reference Tariff represent best estimates arrived at on a reasonable basis.

These matters are addressed during the review of GSN's Access Arrangement and the drafting by the Tribunal of the Access Arrangement for GSN. The reference tariffs in the Access Arrangement for GSN are designed to meet the objectives of the Code.

2.1 Tariff determination methodology

The reference tariffs in the Access Arrangement for GSN have been derived using a cost of service model. The total revenue is calculated under section 8 of the Code. GSN is expected to recover the cost of services if its network achieves its target utilisation.

The services provided in the Access Arrangement for GSN are:

- Transportation services.
- Other negotiated services as may be agreed in any negotiated service agreement with the user or prospective user.

The determination of the reference tariffs for the transportation services involves the following steps:

- The capital and operating and maintenance costs relating to the network assets are divided into cost pools based on defined asset groups.
- Customer classes (and thus the tariff categories) are defined based on consumption levels and location.
- The cost pools are allocated to the Customer classes based on each group's use of the corresponding asset group.
- The reference tariffs are designed to cover the target revenue allocated to that customer group based on the forecast utilisation, ie target revenue equals the reference tariffs multiplied by the forecast demand and growth for each year.

The costs of providing transportation services are to be recovered through reference tariffs for contract and volume customers. The structure of the reference tariffs and the cost allocation approach are described in section 2.2 and 2.3 respectively.

Reference tariffs in each year of the Access Arrangement for GSN are determined from the total revenue. The total revenue is determined by the Tribunal based on the following approach:

- Calculating the costs of providing services over the Access Arrangement period based on its final decision on rate of return, initial capital base, depreciation, forecast facilities investments, non-capital costs and rolling forward of the capital base.
- The cost of service is calculated as the sum of:
  - a return on the capital base
  - depreciation of the capital base
  - non-capital costs.
- The total revenue is smoothed to achieve price stability and financial stability to GSN.

The smoothed revenue path is determined based on the forecast total cost of services and after considering the impacts on customers and financial impacts on GSN[2]. Total revenue in the last year of the Access Arrangement for GSN (year 2003) is expected to be equal to the forecast cost of services in 2003. The components of the forecast total costs of providing transportation services and the smoothed total revenue in the first year and in subsequent years of the Access for GSN are set out in Attachment 1.

[2] The Tribunal has modelled financial projections and considered the financial indicators in the review process.

2.2 Referent tariffs structure

The Reference Tariff structure consists of two basic tariffs for the Transportation Services, namely:

- A tariff (referred to as a "Contract Tariff") in respect of Customers who have an annual consumption of 10 TJ or greater at a single Delivery Point ("Contract Customers").
- A tariff (referred to as a "Volume Tariff") in respect of Customers who have an annual consumption of less than 10 TJ at a single Delivery Point ("Volume Customers").
- Users must provide to GSN, in respect of each of their Contract Customers, a proposed maximum daily quantity of natural gas to be delivered to the Delivery Point or Delivery Point serving that Contract Customer prior to the commencement of each Year and on that basis such Customers will be charged in respect of that Year:
- A monthly charge equal to one twelfth of the annual per GJ rate for that MDQ.
- A monthly metering charge to recover the specific costs of providing, maintaining, operating the Metering Facilities installed at their Delivery Point as well as the costs associated with remotely reading that meter on a daily basis and forwarding that data to the User, the Transmission Operator and any other person nominated by the User (a "Metering Charge").
- Any Overrun charges (as defined in section 6.3 of the Access Arrangement) for GSN where the User's actual MDQ exceeds its annual nomination.
- Any capacity trading and other charges (as defined in the Access Arrangement) for GSN

Users must provide to GSN, in respect of each of their Volume Customers, the maximum hourly flow rate of the Metering Facilities which service that Customer at the time that Customer is first connected to the Network or, in the case of a Customer which is already connected to the Network, the maximum hourly flow rate of the existing Metering Facilities which service that Customer and on that basis such Customers will be charged:

- A monthly fixed charge based on the nominated Metering Facilities size. This charge is designed to recover 44 per cent of the target revenue for the relevant Customer class.
- A monthly charge per GJ of actual gas consumption. This charge is designed to recover the remaining 56 per cent of the target revenue for the relevant Customer class.

Any Customer can elect to be charged the Contract Tariff provided that they agree to pay a minimum monthly charge based on an MDQ of 27.5 GJ (10 TJ annual consumption at a 100 per cent load factor).

2.3 Cost allocation approach

The approach taken in regard to cost allocation was to fully allocate the Target Revenue to classes of Volume Customers and Contract Customers based on a measure of their usage of the Network.

The Network assets used to provide the Service were valued on an optimised replacement cost (ORC) and depreciated optimised replacement cost (DORC) basis.

The Network assets (ie the pipes, regulators, meters and services etc) were allocated into two categories, high and medium pressure assets (used by all Customers) and low pressure

assets (used only by Volume Customers). The high and medium pressure assets were further allocated into the three Zones (Bomen, Central and Fringe) on the basis of the length of pipe in each Zone.

The resulting asset groups were then allocated to classes of Volume Customers and Contract Customers on the basis of the use made by that class. The measure of use is the peak co-incident demand (MHQ). In a small scale distribution network such as Wagga Wagga, with no linepack or storage, the ability to meet system MHQ drives system augmentation and new investment.

This allocation of network assets produced the optimised replacement cost of the assets allocated to classes of volume customers, contract customers and zone. Assets relating to volume customers were adjusted in accordance with the Tribunal's decision on initial capital base (see section 3.1).

The adjusted ORC is allocated into customer classes as follows:

Bomen contract zone	$1.85m (4.5%)
Central contract zone	$0.66m (1.6%)
Fringe contract zone	$2.56m (6.3%)
Volume customers	$35.74m (87.6%)
Total	$40.81m

The adjusted optimised replacement cost was used to allocate:

- the annual depreciation charge
- the annual operating, maintenance and administrative costs of the business
- the allowed return for the business.

The use of an undepreciated value of the assets as an allocation method is considered to remove age variations from the cost of supply and tariff calculations. This will generate a stable cost of supply for each Customer class and Zone and not one that decreases as assets age and then has a step increase when assets are replaced.

For Contract Customers, the Target Revenue for each Zone was divided by the total MDQ of that Zone to establish an annual rate per GJ of MDQ.

Conceptually all gas distribution tariffs should be fixed as the costs are fixed and all equivalent users have an equal capacity to utilise the Network. However, historically customers in Wagga Wagga have not paid any significant fixed charges. The Target Revenue for these Volume Customers was thus split into a 44 per cent fixed component and a 56 per cent variable component.

The fixed component was allocated to Customers on a Customer maximum meter flow rate basis. This results in a Customer which has a Metering Facility with a 30 cubic metres per hour maximum flow rate paying a fixed charge three times as great as a Customer with a Metering Facility with a flow rate of 10 cubic metres per hour. All residential and many small business Customers are in the smallest class (less than 10 cubic metres per hour maximum flow rate).

The variable component was spread on the total annual consumption of the relevant class of Customers.

The cost of supply was based on a typical year using actual and estimated quantities, Customer numbers and system MDQ and MHQ values from both the 1996/97 and 1997/98 years. The typical year approach was used because:

- Sales are relatively static and have been in the range of 1.5 to 1.6 PJ for the last four years.
- Future growth rates are expected to be zero for Contract Customers and 1 per cent per annum for Volume Customers.

Attachment 2 details current and anticipated customer numbers and annual sales volumes. The anticipated growth will not have a material impact on the Network MDQ and MHQ levels. Attachment 3 details the allocation of costs to customer classes and zones.

2.4 Reference tariffs

To ensure price stability, the reference tariffs have been designed to transition smoothly from their existing levels (as determined by the network component of existing fully bundled retail prices in 1997/98) to cost reflective tariffs over the period of this Access Arrangement.

Reference tariffs for each year over the Access Arrangement for GSN are pre-determined prices expressed in real 1999 dollars. GSN's cost of supply model has been used in this process using forecast growth assumptions and total revenue. Reference tariffs will be indexed by an inflation index applicable to each of the subsequent year.

The annual charge component of the Volume Tariff for residential and small business customers has been set at $51 in the first year of the Access Arrangement for GSN, rising to $126 in the fifth year of the Access Arrangement for GSN.

The reference tariffs for Contract and Volume Customers are contained in the following table.

Table 2.1 Reference Tariffs (Real 1999 Dollars)

			1999	2000	2001	2002	2003
Contract customers					**$'s/GJ of MDQ per Year**		
Bomen Contract Customers			169.15	130.46	102.08	81.12	65.60
Central Contract Customers			682.76	509.98	381.17	285.11	213.40
Fringe Contract Customers			450.22	445.56	441.64	438.34	435.70
Volume customers							
max Meter Flow Rate (m^3/hr)							
Large Industrial Customers	150	Annual Charge	378	756	1,134	1,512	1,890
		$/GJ	4.06	3.85	3.63	3.42	3.21
Industrial Customers	85	Annual Charge	214	428	643	857	1,071
		$/GJ	5.59	4.97	4.36	3.78	3.21
Commercial Customers	30	Annual Charge	76	151	227	302	378
		$/GJ	6.09	5.34	4.60	3.89	3.21
Residential & Small Business	10	Annual Charge	51	70	88	107	126
		$/GJ	4.70	4.32	3.95	3.58	3.21

The Reference Tariffs for the three classes of Contract Customers are average prices only. Each Contract Customer will be given an individual price based on their current bundled contract rate less commodity, transmission and retail costs and their current MDQ. Those individual prices will then transition to the year five Reference Tariff for the Zone in five steps of equal percentage weight. New Contract Customers will pay the *average Reference Tariff* for their Zone shown in Table 2.1.

The range of implied current contract prices in each Zone in 1999 is:

- Bomen Zone - between $78.60/MDQ pa and $262.50/MDQ pa (weighted average $169.50/MDQ pa).
- Central Zone - between $539.30/MDQ pa and $761.60/MDQ pa (weighted average $682.76/MDQ pa).
- Fringe Zone - between $380.60/MDQ pa and $562.10/MDQ pa (weighted average $450.22/MDQ pa).

These Reference Tariffs have been prepared on the basis that there will be no additional costs for such activities as metering, meter reading, billing and settlement arising from the introduction of open access for Customers with an annual consumption of less than 10 TJ.

The Tribunal considers that the introduction of a Goods and Services Tax (GST) may have an impact on reference tariffs. The access arrangements provides for the adjustment of tariffs to pass through the specific impact of tax changes such as the GST and associated tax changes. In order to avoid double-counting of the impact of the GST, the index used in the Access Arrangement for GSN to vary reference tariffs is in the following form:

"CPI (EX-GST)" means the Consumer Price Index: All Groups, index number weighted average of eight capital cities exclusive of the impact of the Goods & Services Tax (GST) as

defined in A New Tax System (Goods and Services Tax) Act 1999, calculated and published by the Australian Bureau of Statistics from time to time. If the Australian Bureau of Statistics does not, or ceases to calculate and publish such an index (exclusive of the impact of the GST as defined), then CPI (EX-GST) will mean such an index calculated and published by Commonwealth Treasury or the Reserve Bank and failing this as calculated and published by an independent person appointed by the Relevant Regulator after consultation with Great Southern Networks.

2.5 Other revenue

The Reference Tariffs have been designed to recover the Total Revenue if the Network achieves the planned utilisation. No allowance has been made for other revenue that may accrue from overrun charges, trading charges or other miscellaneous revenue as they are not considered material.

2.6 Incentives structure

In accordance with the principles of the Code:

- Reference tariffs should be based on the efficient cost (or anticipated efficient cost) of providing the reference services.
- Reference tariffs should be designed to provide a market-based incentive to improve efficiency and to promote efficient growth of the gas market. Tariffs are to be designed to provide the service provider with the ability to earn greater profits (or smaller profits) between reviews than anticipated, if it outperforms (or under-performs) against the benchmarks adopted in setting the reference tariffs.

The reference tariffs for GSN are structured to achieve the following incentives:

- *Incentives for efficiency*. If GSN is able to achieve cost outcomes (operating and capital) below the level allowed for in the decision, while maintaining service standards, it will retain the benefits of such efficiency improvements over the regulatory period.
- *Incentives to grow the market*. The approach will encourage the service provider to increase load growth in the contract market and to expand the volume market. Prices are calculated on the basis of an agreed set of revenue and growth projections. If growth turns out to be stronger than forecast, the benefit is retained by the utility and the prices will not change.
- *Incentive to customers***.** Individual customers have an incentive to reduce their delivered price of gas if they reduce or control their peak demand on the system or if they increase their annual consumption without exceeding their nominated MDQ or maximum meter flow rate.

3 CAPITAL COSTS

3.1 Asset values and initial capital base

When a reference tariff is first proposed for a reference service provided by a covered pipeline which was in existence at the commencement of the Code, the following factors should be considered in establishing the initial capital base (section 8.10):

(a) The value that would result from taking the actual capital cost of the Covered Pipeline and subtracting the accumulated depreciation for those assets charged to Users (or thought to have been charged to Users) prior to the commencement of the Code;
(b) The value that would result from applying the "depreciated optimised replacement cost" methodology in valuing the Covered Pipeline;
(c) The value that would result from applying other well recognised asset valuation methodologies in valuing the Covered Pipeline;
(d) The advantages and disadvantages of each valuation methodology applied under paragraphs (a), (b) and (c);
(e) International best practice of Pipelines in comparable situations and the impact on the international competitiveness of energy consuming industries;
(f) The basis on which Tariffs have been (or appear to have been) set in the past, the economic depreciation of the Covered Pipeline, and the historical returns to the Service Provider from the Covered Pipeline;
(g) The reasonable expectations of persons under the regulatory regime that applied to the Pipeline prior to the commencement of the Code:
(h) The impact on the economically efficient utilisation of gas resources;
(i) The comparability with the cost structure of new Pipelines that may compete with the Pipeline in question (for example, a Pipeline that may by-pass some or all of the Pipeline in question);
(j) The price paid for any asset recently purchased by the Service Provider and the circumstances of that purchase; and
(k) Any other factors that the Relevant Regulator considers relevant.

The Tribunal has considered the factors set out in section 8.10 of the Code in establishing the capital base of GSN's network for the purpose of determining reference tariffs for reference services.

3.1.1 Depreciated actual costs (section 8.10(a))

The Tribunal estimates that the DAC for GSN is approximately $14.9m.[3] This estimate includes an additional amount to take account of capitalisation of overheads of 15 per cent. The figure was recommended by the Tribunal's consultant, Kinhill Pty Limited (Kinhill) and having considered the amount the Tribunal regards it as appropriate.

[3] For the details of this estimation, please refer to Attachment 4 to the Final Decision on the Access Arrangement for GSN.

3.1.2 Depreciated optimised replacement cost (section 8.10(b))

GSN submitted a consultancy report by GHD to support a DORC of $34.88m for the Wagga Wagga gas distribution system assets.[4] During the review process of GSN's Access Arrangement proposal, the Tribunal commissioned Kinhill to conduct an independent assessment of the replacement cost valuation.[5] The optimised replacement cost estimated by Kinhill is lower than GSN's proposed DORC. The main reasons are the lower meter/regulator costs and the use of smaller diameter pipe due to the higher operating pressures proposed for an optimised system. After accounting for accumulated depreciation, the DORC value has been estimated at $30.8m, which is 4 per cent below GSN's proposed DORC.

Table 3.1 DORC valuation as at 1 July 1998 ($m)

Asset Class	GSN proposed DORC	DORC based on Kinhill Study
Distribution mains	23.6	22.0
Services (14,000 services)	5.7	6.0
Metering/regulators	1.3	1.0
District regulators	1.2	1.4
City gate	0.3	0.3
SCADA system	0.07	0.1
Total system assets	**32.1**	**30.8**
Other non-system assets:		
Stock at 27 June 97	0.4	0.4
Land and building	0.7	0.7
Mobile equipment	0.5	0.5
Sundry plant and equipment	0.3	0.3
Total non system assets	**1.8**	**1.8**
Initial capital base excluding working capital	**34.0** (1)	**32.7**

Source: GSN correspondence, May 26 1998, *Review of the Optimised Replacement Cost of the Natural Gas Distribution Network in Wagga Wagga*, Final Report by Kinhill Pty Ltd, August 1998.
Note:
1. GSN proposes an initial capital base of $34.9m. The $34m value includes net working capital of $0.9m..
2. The totals may not add up due to rounding.

Both valuations estimate optimised replacement cost on the basis of brownfields conditions. Kinhill was also asked to comment on a greenfields valuation. In its analysis, Kinhill assumes that the optimised network is built as designed, but roads, footpaths and driveways have not yet been built and therefore, construction rates are low. The undepreciated optimised replacement cost for a greenfields system is estimated at $28.4m, which is substantially lower than for the brownfields valuation.

4 GHD valuation of the Wagga Wagga Gas Distribution System Asset, June 1997.
5 Kinhill, *Review of the Optimised Replacement Cost of the Natural Gas Distribution Network in Wagga Wagga*, August 1998.

The Tribunal acknowledges that the actual capital outlay paid by the original investors/owners may be somewhere between brownfields and greenfields optimised replacement costs, particularly where the system has been built and then gradually expanded in a 'developing' area. Furthermore, to the extent that pipes are replaced rather than refurbished and/or relined, future replacement costs may more closely approximate the brownfields estimate. However, it does highlight the sensitivity of valuation outcomes to the approach.

The Tribunal has carefully considered the GHD and Kinhill values, which in any case are close. The Tribunal considers that they are both reasonable estimates of DORC asset values for the Wagga Wagga system.

3.1.3 Application of other well recognised asset valuation methodology (section 8.10(c))

Depreciated inflation adjusted historical cost

Indexed historical cost is a cost based valuation derived by applying inflation (or some appropriate indices) to actual capital costs. Providing that this value does not violate the by-pass cap (ie DORC), this valuation would be consistent with the ongoing regulatory regime which adjusts the asset base in line with inflation, and allows a real rate of return on this base. If the relevant assets had been operational under a depreciated historical cost regime with a nominal allowed return that reflected the true cost of capital, then switching to a depreciated inflation adjusted actual cost regime with a real return, and using the remaining DAC asset base as the value for sunk existing assets, would be consistent. This change need not alter the net present value of the original investment from the time the investment was made.[6]

The Tribunal estimates that the indexed historical cost for the Wagga system is between $23-27m.

Optimised deprival value

Optimised deprival valuation is expressed as:[7]

Optimised Deprival Value = *minimum* { DORC, *maximum* [NPV,NRV] }
NPV = net present value of future earnings (ie economic value)
NRV = net realisable value (ie disposal value)

In applying ODV, the Tribunal has adopted an approach broadly similar to that adopted in the NZ handbook for optimised deprival valuation of electricity line businesses. The process matches assets with particular groups of customers. Factors to be considered when determining how the system should be partitioned include tariff structure and asset location.

6 The Tribunal has obtained advice by Professor S King.

7 *Review of the Asset Valuation Guidelines of the Steering Committee on National Performance Monitoring of GTEs*, Johnstone, DJ, and Gaffikin, JR, Department of Accounting and Finance University of Wollongong , June 1995, p 4.

The gas distribution system in Wagga Wagga is first partitioned into segments comprising assets servicing customers with similar characteristics. DORC valuations of asset groups are determined and allocated to various parts of the system in a way that reflects the use made of those asset components by customers. This establishes a DORC asset-based value for each part of the system. The broad steps therefore involve:

- Allocating DORC asset values to various parts of the system as described above.
- Partitioning the Wagga Wagga system in two: one part servicing volume, the other servicing contract customers.
- Allocating current revenues and expenses to each part of the system.
- Projecting the future revenues and expenses of each part. This will involve estimating sales growth and efficient expenditure levels. Current average prices for volume customers are assumed to achieve price stability. As for contract customers, the current revenue is not sustainable due to the bypass risk (charges include a return on asset value well above DORC). As a consequence, a transitional revenue path is assumed for contract customers.
- Calculating the future free cashflow based on the projected revenue and expenditures.
- Discounting the free cashflow to derive the NPV.
- Determining the ODV asset value as the lower of the DORC asset value and NPV.

The valuation results based on a discount rate of 7.75 per cent are summarised below:

Table 3.2 Asset value based on optimised deprival value approach ($m)

	Contract market	Volume market	Residual value	Total
Operating costs	0.2	1.5		**1.65**
Network revenue	1.5	3.9		**5.4**
Discount rate = 7.75%				
A - NPV (net of capital refurbishment)	6.1	25.0	1.1	32.2
B - DORC (system + non system assets)	3.5	29.3		32.7
Optimised deprival value (lower of A&B)	**3.5**	**25.0**	**1.1**	**29.5**

Note:
1. The total column may not add, due to rounding.
2. The residual value has not been divided into the two markets.

Details of the assumptions and the net present value analysis are listed in the *Final Decision - Access Arrangement Great Southern Energy Gas Networks Pty Limited.*

Indicative market value

In establishing the indicative market value, the Tribunal has considered the tender bids submitted at the time of sale of the gas business by the Wagga Wagga Council in 1997.

To establish the market value for the gas network business, an estimate of the value of the retail margin needs to be deducted. A net retail margin of 2 per cent was assumed, following consultation with various stakeholders. This suggests a retail margin of $230,000

per annum. Depending on which price earnings multiple is adopted, this implies a value of $2-3m for the retail business.

On the basis of tenders from companies not involved in the electricity business in NSW, an indicative business value for the gas network of $14-$32m could be derived. If the outlier bid (the lowest tender) is excluded, the indicative business value for the gas network would be within the range $22-32m. This value would include:

- any strategic value for bidders who do not have a presence on the regional electricity market
- the value of future growth opportunities.

The strategic value of purchasing the Wagga Wagga gas business may be greatest for electricity utility because of the synergies provided. These synergies may be even greater for an incumbent electricity supplier such as GSE.

3.1.4 Advantages and disadvantages of alternative asset valuation methodology (section 8.10(d))

An evaluation of the methodologies for asset valuation for pricing purposes can be assessed in terms of:

- degree of subjectivity, the key factor being the ability to verify the asset value
- implications for economic efficiency and competition
- equity, in terms of impacts on customers and the service provider
- transparency, in terms of stakeholders' expectations
- practicability, in terms of future implementation as the capital base is rolled forward.

The advantages and disadvantages of methodologies considered by the Tribunal are summarised below.

Table 3.3 Evaluation of asset valuation methodologies for existing assets

	DAC	Inflation adjusted historical cost	DORC	ODV	Market value
Basis	Cost-based measure, sunk costs.	Cost-based measure, sunk costs.	Cost-based measure, sunk costs.	Hybrid approach; cost based and value based using cashflow.	Based on earning capacity and cashflows of the asset/business, forward looking.
Subjectivity	A balance sheet item required in the audited financial statement, arguably least subjective.	Indexation of actual cost using inflation, arguably less subjective.	Engineering assessment, subject to optimisation and estimate of remaining life. Arguably greater subjectivity.	Subject to "allowed regulated price" requiring a high degree of judgement.	Market evidence but may fluctuate depending on market sentiment and condition. Limited evidence available.
Pricing implication/ revenue profile	Likely to lead to front loaded cost recovery ie higher revenue in early years.	Likely to give a stable revenue requirement if implemented at the beginning of the asset life.	Likely to give a stable revenue requirement if implemented at the beginning of the asset life.	Prices are likely to be capped for some customers.	Subject to the relationship between market value and book value.
Movement over time	Depends on accounting depreciation and assumed asset life.	Indexed by inflation.	Depends on indexation and depreciation.	Depends on assumptions and economic valuation.	May be more volatile, depending on investors' behaviour and expectations.
Implications for depreciation assuming straight line depreciation	Historical cost depreciation.	Inflation indexed historical cost depreciation. Higher depreciation over time.	Current cost depreciation. Higher depreciation over time.	Between DAC and DORC depreciation.	May require the application of a market to asset ratio to calculate "regulatory" depreciation.
Practicability and ease of implementation	Arguably relatively simple to implement.	Arguably relatively simple to implement.	More complex at initial setting. Future complexity depends on indexation.	Problem of circularity in the economic valuation.	Available only if there is tradeable equity or there is an established market for the asset.

Source: IPART analysis.

Economic efficiency issues

Economic analysis can place bounds on the valuation of sunk assets that embody a natural monopoly service. The lower bound is represented by a 'scrap value' or 'exit price valuation'[8], which is the opportunity cost of retaining assets in their current use. The upper bound is given by the opportunity for inefficient bypass. Often, DORC is considered a proxy for this upper bound so that setting an asset value above DORC may create the potential for inefficient bypass.

Regarding economic efficiency, productive efficiency suggests that the asset valuation should lie between the 'exit' value and the 'bypass' value. Principles of pricing for allocative efficiency suggests that fixed costs should be recovered in a manner which minimises distortion of behaviour. By increasing the fixed costs a higher initial asset valuation may make it difficult to achieve this objective.

In regard to dynamic efficiency, the issue is the relationship between the valuation of existing sunk assets and future incentives for investment.

8 King (1996) uses the term scrap value and Ergas (1998) uses the term exit price valuation.

Two basic economic arguments can be used to connect the once-off valuation of existing sunk assets with regulatory reputation and future investment. Firstly, there may be an 'adverse selection' argument. This argument is based on asymmetric information and the belief that there is a 'type' of regulator that is willing to act opportunistically over time. If the regulator sets a low asset value today, this 'reveals' that the regulator is intending to act opportunistically at a later date. The low valuation will deter investment because potential investors will perceive that they will have the value of their investment reduced by the opportunistic regulator at a later date.

Secondly, there is an on-going 'regulatory contract' argument. This analysis centres on the on-going interaction between the relevant regulator and firm over time. If the regulator behaves opportunistically at one point in time, the regulated utility will be unwilling to invest because it believes that any future investment will be met with further opportunism by the regulator.

Both arguments rest on the purported ability of the regulator to act opportunistically in the future. However, there appears to be relatively limited scope for such future opportunism. The Code will clearly state how new investment should be rolled into the existing asset base and how it should be treated over time. The use of inflation adjusted actual asset valuation for the on-going asset base substantially limits the possibilities for regulatory opportunism. The ability of a regulator to act opportunistically appears to be limited to the treatment of redundant capital.

Some argue that to avoid any appearance of regulatory opportunism, it is necessary to value the existing sunk assets at the DORC valuation. This is not an economic argument for DORC valuation. Rather, it suggests that a higher asset valuation is less likely to lead to a perception of regulatory opportunism. It can be argued that any valuation above the 'exit' value will show that the regulator is not behaving in an opportunistic fashion. On the other hand, it can also be argued that either a DAC valuation or an ODV valuation may be viewed as equally valid 'signals' of non-opportunistic intent as a DORC valuation.

Equity issue

Economic analysis provides important input for the valuation of sunk assets for access regulation. But it does not suggest that one specific asset valuation is unambiguously superior to all others.

Consideration of customer impact is another important issue in deciding the initial capital base, which has implications for the total revenue and network prices. Assessing the impact on users and service providers is not a mechanistic process, particularly if there are existing cross subsidies between customer classes. Often, the issue is complicated by historical factors, eg past pricing decisions which may not have been made efficiently.

3.1.5 Other considerations required by the Code

International best practice and impact on energy consuming industries

North American regulatory practice is largely based on DAC. The US experience with historic cost valuation and nominal returns is very much within the context of 'ongoing' regulation. In this context, the US experience provides limited input to the question of introducing a regulatory regime and the transitional problem of sunk asset valuation.

UK utility asset values for price regulation are based on values which are commonly well below depreciated replacement costs.[9]

The flow-on effect on pricing (from an asset valuation) has important implications for network users, particularly energy consuming industries. Higher charges to downstream users will jeopardise recovery of their costs, as they may not be able to pass the higher charges on to their customers. The impact will depend on the availability of substitutes for gas.

Historical tariffs, economic depreciation and returns

The Tribunal undertook a profitability analysis using audited gas trading accounts provided by the former owner, Wagga Wagga City Council (WWCC). The analysis[10] suggested that tariffs set by WWCC generated good returns by commercial standards, including recovery of capital through the allowance for $7m accumulated depreciation in the cost base. The Tribunal therefore inferred that "customers as a whole appear to have contributed substantially to the capital investments made by the previous pipeline owners". There was no suggestion of under-recovery of costs (on a DAC basis), which would require remedy through increases in average prices.

The profitability analysis is based on returns to the previous owner (WWCC) which had reported its gas business used historical costs. Although tariffs are not set on a cost of services in the past, it can be inferred that the costs reported in WWCC accounts included a return component and depreciation on historical cost basis.

Reasonable expectations of persons under the regulatory regimes that applied for connection prior to commencement of the Code

One indicator of the reasonable expectations of the various parties is to compare the revenue stream which would result from continuation of the pricing policies of the previous network owner with the revenue stream that will be allowed under GSN's access arrangement. It is reasonable to infer that this implies that the projected transportation price in the future should not exceed that which would have existed in the absence of the change of the regulatory regime, unless the previous pricing policies can be shown to be clearly undesirable or unsustainable.

Impact on the economically efficient utilisation of gas resources

The valuation of initial capital base should encourage:

- static efficiency, ie the efficient use and operation of the existing network
- dynamic efficiency, ie efficient decisions about new network investment.

In a competitive market it would be expected that prices would be sufficient to provide the investor with a 'normal' return over the life of the asset, even though returns from year to year are likely to reflect market conditions. The use of either a nominal return on DAC or a real return on DORC should, in principle, provide a similar income stream over the life of an asset.[11] Thus, both can approximate market outcomes over the life of the asset although the

9 For example, the regulatory capital base for the UK water services companies in 1994/95 is around 15 bn pounds compared with a modern equivalent asset value of 156 bn pounds. The exceptions are British Airports Authority and British Telecommunication Plc.

10 *Draft decision on GSN Access Arrangement*, pp 48-49.

11 Subject to the impact of technological change and construction costs.

profile will vary over time. The decision of a potential new entrant would be expected to reflect expected income streams over the life of an asset. In this context it is expected that the new entrant will respond to expected prices over time rather than to the price in a particular year.

The potentially competitive elements of the gas supply chain are upstream and downstream of the distribution and transmission networks. To the extent that the network business extracts monopoly rent (for example, through high asset values and/or high cost of capital), it reduces the scope for competition in the potentially competitive retail (downstream) and production sector (upstream). It is argued that if economic rent is extracted by the network service provider, there is less scope for competition from new fields. New gas producers will be discouraged if transportation tariffs are too high.

Lower prices are likely to encourage gas use. However, setting prices too low may discourage a service provider from investing in the gas industry. Insufficient investment in gas pipelines may adversely affect the serviceability of the service provider, leading to lower service standards.

Economic efficiency principles provide guidance on the valuation of the initial capital base. However, an approach, or switch over in approaches, resulting in systematically higher average prices than necessary to meet the reasonable business interests of the service provider would run counter to the objectives of efficient pricing.

Once an initial capital base has been chosen it is not able to be changed in subsequent reviews except for circumstances specified in the Code. The key issue for incentives, therefore, is how new investment is brought into the capital base.

Comparability with the cost structure of new pipelines that may compete

The asset valuation methodologies chosen should not leave GSN open to uneconomic bypass. A DORC valuation reduces the possibility of inefficient bypass. If DORC is properly estimated and allocated to customers, it should not be economic to duplicate the system as a whole, or large sections of the system. However, if prices are based on average costs, it may still be economic to 'cherry pick' and build bypass networks to serve a smaller group of particularly attractive loads. Hence, it is important that there be sufficient scope for negotiation to allow the utility to respond to circumstances.

However, in some cases, the alternative to the existing network may not be a bypass pipeline but rather, use of another energy source or feedstock or the importation of a processed product. In this case, the DORC asset value may not be applicable and the 'bypass price' may be lower than DORC.

The price paid for any asset recently purchased by the service provider and the circumstances of that purchase

The Tribunal is of the view that the initial capital base should not normally be equated to the purchase price of the business. It is of the view that any apportionment of intangible assets to the network business should normally be excluded from the initial capital base.

3.1.6 Initial capital base

After considering the factors noted above, the Tribunal has determined that the initial capital base of GSN's network at 1 January 1999 should be $28m. This is consistent with the Code that the initial capital base should normally lie between depreciated actual cost and depreciated optimised replacement cost.

The initial capital base ($28m) is allocated between the various zones and customer classes on the basis of the 'adjusted' optimised replacement cost of the initial capital base.

3.1.7 Rolling forward the capital base

Section 8.14 of the Code provides for the initial capital base after the expiry of an Access Arrangement:

> Where an Access Arrangement has expired, the initial capital base at the time a new Access Arrangement is approved is the capital base applying at the expiry of the previous Access Arrangement adjusted to account for the new facilities investment or the recoverable portion (whichever is relevant), depreciation and redundant capital (as described in section 8.9) as if the previous Access Arrangement had remained in force.

Rolling forward the capital base can be expressed as follows:

Regulatory capital base = Initial capital base + New facilities investments (excluding speculative investment) - Depreciation - Redundant capital

The Code has specific provisions covering the treatment of:

- New facilities investment (sections 8.15-8.17).
- Speculative investment (section 8.19).
- Capital contributions (sections 8.23 and 8.24).
- Redundant capital (section 8.27).

The Code also provides guidance on dealing with forecast capital expenditure in the development of reference tariffs and the timing of recognising capital expenditure in the capital base.

The Tribunal has determined that under the cost of service model, the capital base (including future new facilities investment which meets the Code requirements) and depreciation should be indexed by the national consumer price index (all groups, weighted average of eight capital cities) defined as "CPI" in the Access Arrangement for GSN. A real rate of return is allowed on the regulatory capital base.

3.2 Rates of return

The Code sets out broad principles for determining the rate of return (section 8.30). Essentially, the Code requires that:

> The Rate of Return used in determining a Reference Tariff should provide a return which is commensurate with the prevailing conditions in the market for funds and the risks involved in delivering the Reference Service.

Section 8.31 of the Code states that:

> The Rate of Return may be set on the basis of a weighted average of the return applicable to each source of funds (equity, debt and any other relevant source of funds). Such returns may be determined on the basis of a well-accepted financial model, such as the Capital Asset Pricing Model. In general, the weighted average of the return on funds should be calculated by reference to a financing structure that reflects standard industry structures for a going concern and best practice. However, other approaches may be adopted where the Relevant Regulator is satisfied that to do so would be consistent with the objectives contained in section 8.1.

The Code provides guidance for the use of capital asset pricing model (CAPM) and the weighted average cost of capital (WACC). However, in assessing and applying the model's parameters, issues arise which reveal considerable differences in opinion. It is noted that CAPM is only one approach to setting a rate of return.

In determining the rate of return for GSN, the Tribunal must have regard to the objectives in section 8.1 of the Code, and other relevant factors under section 8 and the matters in section 2.24 of the Code.

3.2.1 Establishing a WACC range

The Tribunal has considered a feasible range applicable to the gas distribution industry and GSN using WACC. This is described below.

Cost of equity

In accordance with the CAPM principles, the risk free rate of return should be assessed on a forward-looking basis, and should reflect returns which investors currently can obtain in the market. The Tribunal has decided to adopt the 20 day average of the 10 year Commonwealth bond rate to reduce the day-to-day fluctuation of interest rates.

The Tribunal has adopted a nominal risk free rate of return of 5.67 per cent in the draft decision (September 1998) as the upper bound and 5.18 per cent in the final decision (March 1999) as the lower bound. After adjusting for inflation, a real risk free rate of 3.43-3.46 per cent is assumed.

The Tribunal has adopted the risk premium on equity, reducing the range of 5.0-6.0 per cent but has used an asset beta range of 0.40-0.50. The equity beta is in the range 0.9-1.1.

Adding the risk free rate of return to the risk premium applicable to the gas sector gives a post tax return on equity of around 9.8-12.3 per cent in nominal terms.

Cost of debt

The Tribunal has concluded that the cost of debt for gas utilities is 1.2 per cent above the risk free rate of return.

Cost of capital - a feasible range

The Tribunal has assumed a capital structure based on a long term proportion of debt funding of 60 per cent. Having regard to submissions received and the Tribunal's analysis and obligations under the Code, the application of the CAPM/WACC model results in a rate of return in the range of:

- 9.8-12.3 per cent nominal post tax return on equity, or
- 5.9-8.4 per cent pre tax real rate of return on capital.[12]

Table 3.4 presents the results of the parameters adopted in the final decision.

Table 3.4 WACC estimates based on IPART decisions

	IPART's decision
Risk free rate	5.18-5.67%
CPI	1.7-2.1%
Real risk free rate	3.43-3.46%
Market risk premium	5.0-6.0
Debt margin	120 basis points
Debt to total assets	60%
Gamma	0.3-0.5
Tax rate	36%
Asset beta	0.4-0.5
Debt beta	0.06
Equity beta	0.9-1.1
Cost of equity (nominal post tax)	9.8-12.3%
Cost of debt (nominal pre tax)	6.4-6.9
WACC (nominal post tax)	5.5-6.8%
WACC (real pre tax)	5.9-8.4%

The Tribunal has considered the above parameters which provide a useful guide for establishing an appropriate range for the cost of capital under the CAPM approach.

In determining GSN's rate of return the Tribunal has considered its specific market and risk characteristics in the light of capital market conditions at the time of draft and final decision.

3.2.2 Risk assessment of GSN

In assessing the business risk faced by GSN, the Tribunal has examined the profile of GSN, including its area of operation, customer profile, growth prospects, competition, operational issues, and the potential volatility of earnings.

The Tribunal considers that the risks faced by GSN are generally low. However, in determining the rate of return for GSN, some 'headroom' could be allowed for specific risk factors, given:

- risks perceived to be associated with the novelty and immaturity of the regulatory regime

12 The lower and upper range is the real pre tax WACC using the two alternative conversion methods from nominal post tax WACC to real pre tax WACC.

- GSN's vulnerability through having only a small number of major customers.

It should be noted that GSN's risks are unique and diversifiable. Under the CAPM model they should ideally be incorporated into cashflows rather than into WACC.

3.2.3 Rate of return for GSN

The Tribunal has considered a range of issues, including the business risks faced by GSN, market expectations, regulatory returns allowed by overseas regulators, and other economic considerations. A rate of return within the range 7-8 per cent (real pre tax) which is towards the higher end of the range under the CAPM framework is considered appropriate for GSN, given the size of its network and the associated risk.

Within this range, the Tribunal must decide on the most appropriate rate of return for GSN. The final decision was made after examining the initial capital base, the implications for prices, new investments and competition, GSN's cashflow positions and financial projections for the next ten years, other risks including revenue risk due to supply interruption and capital redundancy. The Wodonga inter-connector means that GSN will have dual supply from the Gippsland Basin and the Cooper Basin. The Tribunal has allowed for an additional rate of return to compensate for the risk of possible capital redundancy and in recognition of the uncertainty involved in novel regulatory arrangements.

Having considered the matters described above, it is the Tribunal's determination that **a real pre tax rate of return of 7.75 per cent**[13] should apply to GSN for this Access Arrangement period. This conclusion is consistent with a **nominal post tax return on equity of approximately 11-12 per cent**.[14]

3.3 Depreciation

3.3.1 Assumptions on economic life of assets for depreciation

The optimised replacement cost value of the distribution system was depreciated using industry standard useful lives established by GHD as part of the valuation process.

The remaining lives have been estimated on an asset group basis from GSN staff knowledge. GHD carried out inspections of assets for the purpose of verifying the assumed current ages.

With the inclusion of motor vehicles and mobile plant as well as sundry plant and equipment, *accounting* depreciation for the optimised replacement cost assets is $1.175M per year.

The Tribunal has considered the depreciation component in the cost of service methodology. The Tribunal has determined that regulatory depreciation should be calculated based only

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13 In coming to this judgement, the Tribunal has, as noted above, considered among other things, GSN's return on equity under CAPM. The return on equity can be transformed into a real pre tax rate of return.

14 This conversion occurs within the framework provided by CAPM/WACC. The conversion from a return on equity is based on a cost of debt of around 6.9 per cent and a debt to equity ratio of 60%:40%. The assumed gearing ratio is considered appropriate and reflects standard industry capital structures for energy infrastructure providers.

on the regulatory capital base, thus reflecting the initial capital base determined by the Tribunal.

Table 2.1 below details the useful life, remaining useful life, replacement cost, accumulated depreciation, initial capital base and regulatory depreciation of the various system asset categories in 1999:

Table 3.5 Regulatory depreciation ($'000)

Asset Category	Useful Life (Years)	Average Age (Years)	Replacement Cost $000's	Accumulated Depreciation $000's	Initial Capital Base $000's	Regulatory Depreciation $000's
Network						
Nylon Pipe	50	10	485.60	97.10	388.50	9.70
Polyethylene Pipe	50	10	9,822.60	1,964.50	7,858.10	196.50
Steel Pipe	80	14	6,530.30	1,142.80	5,387.50	81.60
Cast Iron Pipe	100	50	3,343.40	1,671.70	1,671.70	33.40
Galvanised Pipe	50	30	5,593.20	3,355.90	2,237.30	111.90
Services	50	14	7,979.90	2,234.40	5,745.50	159.60
Meters & Regulators	15	8	2,931.50	1,595.70	1,335.80	195.40
District Regulators	40	14	1,820.00	637.00	1,183.00	45.50
Gate Station	50	14	400.00	112.00	288.00	8.00
SCADA & Telemetry	20	1	70.00	3.50	66.50	3.50
Total (network)			38,976.60	12,814.60	26,162.00	845.10
Land & building			658.00	12,814.60	658.00	0
Vehicles & mobile plants			500.31	12,814.60	500.31	100.06
Stock			426.83	12,814.60	426.83	0
Sundry plant & equipment			252.90	12,814.60	252.90	51.6
Total			40,814	12,814.60	28,000	995.77

3.3.2 Forecast depreciation

In accordance with the cost of service method, the forecast cost of services includes depreciation of the capital base.

The Tribunal is aware that depreciation of the capital base is to be determined in accordance with the requirements of section 8.32 of the Code and that the depreciation schedule should be designed having regard to section 8.33 of the Code.

The Tribunal has determined that depreciation for each group of assets will be allowed on the initial capital base established for regulatory purposes. The depreciation schedule will be calculated using straight line depreciation over the economic life of the assets. Depreciation on new capital expenditure will be allowed and added to the cost of service model. For the purposes of determining a reference tariff over this access arrangement period, depreciation based on GSN's forecast capital expenditure as adjusted by the Tribunal is assumed.

The forecast depreciation is shown in Attachment 1 (Financial Summary).

3.4 Capital expenditure forecasts

Annual capital expenditure during the period of the Access Arrangement for GSN is detailed in Attachment 4.

The capital expenditure approved by the regulator (IPART) included an allowance for augmentation to the Network during the period of this Access Arrangement to provide network reinforcement and additional security of supply.

The capital expenditure proposed by GSN has been revised in light of the amounts allowed by the Tribunal in its Final Decision dated 8 March 1999 and in particular the expenditure proposed by GSN to construct the southern gate station and to reticulate Uranquinty has been reduced to the levels allowed by the Tribunal to reflect what the Tribunal believes to be the preferred option to address the need to reinforce supply to the southern portion of the Network. The adjustment was made after consideration of an independent review by an engineering firm. However, if GSN proceeds to reticulate the village of Uranquinty during the period of the Access Arrangement, the assets constructed will not form part of the network covered by the Access Arrangement.

The inclusion of the proposed new infrastructure investment in determining the revenue requirement does not imply that this investment would automatically be included in the capital base at the beginning of the next Access Arrangement period. During the next review the regulator will be required to assess all actual capital expenditure incurred during this Access Arrangement period against the requirements of the Code.

4 OPERATIONS AND MAINTENANCE COSTS

GSN has owned the Wagga Wagga gas business for just two years (since June 27, 1997). GSN now operates it in a substantially different mode to that of its previous owner. Staff numbers have been reduced and the gas field services staff has been integrated into Great Southern Energy's existing electricity depot facilities and structures.

There is little historical financial data available from GSN which to estimate operating and maintenance costs. In the last full year of operation, the 1997/98 financial year, the operating and maintenance costs for the Network were $1.574M.

There are obvious synergies between the gas and electricity network businesses in areas such as meter reading, plant and equipment and technical design and supervision. This work to merge operations is ongoing and will not be concluded for some time.

Operating and maintenance costs for this report are based on actual costs incurred (with an appropriate allowance for non-recurring costs associated with the integration) and internal data prepared for GSN's 1999/2000 budgetary process.

No allowance has been made in the operating and maintenance costs for the cost of Unaccounted for Gas (UAG). As detailed in the Access Arrangement (Section 7.3), UAG will be dealt with in a manner that does not impact on operating costs.

GSN will add to a User's daily withdrawal of natural gas at their Delivery Points an allowance for UAG to calculate their receipts of natural gas at the Receipt Point. The overall adjustment for UAG is 3.8 per cent in year one of the period of the Access Arrangement falling to 2.5 per cent in year 5. GSN will only be required to make up or receive credit for UAG to the extent that the actual UAG differs from these amounts. That amount is not expected to be material. No gas is used as compressor fuel as there are no compressors on the Network.

GSN's reticulators authorisation includes a condition that UAG must be minimised.

Total annual operating and maintenance costs will be in the order of $1.26m as detailed in Attachment 5. Expenditure on property taxes and equipment rental has not been shown separately as the amounts are not considered material. A real cost reduction of 1 per cent per annum has been allowed.

The five-year financial summary shown in Attachment 1 details all costs and revenues over the initial period of the Access Arrangement for GSN.

All of the operating and maintenance costs are direct costs and there is no material allocation of costs or cost sharing from or with other related entities.

5 OVERHEADS & MARKETING COSTS

5.1 Corporate overheads

GSN's business is managed by Great Southern Energy under a service agreement between the two companies. Two business units within Great Southern Energy incur the majority of the operations and maintenance expenditure in providing such services. These are:

- Asset Strategy Division. It is the nominal owner of the network and plans, directs and controls the operations and maintenance as well as capital works activities.
- Field Services Division. It acts as a contractor to the Asset Strategy Division and physically performs the operations and maintenance as well as capital works activities.

As part of a commercialisation process, the Field Services Division functions as an autonomous business unit. The unit rates it charges the Asset Strategy Division for the work done covers all its internal costs, including internal payments to other business units of Great Southern Energy for such corporate services functions such as accounting services, information technology, pay-roll and personnel services, property services, legal services and the like.

As such, it is not possible to readily determine the corporate overheads inherent in the Field Services Division charges to the Asset Strategy Division. Those unit rates are benchmarked against the rates charged by external organisations offering similar services.

The direct charge from other business units of Great Southern Energy to the Asset Strategy Division which has been allocated to the Network is approximately $0.6m, as shown in Attachment 5, and covers the provision of such services as accounting, insurance, information technology, pay-roll and personnel, property, legal and the like to the Asset Strategy Division gas network staff.

5.2 Marketing

GSN's annual marketing budget of around $0.14m as shown in Attachment 5 is primarily allocated to encourage the efficient use of gas resources and to promote the most environmentally responsible mix of energy consumption across all consumer groups.

GSN believes that consumption products such as gas hot water systems have an important role to play in greenhouse gas reduction due to the displacement of electricity generated from traditional methods (ie coal fired power generation). GSN's public communication approach is two fold B the promotion of gas appliances in the energy mix, and, the education of consumers as to the role (and impact) of various energies in contributing to global environmental problems and the appropriate reduction strategies.

All of the marketing costs of GSN are direct costs and there is no material allocation of costs or cost sharing from or with other related entities.

6 SYSTEM CAPABILITIES AND VOLUME ASSUMPTIONS

6.1 Network description

Natural gas enters the Network through the city gate at Bomen, north of the main city area from the transmission system owned and operated by East Australian Pipeline Limited. At the city gate the pressure is reduced from the transmission line pressure of approximately 7000kPa to approximately 1000kPa.

The gas is then supplied by a Division II Steel main to the Bomen industrial area and via a ring main to the Wagga Wagga central business area. A secondary ring main consisting of 110mm polyethylene pipe supplies the southern area of Wagga Wagga. There are two extensions of the secondary ring main to the areas of Kapooka (to the South West) and Forest Hill (to the East). Most of the Contract Customers are connected to this medium and high pressure system.

Natural gas is then supplied to residential and small business customers in urban subdivisions via a series of 38 district regulators and the medium low and low pressure portions of the Network distribution system which uses mainly plastic pipe (both nylon and polyethylene) with some older areas still using cast iron and galvanised pipe.

The map of the Network at Attachment 6 shows the high pressure steel mains and the medium pressure polyethylene mains.

6.2 Network operation principles

GSN operates the Network at various pressures depending on the location and the piping medium. There is a rehabilitation program in place, which is targeting older areas and replacing or inserting galvanised steel and cast iron piping systems. System pressures will be increased as the rehabilitation program is progressed. The reticulation system operates under the following pressure regime:

- High Pressure - >200kPa
- Medium High Pressure - 90 to 200 kPa
- Medium Low Pressure - 20 kPa
- Low Pressure - 7 kPa

6.3 Network capacity

Network flow rates and capacities have been modelled. The results of this model are given in the Table 6.1.

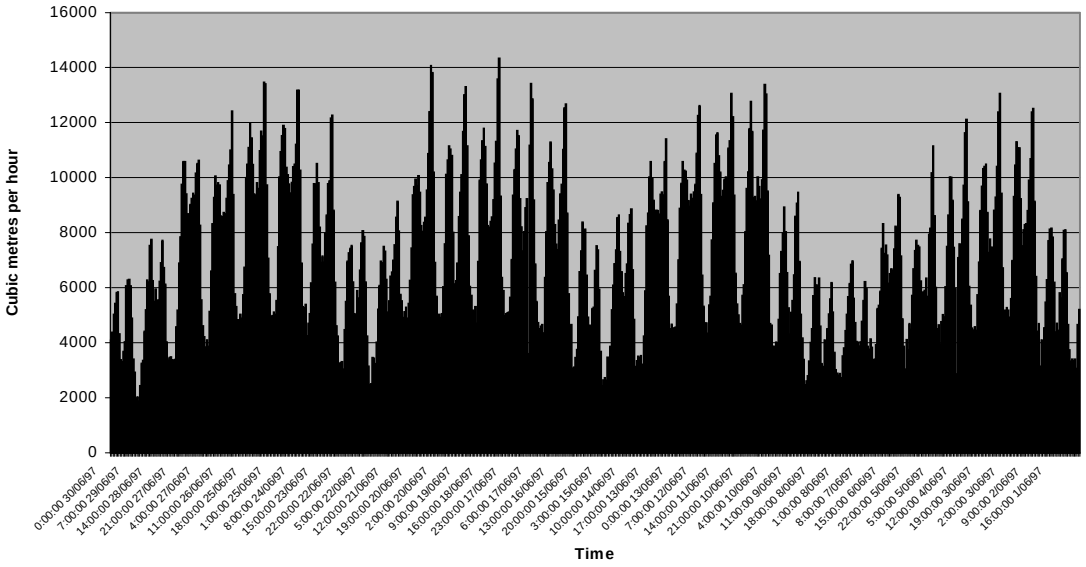
Table 6.1 Flow Assumptions

Suburb	Domestic Consumption (m^3/hr STP)	Com./Ind. Consumption (m^3/hr STP)	Total Consumption (m^3/hr STP)
Bomen	9	511	5,520
Estella	290	1,064	1,354
North Wagga	132	0	132
Bourklands	204	550	754
Glenfield Park	797	0	797
Lake Albert	1,273	0	1,273
Lloyd	48	0	48
Tatton	152	0	152
Ashmont	1,011	150	1,161
Kooringal	1,768	0	1,768
Mount Austin	1,045	200	1,245
Tolland	961	0	961
Turvey Park	671	115	786
W.W Central	2,405	750	3,155
Forest Hill	651	1,070	1,721
Gumly Gumly	35	150	185
Kapooka	214	750	964
San Isidore	0	0	0
Springvale	111	0	111
Total	**11,777**	**10,310**	**22,087**

The information in this model assumes certain conditions and the results are indicative, as these assumptions have not been fully verified.

A review of the Network flows generally indicates that peak flows within the system generally occur during normal business days at around 9 - 10am. Hourly flow rates of up to 19,000 standard cubic metres per hour have been registered at various winter peak times over the past several years. The hourly flow rates at the city gate for June 1997 are shown in Graph 1.

Graph One
Hourly Flowrates June 97

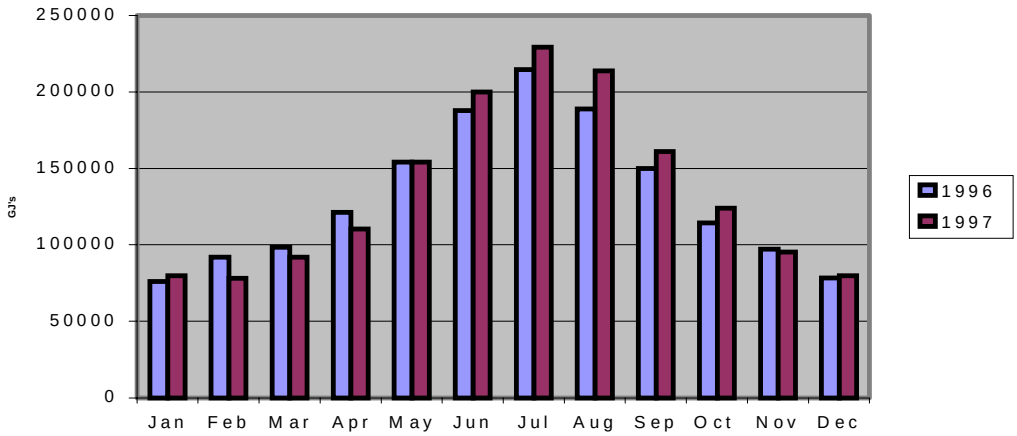


System MDQ on peak winter days is around 9,000 GJ distributed across the following zones and customer groups:

- Bomen Contract Zone - 3550 GJ
- Central Contract Zone - 350 GJ
- Fringe Contract Zone - 550 GJ
- Volume Customers - 4550 GJ

Annual volumes of gas delivered have remained fairly static and have been in the range of 1.5 to 1.6 PJ per year over the last four financial years. Growth in the volume of gas delivered is expected to be zero for Contract Customers and 1 per cent for Volume Customers over the period of this Access Arrangement. Gas deliveries are highly seasonal as indicated by Graph 2.

Graph Two
Monthly Gas Purchases



6.4 Growth assumptions

Key features of demand forecasts are as follows:

a) Contract market: In 1999 (year 1), the forecast for sales and demand for the contract market will be 834 TJ and 4470 GJ/MDQ respectively. For deriving the reference tariffs, the same level will be used throughout the Access Arrangement period.

b) one per cent growth per annum for volume customers (clause 3.5.2). In 1999 (year 1), the sales volume forecast is 755 TJ. This growth rate is reflected in the derivation of reference tariffs for the volume market.

Attachment 2 details current and anticipated numbers and annual sales volumes.

7 KEY PERFORMANCE INDICATORS

The objectives of including key performance indicators (KPI's) in this document are to allow comparison of the operating and maintenance costs included in GSN's target revenue with costs in other Australian gas utilities. The KPI's have not been used in any part of the derivation of the Target Revenue or the establishment of Reference Tariffs.

There are issues with the validity of data used in comparisons as the information available is not always relevant or up-to-date.

The Tribunal in the Final Decision uses measures such as cost per customer, cost per thousand kilometres of distribution pipeline and cost per gigajoule. All three are used in Table 7.1 to compare GSN's Wagga Wagga gas operations with estimated costs from Westar, Multinet, Stratus and actual costs from Alinta Gas and AGL.

Table 7.1 Comparison of Operating and Maintenance Costs

	Great Southern Energy (1)	AGLGN (2)	AGC (3)	Multinet (4)	Status (4)	Weststar (4)	Australian average (5)	US Performance Benchmarks (4)
Year	1998	1998	1998	1998	1998	1998	1998	1995
$ per customer	115	170	78	79	102	93	157	302
$ m per 1000 km of main	3.0	5.9	4.06	5.30	5.66	5.33	7.0	8.01
$ per GJ	1.00	NA	0.44	0.79	0.75	0.54	NA	0.22

Sources:
(1) Calculated by the Tribunal using 1997/98 actual results.
(2) AGLGN proposed Access Arrangement Information, p 33.
(3) AGC proposed Access Arrangement, p 41.
(4) ORG Final Decision - Attachment D.
(5) AGA Statistics 1998.

ATTACHMENT 1 FIVE YEAR FINANCIAL SUMMARY

(1999 $'000)

	1999	2000	2001	2002	2003
Revenue (smoothed)					
Bomen Contract Revenue	574	443	346	275	223
Central Contract Revenue	254	190	142	106	79
Fringe Contract Revenue	317	314	311	309	307
Volume Revenue	4,350	4,385	4,413	4,458	4,504
Total Revenue	**5,495**	**5,332**	**5,212**	**5,148**	**5,113**
Expenditure					
Operating and Maintenance Costs[1]	1,269	1,256	1,234	1,233	1,221
Corporate Overheads	225	223	221	218	216
Marketing Costs	140	139	137	136	134
Return on Working Capital	95	95	95	95	95
Depreciation	996	1,032	1,041	1,049	1,051
Return on Assets	2,170	2,287	2,312	2,338	2,347
Total Expenditure	**4,895**	**5,032**	**5,050**	**5,069**	**5,064**
Nominal Difference	**600**	**300**	**162**	**79**	**49**
Regulatory Capital Base [2]	28,000	29,505	29,836	30,168	30,283
Annual Return	7.75%	7.75%	7.75%	7.75%	7.75%

Note:

1. Includes cost of preparing Access Arrangement.
2. Regulatory capital base = Initial capital base + forecast new facilities – depreciation.
   The figures shown are before indexation. The Regulatory capital base will be indexed by the annual inflation for each year of the Access Arrangement. The national CPI will be used.

ATTACHMENT 2 SALES GROWTH

	1999	2000	2001	2002	2003
Annual Sales (TJ)					
Contract Customers					
Bomen Zone	639	639	639	639	639
Central Zone	81	81	81	81	81
Fringe Zone	115	115	115	115	115
Total Contract Customers	834	834	834	834	834
Volume Customers	755	763	771	779	787
Total Sales	**1,589**	**1,597**	**1,605**	**1,613**	**1,621**
Customer Numbers					
Contract Customers					
Bomen Zone	5	5	5	5	5
Central Zone	5	5	5	5	5
Fringe Zone	4	4	4	4	4
Total Contract Customers	14	14	14	14	14
Volume Customers	14,470	14,615	14,761	14,909	15,058
Total Customers	14,484	14,629	14,775	14,923	15,072
Volume Growth	1.0%	1.0%	1.0%	1.0%	1.0%

Note: Total may not add up due to rounding.

ATTACHMENT 3 ALLOCATION OF COSTS

(1999 $'000)

	Contract Bomen	Contract Central	Contract Fringe	Volume	Total
Operating and Maintenance Costs ($)	62.0	22.1	85.6	1,194.0	1,363.7
Corporate Overheads ($)	10.2	3.6	14.1	197.0	225.0
Marketing Costs ($)	6.4	2.3	8.8	122.6	140.0
Depreciation ($)	45.3	16.2	62.5	871.9	995.8
Return on Assets ($)	98.6	35.2	136.2	1,900.0	2,170.0
Total Costs ($)	**222.5**	**79.4**	**307.2**	**4,285.5**	**4,894.5**
Total Base Revenue ($)	222.5	79.4	307.2	4,285.5	4,894.5
Number of Customers	5	5	4	14327	14341
Annual Sales (GJ)	638935	80513	115023	747400	1581872
Class MDQ (GJ)	3393	372	705	4448	8918
Class MHQ (m^3/hr)	9000	1508	2980	7702	21190
Cost per Customer ($)	44,500	15,880	76,800	299	341
Cost per GJ ($)	0.35	0.99	2.67	5.73	3.09
Cost per GJ of MDQ ($)	65.60	213.40	435.70	963.50	548.80

ATTACHMENT 4 FIVE YEAR CAPITAL EXPENDITURE FORECAST

(1999 $'000)

Distribution System	1999	2000	2001	2002	2003
System Rehabilitation	300,015	315,500	315,500	315,500	315,500
Medium Pressure Mains	309,925	233,190	233,190	210,000	210,000
High Pressure Mains	1,000,000		100,000		300,000
Telemetry	60,000	100,000	20,000	20,000	20,000
Total Distribution System	1,169,940	3,888,690	1,308,690	545,500	545,500
Customer Services					
New Connections	300,000	404,600	404,600	404,600	346,800
Meter Change/Testing	200,100	157,500	206,700	121,800	117,900
Contestable Metering	255,000	60,000	-	-	-
Refurbishment	60,000	77,050	77,050	77,050	77,050
Total Customer Services	815,100	872,550	829,270	663,450	601,750
Other Items					
Computer Software	2,500	2,500	2,500	2,500	2,500
Computer Hardware	5,000	5,000	5,000	5,000	5,000
Telephones	1,000	1,000	1,000	1,000	1,000
Office Furniture & Equipment	2,000	2,000	2,000	2,000	2,000
Other	3,000	3,000	3,000	3,000	3,000
Instruments	2,000	2,000	2,000	2,000	2,000
Total Other	15,500	15,500	15,500	15,500	15,500
Total Capex	2,500,540	1,363,340	1,372,540	1,164,450	922,750

ATTACHMENT 5 FIVE YEAR OPERATING COSTS

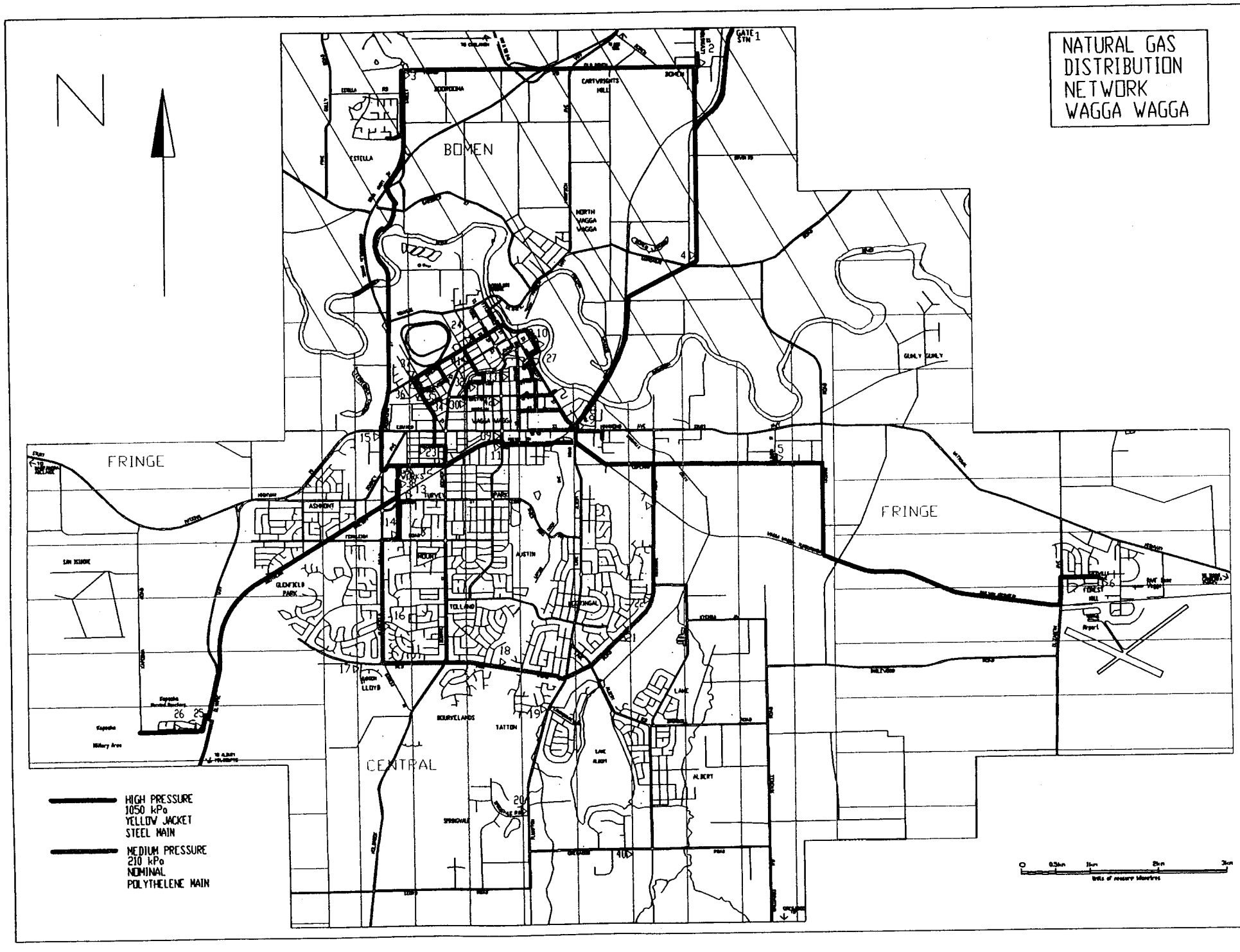
(1999 $'000)

Asset Strategy	1999	2000	2001	2002	2003
Salaries & Wages	190,440	188,536	186,651	184,784	182,936
Core Training	8,000	7,920	7,841	7,763	7,685
Discretionary Training	3,000	2,970	2,940	2,911	2,882
Travel Costs	10,000	9,900	9,801	9,703	9,606
Entertainment (meals only)	1,000	990	980	970	960
Telephones	21,600	21,384	21,170	20,958	20,748
Printing & Stationery	8,000	7,920	7,841	7,763	7,685
Subscriptions	6,000	5,940	5,881	5,822	5,764
Office Equipment	5,500	5,445	5,391	5,337	5,284
Regulatory inspection	10,000	9,900	9,801	9,703	
Licence fees	100	99	98	97	96
Legal fees	4,000	3,960	3,920	3,881	3,842
Consultants	10,000	9,900	9,801	9,703	9,606
Mapping & Data entry	30,000	29,700	29,403	29,109	28,818
Easements & Surveying	1,000	990	980	970	960
Photocopier Rental	800	792	784	776	768
Postage	300	297	294	291	288
Corporate Overheads	225,000	222,750	220,523	218,318	216,135
Marketing	140,000	138,600	137,214	135,842	134,484
Total Asset Strategy	***674,740***	***667,993***	***661,314***	***654,701***	***648,153***
Field Services					
System Operations					
District Regulator Pressure Changes	6,802	6,734	6,667	6,600	6,534
Data Logging (Network & Customers)	20,942	20,733	20,526	20,321	20,118
Telemetry Maintenance	3,639	3,603	3,567	3,531	3,496
Gate Station					
Water Treatment	589	583	577	571	565
Maintenance	3,787	3,749	3,712	3,675	3,638
Weekly Inspections	9,308	9,215	9,123	9,032	8,942
District Regulators					
Annual Maintenance Inspection	13,604	13,468	13,333	13,200	13,068
Maintenance	31,503	31,188	30,876	30,567	30,261
Mains Maintenance Surveys & Protection					
Leak Survey	23,552	23,316	23,083	22,852	22,623
Cathodic Protection Survey	4,013	3,973	3,933	3,894	3,855
Cathodic Protection Maintenance, Anodes etc.	4,677	4,630	4,584	4,538	4,493
Coating Survey & Repairs	49,460	48,965	48,475	47,990	47,510
Location Service	65,215	64,563	63,917	63,278	62,645
Survey of exposed assets	8,786	8,698	8,611	8,525	8,440
HP Valve Inspection	10,033	9,933	9,834	9,736	9,639
Pipeline Patrol	17,391	17,217	17,045	16,875	16,706

Asset Strategy	1999	2000	2001	2002	2003
Mains Repair & Maintenance					
Emergency Response	55,187	54,635	54,089	53,548	53,013
Repairs to mains (L Pressure-MH Pressure)	176,875	175,106	173,355	171,621	169,905
Repairs to mains (H Pressure)	9,901	9,802	9,704	9,607	9,511
Services					
Domestic Service Repairs	92,842	91,914	90,995	90,085	89,184
Domestic Service Inspection	47,104	46,633	46,167	45,705	45,248
Ind/Com Service Repair	48,564	48,078	47,597	47,121	46,650
Ind/Com Meter Inspection	73,576	72,840	72,112	71,391	70,677
Volume Corrector Maintenance Cal	1,003	993	983	973	963
Meter Reading	130,433	129,129	127,838	126,560	125,294
Total Field Services	***908,786***	***899,698***	***890,703***	***881,796***	***872,978***
Cost of Access Arrangement	50,000	50,000	50,000	50,000	50,000
Interest on Working Capital	95,151	95,151	95,151	95,151	95,151
Total Network O & M Costs	***1,728,677***	***1,712,842***	***1,697,168***	***1,681,648***	***1,666,282***

Note: Total may not add up due to rounding.

ATTACHMENT 6 MAP OF WAGGA WAGGA NETWORK


NATURAL GAS
DISTRIBUTION
NETWORK
WAGGA WAGGA
N
BOMEN
FRINGE
FRINGE
CENTRAL
GATE STN 1
HIGH PRESSURE
1050 kPa
YELLOW JACKET
STEEL MAIN
MEDIUM PRESSURE
210 kPa
NOMINAL
POLYTHELENE MAIN