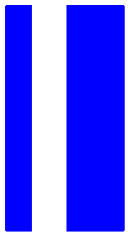

TASMAN
ASIA
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THIRD PARTY ACCESS IN THE WATER INDUSTRY

An assessment of the extent to which services provided by water facilities meet the criteria for declaration of access

SEPTEMBER 1997

A final report prepared for the National Competition Council by Tasman Asia Pacific Pty Ltd

CONTENTS

EXECUTIVE SUMMARY iii

PART 1: DO SERVICES PROVIDED BY WATER FACILITIES COMPLY WITH CRITERIA FOR DECLARATION? 1

Chapter 1: Background to the water industry 1

Chapter 2: Defining facilities, services and markets 10

2.1 WSD facilities 10

2.2 Water services 12

2.3 Water markets 13

Chapter 3: Would access promote competition in another market? 18

3.1 Identifying upstream or downstream markets 19

3.2 The level of competition in existing water and wastewater disposal markets 19

3.3 Will access encourage non-trivial competition? 21

3.4 Services where access is most likely to be sought 23

Chapter 4 Is it economic to duplicate a water facility? 26

4.1 Factors affecting whether it is economic to duplicate a water facility 26

4.2 Evidence of economies of scale and scope 27

4.3 Identifying facilities that are least likely to be economic to duplicate 30

4.4 Services provided by multiple facilities 31

4.5 Conclusion 32

Chapter 5: Are water facilities likely to be nationally significant 33

5.1 The size of water facilities in Australia 33

5.2 Do facilities engage in or support constitutional trade or commerce, high levels of trade? 35

5.3 Are facilities important to the national economy? 36

5.4 Conclusion 38

Chapter 6: Are there health and safety reasons for denying access? 39

6.1 Hydraulic and network management factors which affect human health and safety 39

6.2 Water quality concerns 40

Chapter 7: Is access likely to be contrary to the public interest? 41

PART 2: INTERNATIONAL EXPERIENCE IN WATER REFORM 44

REFERENCES 59

EXECUTIVE SUMMARY

Tasman has prepared this report to assist the NCC to determine whether water facilities are likely to meet the criteria for access declaration under Part IIIA of the Trade Practices Act (TPA). The report presents material relevant to consideration of whether:

- access to services provided by water facilities would promote competition in another market;
- it is economically feasible to develop another facility to provide the service;
- water facilities are nationally significant;
- access can be provided without undue risk to human health and safety; and
- access is likely to be in the public interest.

In the absence of any particular declaration applications, Tasman has assessed the extent to which water facilities are likely to meet the criteria for declaration in general terms. Whether access should occur in specific instances will need to be assessed on a case by case basis. This report establishes guiding principles that the NCC, potential applicants and incumbent service providers can take into account when considering or preparing declaration applications.

Generally, there are many services provided by the industry that are likely to meet the criteria for declaration:

- There is convincing evidence to suggest that water and wastewater transportation networks, including bulk transmission and reticulation networks, will be uneconomic to duplicate in many cases. In most cases, it will also be uneconomic to duplicate facilities that may be integral to the transportation service, including pumping facilities, localised storage facilities and meters.
- In the United Kingdom access (or "common carriage") is seen as a means of encouraging competition in upstream markets, that is new water collection and harvesting facilities. However, in Australia access is more likely to encourage competition in downstream product markets or downstream water markets (including retail supply). Given the excess capacity in most Australian systems, it is unlikely that parties will find it profitable to develop new water collection facilities. However, water pricing reforms, particularly the

elimination of under-pricing, may increase the feasibilty of developing new water collection facilities in future.

- The national significance test is, arguably, the most difficult hurdle for any declaration application to overcome. Water facilities can be judged as nationally significant in their own right, though this may be difficult, or because they support an industry which produces a highly traded good or service. To be found significant in their own right, water facilities must be nationally significant in terms of their size or make a significant contribution to the national economy. Where water users (eg wine grape grower, electricity generator, brewery or pulp and paper manufacturer) rely on a particular water facility to support high levels of inter-state or international trade in a downstream product market (eg wine grape and bottled wine trade, electricity trade, beer trade, or paper trade), they may be able to demonstrate that a water facility is nationally significant on volume of trade grounds.
- Health and safety issues were major concerns in the consideration of access in the United Kingdom. Ofwat, the water regulator, commissioned studies of the implications of access for hydraulics, network security and water quality. These studies suggest it is technically feasible to introduce various measures to ensure that access does not violate health and safety standards. However, there may be some situations where the costs of introducing these measures outweigh the benefits that access will generate. This highlights the need for case by case assessment of declaration applications. In the United Kingdom, where applicants seek access to potable water pipelines, they will be obliged to treat water to prescribed standards before waters are mixed, or pay the incumbent service provider to treat if the connection point is above treatment works.
- The NCC must also take into account public interest concerns when considering any declaration application. For the NCC to reject a declaration application on these grounds, the incumbent service provider has to demonstrate that access is against the public interest. Factors that are relevant to consideration of the public interest include resource allocation, environmental, equity, regional development and transitional costs and benefits. It is unlikely that a declaration application would be rejected on these grounds alone.

We expect that the areas where access will first be sought in the industry are irrigation water markets, industrial wastewater markets and urban retail water markets. However, on balance, it is not likely that access arrangements will generate such widespread competition in water markets as it has in electricity and telecommunications. This is mainly because the feasibility of

access is highly sensitive to the physical location of potential access applicants. Nevertheless, access is likely to stimulate competition at the margin. And, as has been the experience in the United Kingdom, just the potential for access can stimulate pricing reform and efficiency improvements.

When considering individual declaration applications, the NCC should ensure that access is the best instrument for achieving a particular objective. In preparing this report we are mindful that access is just one of several options for introducing competitive disciplines in water and wastewater services. For instance, Commonwealth, state and territory governments have agreed to introduce substantial reforms in the industry over the next few years. These reforms affect industry structure, pricing, cost allocation, corporate governance, natural resource management and trading in water entitlements. Competition will also evolve in water and wastewater service provision through franchising and other contract arrangements.

It is desirable that many of these reforms are implemented prior to the introduction of access. Pricing reforms are particularly relevant to the consideration of third party access in the water industry. Traditionally, uniform or "postage stamp" pricing regimes have been commonplace. Prices determined in this way rarely reflect the cost of providing a service to a particular user. In some cases, prices have been based on property values, which bear no resemblance to actual costs. The latest reforms require that service providers make charges fully reflect the cost of producing a service to customers, where practical. If access occurred before these pricing reforms are implemented, new entrants could be attracted to the industry on the basis of distorted price signals. There is a risk that, under these circumstances, the resulting access could be inefficient. Notwithstanding this, access (or potential access) can play an important role in stimulating progress on water reform. This suggests that pricing and other reforms should at least proceed concurrently with access.

In the second part of this report we describe international experience in water reform. The discussion here identifies countries that have private sector water facilities and the types of services provided by those facilities. It also identifies countries that allow competition in water service provision and describes regimes to limit the market power of service providers. As far as we have been able to ascertain, the United Kingdom is the only other country that is considering access regimes to water services.

PART 1: DO SERVICES PROVIDED BY WATER FACILITIES COMPLY WITH CRITERIA FOR DECLARATION?

CHAPTER 1: BACKGROUND TO THE WATER INDUSTRY

The water industry comprises water, sewerage and drainage (WSD) services. WSD services typically have been provided in Australia by vertically integrated government enterprises that operate within regionally defined monopolies.

To date there has been little structural reform in the water industry, relative to other infrastructure industries such as telecommunications and electricity. Reforms so far have extended to corporatisation and some pricing reform. However, substantial reforms are scheduled to occur in the water industry over the next few years. The Council of Australian Governments agreed in February 1994 to implement reforms affecting industry structure, pricing, cost allocation, corporate governance, natural resource management and trading in water entitlements (see box 1.1). The timetable for reform varies for particular reforms but under the Competition Principles Agreement (CPA), all states and territories have until 2001 to fully implement the reforms.

Institutional and pricing reforms are particularly relevant to the consideration of third party access in the water industry. Institutional reform includes a requirement that vertically integrated service providers at least ring-fence, if not structurally separate, their wholesale and retail operations. Pricing reforms generally require service providers to make charges fully cost reflective, where practicable. Traditionally, there has been widespread underpricing of water. This mainly has been the result of political pressure to keep water charges low, the use of average costs instead of marginal costs when there are increasing unit costs, and the use of historical costs rather than economic cost methodology. Under the new arrangements, service providers are expected to introduce customer-based pricing and shift away from uniform charging regime, (also known as “postage stamp” pricing) and property value based charging regimes. As explained later in this report, these reforms are considered by many as important precursors to access.

Box 1.1: The national water reform agenda

The COAG water reform agenda and national competition policy are providing an impetus for national water reform. The COAG Agreement on Water Resource Policy provides for:

- Pricing reforms, including the adoption of consumption based pricing and full cost recovery and removal of uncommercial cross-subsidies. Where cross-subsidies remain, they must be made transparent. In particular, where the price of a water service to a consumer is less than full cost, this fact should be fully disclosed. Ideally, in these situations, the government should pay the shortfall to the service provider directly as a CSO payment.
- Institutional reforms, including structural separation of water service provision, standard setting, regulatory enforcement and resource management functions as far as possible by 1998. The Agreement also requires that service providers, particularly in metropolitan areas, have a commercial focus through corporatisation, privatisation or contracting out.
- Urban water reforms, including the adoption of two part tariffs comprising a connection charge and a usage charge, where this is cost effective, by no later than 1998. Publicly owned service providers must earn a real rate of return on the written down replacement value of their assets. This return should be commensurate with the risk they face under public ownership. Metropolitan bulk suppliers must charge on a volumetric basis to recover all costs and earn a positive real rate of return on the written down replacement value of their assets.
- Rural water supply reforms, including full cost recovery and transparent arrangements for subsidies by no later than 2001. Rural water providers must also achieve a positive real rate of return on the written down replacement costs of assets by 2001, where practicable. Future investment in the industry, whether to extend existing schemes or establish new schemes, is to be undertaken only after appraisals indicate the investment is economically and ecological sustainable. Where there is inter-state trade in water, pricing and asset valuation practices are to be made consistent. Funds should be set aside for future asset refurbishment and/or upgrading of government owned water infrastructure. For the Murray Darling Basin, provision is to be made for funding of future maintenance, refurbishment and/or upgrade of headworks and other structures.

Other sections of the agreement relate to institutional reform of resource management, groundwater, water allocations or entitlements, trading in water entitlements, consultation and public education, environment, water and related research and taxation reforms.

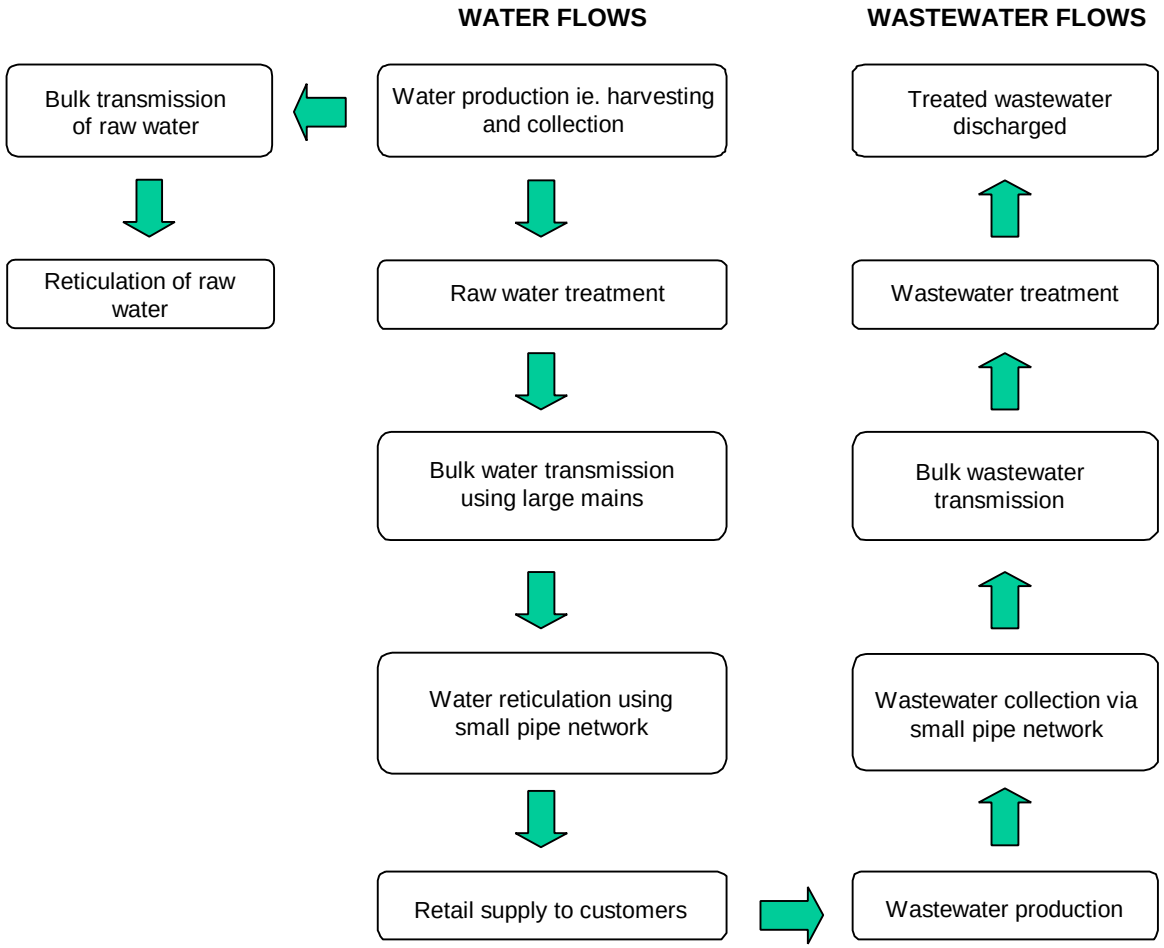
Consideration of access in water requires a broad understanding of industry costs. The water industry is highly capital intensive. Capital costs represent 60 per cent (or $477) of the annual total cost of providing water and wastewater services to each property. This figure is based on operating costs plus depreciation plus a 4 per cent rate of return on the written down replacement value of assets. As the assumed rate of return on assets increases, capital costs become a greater share of total costs. The relative capital intensity of the industry is increasing over time as the number of employees has been greatly reduced since the beginning of the 1990s. The number of full time equivalent employees fell from 20 500 in 1991-92 to 10 580 in 1995-96.

While upfront costs are large, the operating costs associated with core water and sewerage services, including reservoirs, dams, treatment facilities, pipes and channels are relatively low. The Water Services Association of Australia (WSAA 1997) estimated that operating costs comprised around 40 per cent of total costs per property in 1995-96. This figure decreases as the assumed rate of return on assets increases above 4 per cent.

Water and wastewater production cycles are interdependent and best considered as dual systems (see figure 1.1). Water suppliers collect, transport, and supply water to customers. These customers produce wastewater, which is transported, processed and discharged. The duality of the two production cycles is more obvious when they are categorised by production stage or 'layer'. Four layers are commonly used in reference to network-based infrastructure industries such as electricity, gas and telecommunications:

- *Generation layer*: Water generation or production includes the harvesting and collecting of water, water treatment and water pumping. In wastewater disposal, the generation layer refers to the treatment of wastewater.
- *Bulk transmission layer*: Bulk water transmission refers to the bulk supply of raw and treated water using large diameter pipelines. Transmission pipelines transfer water from its source (rivers, dam, groundwater aquifier) through pumping stations, treatment works and other headworks to a local storage reservoir. Bulk wastewater transmission refers to the transfer of sewage through large diameter trunk sewers.
- *Distribution layer*: Water distribution refers to the reticulation of water from bulk mains to users via a diffuse network of medium to small diameter pipes. The wastewater equivalent is the network of medium to small diameter pipes that transport sewage from customers to larger trunk sewers.

Figure 1.1: Water and wastewater flows



Retail layer: Water retailing refers to the customer service stage of water supply. It includes advisory services, metering and billing.

While the water industry is broadly similar in structure to other network based infrastructure industries, there are some key differences.

First, water and wastewater transportation network assets are relatively more expensive to construct than electricity and gas networks. Water and sewerage mains account for around 70 per cent of the industry's assets by value. In electricity, the corresponding figure is around 50 per cent and in gas it is around 60 per cent. These costs are sunk and fixed with respect to throughput.

Second, it is relatively more expensive to operate water transportation networks than electricity, gas and telecommunications networks. This, in combination with high construction costs, makes the total cost of providing transportation services greater in water than in other

infrastructure industries. For example, water transportation services account for around 21 per cent of the industry's total production costs. In electricity, transportation services account for around 8 per cent of total industry costs and in gas they account for around 14 per cent of total costs. Relatively high transportation costs makes it less feasible to trade water over long distances.

Third, production costs in water tend to be substantially lower than other infrastructure industries. For example, water and wastewater production costs comprise around 31 per cent of total industry costs (20 per cent for the integrated Melbourne system). The corresponding figures for electricity generation and gas production are 50 per cent and 40 per cent, respectively. The majority of water and sewerage production costs relate to storage facilities (eg cost of resources used to construct dams, the loss of value attributable to land inundation and ecological damage). Pumping and water treatment costs are relatively small.

Finally, there also are important differences between water and electricity and gas in terms of usage profiles. In electricity and gas markets, large industrial customers account for a substantial proportion of total consumption. This is not the case for water and wastewater markets, where three quarters of all urban water used is used for domestic purposes (see table 1.1). Most water in Australia, around 80 per cent, is used for irrigation. Of the water that is used by households, less than 20 per cent is used for drinking, cooking and other potable purposes. Around one third is for outdoor use.

Table 1.1: Proportion of use by customer class

	Electricity	*Gas*	*Urban water and wastewater*
Industrial	50	45	13[a]
Commercial	20	10	12
Domestic	30	45	75

a This percentage is declining. *Source*: WSAA estimates.

More so than other network infrastructure, water systems typically are confined within state boundaries[1]. The range of services provided by water businesses vary (see table 1.2). In

[1] The Murray Darling Basin system covers four states, Queensland, New South Wales, Victoria and South Australia. Member states administer their own water allocation/entitlement regimes. Generally, water is not traded between states. However, COAG agreed water reforms and access provisions should encourage inter-state water trade in future.

..2: Services supplied by Australian urban water businesse

		Services supplied						
		Water				*Wastewater*		*Drain*
name	State	Bulk Storage	Bulk Transfer	Treatment	Reticulation	Treatment	Reticulation	
Corporation	ACT	✓	✓	✓	✓	✓	✓	
Region Water Authority	VIC	✓	✓	✓	✓	✓	✓	
Water	QLD			✓	✓	✓	✓	
Highlands Region Water Authority	VIC	✓	✓	✓	✓	✓	✓	
Gippsland Region Water Authority	VIC	✓	✓	✓	✓	✓	✓	
st Water Authority	VIC				✓	✓ 1	✓	
Region Water Authority	VIC	✓	✓	✓	✓	✓	✓	
ast Water	QLD	✓	✓	✓	✓	✓	✓	
Water Corporation	NSW	✓	✓	✓	✓	✓	✓	✓
ne Water Corporation	VIC	✓	✓	✓		✓ 2		✓
ıd Water Authority	NT	✓	✓	✓	✓	✓	✓	
ustralian Water Corporation	SA	✓	✓	✓	✓	✓	✓	
est Queensland Water Board	QLD	✓						
ast Water Limited	VIC				✓	✓ 1	✓	
Water Corporation	NSW	✓	✓	✓	✓	✓	✓	✓
orporation	WA	✓	✓	✓	✓	✓	✓	✓
alley Water Limited	VIC				✓	✓ 1	✓	

nall neighbourhood plants only, bulk treatment provided by Melbourne Wat
elbourne Water is also responsible for bulk wastewater transfe
WSAA 1997

urban water, there are three wholesale companies: South East Queensland (SEQ) Water Board, Hobart Water and Melbourne Water. Only Melbourne Water is involved in water and wastewater businesses. The other two are water only businesses. In Brisbane, SEQ provides water to the Brisbane City Council. The Council is both a wholesaler and a retailer. It providers retail services to customers within its boundaries and acts as wholesaler to fringe shires. Sydney Water is a vertically integrated water and wastewater service provider. It has a wholesale subsidiary, Transwater, supplying water to three retail subsidiaries. In Adelaide, the SA Water Corporation acts as wholesale provider and downstream operations are contracted to United Water through a franchise agreement. In Western Australia, Water Corporation undertakes wholesale and retail supply functions with extensive private sector contracting for construction and maintenance.

The infrastructure requirements of state-based water systems are not homogenous. Some systems make extensive use of pumping, and therefore require more water and wastewater pumping stations, while others are able to rely more on gravity feed. The extent of treatment of raw water also varies across systems. For example, water in Sydney requires more treatment than in Melbourne. Hence, Sydney Water Corporation has considerably more full water treatment plants than the Melbourne Water Corporation (see table 1.3).

Table 1.3 Infrastructure asset quantities, 1995-96

Water Business	*Full water treatment plants*	*Other water treatment plants*	*Wastewater treatment plants*	*Water pumping stations*	*Wastewater pumping stations*
ACTEW Corporation	1	1		26	29
Barwon Water	1	1	4	30	104
Brisbane Water	10		10	107	166
Central Gippsland Water	8	12	14	48	153
Central Highlands Water	3	8	8	49	62
City West Water			2	8	76
Coliban Water	12	18	7	62	86
Gold Coast Water	2		6	47	552
Hunter Water Corporation	6	2	22	82	287
Melbourne Water Corporation	2	41	2	25	10
Power and Water Authority	4		6	9	41
SA Water	6	2	4	48	328
South East Water		5	11	75	194
Sydney Water Corporation	14		31	162	653
Water Corporation (WA)	4	8	9	62	479
Yarra Valley Water			13		
Total	73	98	149	840	3 220

Source: WSAA 1997

As pricing and other reforms are implemented and as water technologies become more advanced and cheaper, the industry is likely to develop in several areas. Recycling of wastewater is one area that is expected to develop once water prices become fully cost reflective and recycling technologies become cheaper. Currently use of recycled wastewater is low and restricted mainly to market gardens, public recreational spaces and some industrial processes. Over the whole industry, 28 565 megalitres or 2.2 per cent of effluent was recycled in 1995-96 (WSAA 1997). This low percentage reflects the relatively high cost of treating and transporting treated effluent and the currently limited market for second quality water. Other potential areas for development include:

- continued private sector involvement in the design, construction and operation of WSD facilities is likely to increase in future through BOT (build, operate and transfer) and BOO (build own and operate) arrangements;
- development of transportable, more localised water and wastewater treatment facilities based on new technologies (eg IDEA sewerage technology);
- continued development of market for tradable water allocations and entitlements;
- creation of retailing multi-utilities; and
- continued development of a market for biosolids, the by-product of wastewater treatment.

Against this background, this report examines the extent to which services provided by water facilities meet the criteria for declaration under Part IIIA of the Trade Practices Act. These criteria are set out in box 1.2. The chapters of this report relate to each of these criteria, except criterion (e) as there are no effective access regimes for water. Chapter 2 defines WSD facilities, services and markets. Chapter 3 draws on this information to assess whether access would promote competition in a different market to the service for which access is sought. Chapter 4 examines whether it is economic to wholly or partly duplicate a water facility. It also examines whether part of the service could be provided by another facility. Chapter 5 provides a framework for determining whether water facilities that are the subject of a declaration application are likely to be nationally significant. Chapter 6 discusses the potential for access to impose undue risk to human health and safety. Chapter 7 discusses factors relevant to consideration of whether access is likely to be not contrary to the public interest. Part 2 of this report describes international experience in water reform. Countries analysed include the United Kingdom, United States, France, Canada and New Zealand.

Box 1.2: Assessment criteria for declaration of access

To recommend that an infrastructure service be declared, the following criteria must all be satisfied under Part IIIA of the Trade Practices Act:

(a) that access (or increased access) to the service would promote competition in at least one market (whether or not in Australia), other than the market for the service;

(b) that it would be uneconomical for anyone to develop another facility to provide the service;

(c) that the facility is of national significance, having regard to:

  (i) the size of the facility; or

  (ii) the importance of the facility to constitutional trade or commerce; or

  (iii) the importance of the facility to the national economy;

(d) that access to the service can be provided without undue risk to human health or safety;

(e) that access to the service is not already the subject of an effective access regime;

(f) that access (or increased access) to the service would not be contrary to the public interest.

Source: NCC 1997

CHAPTER 2: DEFINING FACILITIES, SERVICES AND MARKETS

Part IIIA of the Trade Practices Act distinguishes between facilities, services and markets. Facilities refer to the core WSD infrastructure. WSD services are provided by these core infrastructure. These services are then traded in various water markets — ie "fields of rivalry" between firms. In this section we define and describe water, sewerage and drainage (WSD) facilities, services and markets.

2.1 WSD facilities

Water facilities

There is a range of facilities required to deliver a complete water service in Australia. These can be broadly classified under three categories: production or headwork facilities, transportation facilities, and retail supply facilities. Production or headwork facilities include:

- water harvesting and collection facilities, including impounding reservoirs, ground water aquifers, and river water extraction facilities;
- water pumping facilities; and
- raw water treatment facilities.

Transportation facilities include:

- bulk raw water transportation facilities (large/trunk mains and channels);
- bulk treated water transportation facilities (large/trunk mains and channels);
- pumping facilities;
- localised water storage facilities; and
- water reticulation facilities (ie medium and small mains and channels).

Retail supply facilities include:

- user connection to reticulation facility; and
- water metering facilities.

The relative importance of each facility to individual water supply systems in Australia varies. As explained in chapter 1, some systems are able to make use of gravity feed and require fewer pumping facilities. In Melbourne raw water quality is sufficiently high to substantially reduce the number of full water treatment facilities.

Wastewater facilities

Wastewater disposal facilities can be classified under generation, bulk transmission, distribution and retail supply. Retail supply facilities include customer connection. At this stage, there are very few facilities that meter wastewater flows at the customer level. Distribution facilities include:

- the small pipe network to transport sewage from source to trunk network; and
- wastewater pumping facilities.

Bulk transmission facilities include:

- trunk sewers (ie pipelines) used to transport sewage from the local collection network to treatment works; and
- wastewater pumping facilities.

Generation facilities include:

- wastewater treatment works; and
- storage ponds.

In some communities, sewage is stored in septic tanks and periodically removed and treated.

There also are facilities for treated wastewater disposal and reuse. These include:

- treated wastewater bulk transmission sewers;
- treated wastewater outfalls; and
- treated wastewater reticulation (eg for irrigation).

Drainage facilities

The range of facilities required to deliver a complete drainage service comprises:

- a local drainage collection facility (ie underground drainage pipelines and channels from properties, streets, roads and public areas);
- wetland litter traps;
- tidal gates;

- levee banks;
- pumping stations; and
- drainage outfalls.

2.2 Water services

This section defines water services based on the definition in Section 44B of Part IIIA of the Trade Practices Act, which includes the use of an infrastructure facility such as a road or railway line, handling or transporting things such as goods or people and communications services; but does not include the supply of goods, the use of intellectual property, or the use of a production process (except to the extent that it is an integral but subsidiary part of the service).

Water services

The range of water services include:

- water harvesting and collection services;
- bulk raw water transmission services;
- raw water reticulation services, including irrigation services;
- raw water treatment services;
- bulk treated water transmission services;
- localised water storage services;
- treated water reticulation services;
- water metering services; and
- water billing services.

Treated water reticulation services include distribution of water to:

- urban and rural users (domestic, commercial and industrial),
- public areas, including parks, and
- fire hydrants.

Wastewater services

The range of wastewater services includes:

- bulk collection and transmission of wastewater;
- treatment of wastewater;

- specialised collection and treatment of trade waste;
- disposal of treated wastewater;
- disposal of pollutants; and
- recycling of wastewater, including reuse for irrigation and watering of public areas.

Drainage services

Drainage services include:

- transportation of stormwater and other runoff to waterways; and
- flood mitigation.

2.3 Water markets

In this section we attempt to loosely define WSD markets. Markets have four dimensions — function, space, product and time (Brunt 1990). This section describes these dimensions as they apply to WSD markets. In access matters, however, the key focus is on the functional market.

Functional dimension

The functional dimension of a market refers to stages or layers in the production and marketing chain. As noted in chapter 1, there are broadly four production layers in the WSD industry: generation or production, bulk transmission, distribution and retail supply.

Generation markets include:

- water harvesting and collection;
- raw water treatment; and
- wastewater treatment.

Bulk transmission markets include:

- bulk transmission of raw water (this includes irrigation water markets);
- bulk transmission of treated water;
- bulk transmission of wastewater; and
- bulk transmission of treated wastewater.

Distribution markets include:

- reticulation of treated water;

- wastewater collection;
- treated wastewater reticulation (eg for irrigation); and
- stormwater and other drainage transportation and outfall.

Retail supply markets include:

- customer connection;
- metering; and
- billing.

Identification of relevant functional markets must do more than theoretically delineate between layers of production. Ergas (1997) advocates two tests to identify whether markets should be considered functionally different from an economic perspective:

- the transactions costs involved in the separate provision of the good or service at the two layers or stages of production should not be so great to prevent such separate provision from being feasible; and
- serving each of the two stages of production should require assets specialised to that stage, "so that supply side substitution … is not so immediate as to effectively unify the field of rivalry within which services at the two stages of production are provided".

In other words, there must be both separability and speciality of production stages.

The second test is easier to apply in water than the first. To satisfy the second test, the assets (ie capital equipment, human capital and organisation skills) utilised in one stage must not be easily substitutable. At a broad level, assets associated with the construction, maintenance and operation of dams, treatment works and pumping stations cannot substitute for assets (including human capital) required to construct, maintain and operate pipelines. In turn, headworks and transportation assets cannot substitute for the assets required to perform retail customer connection, metering and billing services. However, the speciality of assets becomes less obvious at greater levels of disaggregation. For instance, consider the distinction between the market for bulk water transmission and that for reticulation of treated water to users. Both involve the provision and laying of pipelines, monitoring of water flow and quality through those pipelines and similar labour skills to lay pipes and operate the facility. It may be possible to separate the two stages on the basis of pipe size and network complexity — bulk transmission mains typically are far larger than reticulation mains and far less complicated (ie not as diffuse) as reticulation networks. However, skill requirements would not differ between the two. Hence, labour is likely to be substitutable.

The first test is relatively difficult to apply in the case of water because WSD services traditionally have been provided by vertically integrated government enterprises. This has meant that there is not a history of assessing, let alone publicising, the transaction costs of separating different stages. However, there is some recent evidence of separability in Australian systems. For example, in Melbourne there has been structural separation of bulk supply and retail supply market functions. Further, under the COAG agreed water reforms outlined in chapter 1, all urban water suppliers are expected to at least ring-fence, if not fully separate, wholesale from retail businesses. Wholesale businesses tend to be responsible for trunk pipelines and channels and retail businesses tend to be responsible for localised reticulation networks. This suggests that water businesses will have separate systems to deal with staff and asset management issues in bulk transmission and reticulation.

Another means of gathering evidence on separability is to look at systems overseas. As discussed in part 2 of this report, water only or sewerage only businesses are not uncommon. Within water businesses, there often is structural separation of bulk supply and retail supply functions. In combination, this evidence suggests that there is separability between water and wastewater services, between production and retailing services, and between bulk transmission services (provided by bulk water suppliers) and reticulation network services (provided by retail suppliers).

Product dimension

The product dimension refers to the types of goods and services in the market. It is particularly relevant where there is substitution in production. For example, in the case of gas the relevant market may not be gas but energy, encompassing electricity, solar energy and other energy sources.

In principle, piped water has several production substitution possibilities including: bottled water; water obtained from private wells, bores, dams and rainwater tanks; carted water; and recycled wastewater. However, in most instances where water is used, these alternative sources are not strong substitutes for piped water. Nevertheless, it is appropriate to define the relevant product market as the market for water services, including piped and other sources of water.

This definition has the advantage of allowing for the possibility that a bulk water supplier may directly compete with a retail supplier in the same market. For example, a large water user (eg a brewery) may be in a position, depending on their location relative to bulk and reticulation

mains, to choose between a bulk supplier and a retail supplier to meet their water requirements.

Production substitution possibilities for public wastewater collection, transportation and treatment include private collection (including septic tanks) and either on-site or off-site treatment of wastewater. It is therefore appropriate to define the market for wastewater services to encompass private and public collection, transportation and treatment.

The only significant production substitution possibility for public drainage services is private collection and either reuse or discharge of drainage into an appropriate waterway. It is therefore appropriate to define the market for drainage services to include public and private collection, transportation and reuse/discharge of stormwater and other drainage.

Geographical dimension

The geographical dimension refers to the area covered by the market eg national, multi-state, state or territory, or intra-state. WSD systems typically are limited to regions within states due to the substantial cost of piping water over large distances. There are some instances of water trade across states, however these are border phenomenon and do not involve entire states (eg Murray River irrigation).

The geographical spread of WSD markets can be categorised into urban/metropolitan systems and non-metropolitan/rural systems. Both urban and rural markets can be further disaggregated according to water usage (eg rural markets typically comprise irrigation, domestic and, sometimes, industrial sub-markets).

Temporal dimension

The temporal dimension refers to whether the size or scope of the market is likely to change through time. This criteria is more relevant to markets where production technologies are continually changing (eg telecommunications). Technological change in the provision of WSD markets is not substantial, compared to telecommunications markets.

Notwithstanding this, there have been some technological advances, at the margin, which increase the availability and feasibility of substitute goods and services in the WSD industry. For example, technological advances have increased the feasibility of recycling wastewater. Advances in water conserving technologies (eg shower timers, dual flush toilets, caps on

artesian bores) have also contributed to the availability and viability of substitute goods and services in the industry.

CHAPTER 3: WOULD ACCESS PROMOTE COMPETITION IN ANOTHER MARKET?

If services provided by water facilities are to comply with Part IIIA of the TPA, the NCC must be sure that access to a service provided by a water facility would promote competition in a market other than the market for the service. The requirement that access should "promote competition" does not specify that access substantially promote competition. However, in its Draft Guide the NCC indicates that a trivial increase would not satisfy the competition test under Part IIIA of the TPA.

The NCC takes competition to mean rivalrous market behaviour, reflected in price, the nature of product and the nature and extent of service offered to customers. The NCC has also indicated that the concept should be taken to include potential competition. That is, it should allow for the possibility that new entrants may be drawn to the market at some future point in time. This prospect or "threat" can stifle monopolistic behaviour. In many industries, imports are an important source of potential competition. Potential competition from imports in the water industry is relatively minor and largely restricted to bottled water and water conservation technologies.

This criterion is intended to ensure that access is granted only where there will be benefits in markets beyond the market for the service for which access is sought. To meet this criterion it must be proven that the service for which access is sought is not in the same market as the market in which competition is promoted. The NCC has noted that this does not require the precise definition of the market for the service and the market where competition is promoted. It requires only that the markets can be loosely defined and shown to be different. This can be shown by demonstrating that the two are in different product markets or in different functional markets.

The previous chapter outlined the different WSD product and functional market dimensions. The functional dimension is particularly relevant where access to a service is sought to provide an opportunity for a business to use those services as an input in the production of other goods or services sold in other markets. The product market is particularly relevant where access to a service is sought to provide an opportunity for a business to onsell water and customers may be able to readily substitute between different outputs.

3.1 Identifying upstream or downstream markets

As explained in the next chapter, facilities that are most likely to be the subject of a successful declaration application are the transportation pipes and channels. If an applicant seeks access to services provided by, say, a trunk water or wastewater pipeline, it is incumbent upon them to demonstrate that access will promote competition in either downstream or upstream markets. Downstream markets could include the downstream product market in which a water user may operate. For example, if the party seeking access is a wine grape grower, the downstream product market includes the market for wine grapes and the market for wine.

Downstream markets also can include downstream water markets, as long as they are separate from the market for the service for which access is sought. Downstream water markets can include:

- treated water reticulation market;
- raw water reticulation market;
- treated water retail supply market;
- raw water retail supply markets (including irrigation markets, hydro electricity generation, and other markets involving raw water usage);
- wastewater collection market; and
- treated wastewater disposal market.

Upstream water markets can include:

- raw water harvesting and collection;
- water treatment; or
- wastewater treatment.

Prior to a discussion of how access might promote competition in another market, it is useful to understand the extent of competition already occurring in the water industry.

3.2 The level of competition in existing water and wastewater disposal markets

In principle there are many possible sources of competition to piped water and wastewater disposal services. However, the constraints imposed on water and wastewater service providers by these substitutes are low to moderate for most applications. Currently, there is no head-to-head competition between retail suppliers for domestic customers, who account for around 75 per cent of urban water usage in Australia. This is because retailers generally

operate within (legislated) regional monopolies. While the monopoly power bestowed by legislative monopoly is absolute, widespread and long term underpricing of water has also discouraged new entry to the market.

Although they hold regional monopolies, retail suppliers do compete with various private water suppliers for some water application. For instance, domestic customers can privately source their water from rainwater tanks, bore water, carted water and bottled water. Many large industrial water users (eg food processing operations, paper manufacturing operations, electricity generators requiring water for cooling) are able to supply some of their water requirements from their own on-site sources. This type of competition is substantial in New Zealand, where around two thirds of water used by industry is sourced privately (NZ Business Roundtable 1995).

In future, competition in water supply is expected to develop from other sources. For example, as underpricing of water is phased out, there is expected to be increased competition in water supply from recycled wastewater, at least for some household and industrial applications. Customers already can substitute between the services of retail water suppliers and suppliers of water saving technologies (eg shower timers, water saving shower roses, garden timers, waterless toilets) and localised water collection technologies (eg rain water tanks, private wells and bores). In future, with technological innovation, the feasibility of these technologies is expected to increase.

Competition for piped wastewater services comes from various substitutes, septic tanks, composting toilets and recycling of grey water. Major industries can and do treat their own wastewater and discharge directly to waterways. In principle, major users can relocate or threaten to relocate to obtain the best deals. However, under current arrangements there are very few large water users that would relocate on the basis of water prices/service quality as these typically represent a relatively small proportion of total production costs. For example, pulp and paper manufacturers typically are one of the largest industrial water users. However, electricity costs account for a greater share of total production costs than water costs (see box 3.1). However, this situation may change as underpricing of water is removed.

Box 3.1: Water requirements of the pulp and paper water industry

The Australian pulp and paper industry is a relatively large water user. Water usage varies across mills, depending on output. As an indication, Australian Paper's Maryvale plant, the largest in Australia, uses approximately 26 000 megalitres of water and produces 400 000 tonnes of paper per annum. Australian Newsprint Mills' Albury plant, the fifth largest in Australia, uses approximately 5 300 megalitres and produces 215 000 tonnes of paper per annum.

Generally, water costs represent between 2.5 per cent and 5 per cent of total production costs. By way of comparison, electricity costs represent between 10 per cent and 20 per cent of total production costs. Consequently, energy considerations will have a greater impact on location decisions than water services.

Individual mills obtain either raw water from nearby rivers or treated water from retail water suppliers. If raw water is obtained, it usually is treated on site before it can be used in production. The mills tend to store water in on-site dams. Increasingly, mills are investing in technologies to reuse wastewater.

There is no head to head competition in bulk supply functions. Water harvesting and collection facilities and bulk transport facilities usually are owned and operated by a single entity (ie they are vertically integrated). Consequently, unlike electricity generation, there is no competition between rival water harvesting and collection facility operators. There is some competition through contracting of construction, surveying, maintenance, legal services, IT services and other head office functions.

3.3 Will access encourage non-trivial competition?

Access could lead to competition in the provision of upstream or downstream water services, subject to appropriate access pricing. Whether access will promote non-trivial competition in the product market that the declaration applicant operates in is a matter for case by case assessment. Access to a declared service could increase competition in downstream water markets by:

- allowing developers of new water sources to market their product;

- allowing new retail suppliers, who can provide a service at lower cost than an incumbent, to enter the market. This places pressure on incumbents to adopt cost minimising technologies and practices and adopt more user-focused (ie marginal cost) pricing.
- allowing a greater number of differentiated services to develop. There are several aspects of water and wastewater disposal services that lend themselves to differentiation. For example, multi-utilities could emerge, providing integrated electricity, gas and water services, or just integrated meter reading services and/or integrated billing. Also, a service provider may find it can offer a fire protection service by installing small reticulation systems within buildings to compete with hydrants. A new entrant with access to either treated wastewater or raw water services may offer water of second quality to customers who do not require potable water (eg irrigators). Similarly, a new entrant might be able to offer less reliability of supply in return for lower prices for customers who do not require 24 hour water or wastewater services.

Access may also stimulate competition in upstream markets, though probably not to the same extent as downstream competition. Upstream competition will occur if retail businesses (including retail supply and reticulation operations) connected to a bulk transmission facility are permitted to onsell water through their own network (or another's network) to other water suppliers. In most cases it is unlikely that these suppliers could provide water or sewerage services at lower cost than the bulk supplier. Nevertheless, there may be situations where the end user is remote from the bulk supplier's facility and the cost of connecting to the bulk supplier is greater than the cost of contracting with a retailer.

There are several possible factors which could limit the potential for access to promote competition. For instance, in some situations it might be argued that the market for downstream water and wastewater services is already contested by substitutes. This is not as strong or convincing an argument in water as it may be for electricity and gas or rail and road. As noted earlier, the range of piped water uses for which there are substitutes is limited. For many applications there is no close substitute for piped water services. In some cases, there may be moderate competition between piped water and bottled water or rainwater, or between reticulated water and private bores and dams. However, these potential substitutes do not substitute for reticulated water for all water uses. A case by case analysis, assessing the cross price elasticity of demand for a particular water service, is necessary to fully appreciate the 'threat' to a particular water or wastewater service posed by substitute goods and services.

Some may argue that the increase in competition could be trivial as the party seeking access to the service would just take business away from the incumbent up or downstream service provider, with no or little change in price, product differentiation or take-up of new technology. This might occur if there is not excess demand for existing and new water services and the incumbent already had achieved internationally best practice operations. It is not possible to comment with any certainty on the demand for the possible new services that access arrangements and other water reforms may foster. On the point of best practice, there are few independent benchmarking studies of the Australian water industry which shed light on the extent of the performance gap between Australian and international water systems. However, given the legislated monopoly position that most retailers find themselves in, and the widespread use of pricing regimes that do not reflect full economic and social costs, it is unlikely that costs are currently being minimised.

In some situations, access may not lead to lower prices where the provision of access imposes substantial costs on the service provider. However, the NCC should exercise care when considering arguments of this kind. In some cases, prices may not decline with access because service providers concurrently introduce pricing regimes that better reflect economic costs, leading to a more efficient allocation of resources across the economy.

Some may argue, as they have for other access declaration applications, that there already is strong competition in the market for the downstream or upstream service, which is unlikely to be enhanced by declaration of access. It is difficult to apply this argument to water markets as competition generally is weak. Whether this argument might apply for the product market in which the applicant operates is a matter for case by case assessment.

In some cases it may be tempting to deny access where the party seeking access already has substantial market power. It may be argued in this situation that granting access might stifle competition by entrenching market power. However, it is not appropriate to deny access on these grounds. The ideal solution from the community's perspective would be to allow access to occur, provided the application meets the necessary criteria, and treat the market power issue separately (eg through structural separation and price regulation). Indeed, the TPA considers access and market power issues separately. Also, access is not limited this incumbent. Once achieved access could encourage other entrants or potential entrants. This will impose a discipline on the downstream supplier.

3.4 Services where access is most likely to be sought

It is most likely that access will be sought in relation to the larger transmission (ie trunk) mains facility and the more complex reticulation network. As explained in chapter 4, this is the most likely scenario because these facilities are likely to be most uneconomic to duplicate. Access may also be sought to services provided by metering facilities, localised storage facilities and pumping facilities that are integral to the transportation service (see chapter 4).

The prospect of access being sought increases with the reach of the relevant pipeline facility. Generally, access is more likely to be sought for urban water and wastewater services than rural services (excluding irrigation services). This is largely because there is greater capacity for upstream and downstream competition in urban markets relative to thinner, smaller rural markets. For rural water systems, access is most likely to be sought for irrigation water and, possibly, wastewater disposal services.

Irrigation markets, particularly Murray-Darling irrigation markets, are strong prospects for access. There already are multiple water wholesalers and multiple large customers operating in the Murray Darling basin. There also are water allocations and entitlements and at least intra-state trade in these rights and entitlements. In combination with pricing reforms, access can complement these COAG supported reforms to stimulate competition in irrigation water markets.

Where the boundary between retail and wholesale supply operations is inappropriately defined or where retailers believe the wholesaler is using its monopoly power to charge higher than commercial prices, there may be an attempt to use access provisions to renegotiate interconnect arrangements. As noted in chapter 7, this may not be in the public interest.

It is less likely that access will be sought to the urban drainage network. This is largely because drainage services generally are non-excludable, creating a situation where "free riders" can benefit from drainage services without paying for them. Currently in most urban areas in Australia, a bulk supplier provides drainage services under contract with local councils. Councils bill their constituents for drainage services through rates. There may be some wastewater producers that fully treat their own waste and seek access to drainage networks to dispose of treated wastewater. However, in such cases, care should be taken to ensure that access provisions are not used to by-pass the more costly treatment processes associated with wastewater systems.

The types of entities which might seek access include:

- parties who have purchased bulk water entitlements (eg irrigators) and seek access to a trunk water pipeline to transport water to its intended point of use;
- parties seeking access to trunk raw water pipes and channels to develop new irrigation markets, small scale hydro electricity generation facilities, etc;
- new irrigators seeking to connect to an existing irrigation scheme.
- large industrial customers seeking access to recycle treated wastewater;
- large water users seeking to bypass the reticulation network;
- parties seeking to service greenfield sites, requiring access to bulk water pipelines or channels and/or bulk wastewater mains because they believe they can provide reticulation and retail services more cheaply than alternatives;
- parties seeking access to services provided by trunk pipelines/channels, reticulation networks and/or metering facilities to provide retail water and/or wastewater disposal services in competition with incumbent service providers. This form of access could only occur if legislation granting retailers exclusive markets was abolished;
- large wastewater producers who treat their own waste and seek access to part of the reticulated wastewater network to treat others' wastewater. This is more likely if pricing was volume related rather than by user category (domestic, industrial, commercial);
- wastewater producers, who fully treat their own wastes, seeking access to drainage pipes and channels; and
- developers of new water sources seeking to transport water to its intended point of use.

CHAPTER 4 IS IT ECONOMIC TO DUPLICATE A WATER FACILITY?

Under Part IIIA of the Trade Practices Act, a water service can be declared if it would be uneconomical for anyone to develop another facility to provide the service. This criterion is often interpreted to limit access largely to natural monopoly situations, where it is not commercially feasible for an actual or potential supplier to develop a rival facility. The NCC is required to consider whether it is uneconomic to develop another facility to provide the total service for which declaration is sought. It must also assess whether it is economic to develop another facility to provide part of the service. This chapter discusses both these issues after defining factors affecting the feasibility of duplication.

4.1 Factors affecting whether it is economic to duplicate a water facility

In economics textbooks, a facility will be uneconomic to duplicate when it is a natural monopoly. It is difficult to determine whether a technology is a natural monopoly. Natural monopoly exists where one firm can supply a market at lower cost than two or more firms. In single product markets, the existence of pervasive economies of scale is sufficient for natural monopoly. In multi-product markets, there must be pervasive economies of scale and/or scope. Economies of scale exist where the marginal costs of production are less than the average costs of production. They commonly exist for facilities requiring a substantial upfront investment. Economies of scope exist where one firm, using cost minimising technology, can produce two or multiple goods or services at a lower cost than if different firms specialised in the production of each good or service.

The existence of pervasive economies of scale or scope are key indicators of whether a facility providing more than one output is uneconomic to duplicate. Where there are pervasive economies, duplication is likely to be uneconomic and, therefore, inefficient.

The existence of excess capacity in a facility providing the service for which access is sought may be relevant to the consideration of a declaration application to the extent that it affects the economic cost of duplication. For instance, excess capacity may lead to a write down of the existing capital stock such that it will not be possible to achieve an economic rate of return to justify investment in duplicate facilities. Capacity considerations also should be factored in during negotiation of access terms and conditions. Capacity will vary over the lifetime of any

water facility, particularly where they involve large, lumpy investments. Under-utilisation is common for any large infrastructure facility in the years immediately following construction. Conversely, capacity constraints are common in the period before new investment occurs.

4.2 Evidence of economies of scale and scope

Most international studies agree on the existence of economies of scale in water supply. However, there is considerable disagreement about the range over which these economies persist (see, for example, Kim and Clark 1988).

Assessments of economies of scale often have focused on entire water or wastewater operations. For example, some engineering based studies suggest that economies of scale in water supply persist over a utility's entire operation. These assessments are not relevant here, as it is preferable to isolate economies of scale and scope to particular production layers, particularly water transportation. Water transportation refers to the large diameter bulk transmission mains and the smaller diameter distribution or reticulation network. We are not aware of any studies of scale or scope economies that distinguish between these two sections of the transportation network.

Economies of scale in water and wastewater disposal

There is some evidence to suggest that there are substantial economies of scale in the transportation of water. Bruggink (1982) found significant economies of scale in water supply and distribution utilities. The largest utility in his data sample supplied 605.6 gigalitres of water per annum. The mean utility supplied 39.7 gigalitres of water per annum. In Australia, the volume of water supplied per annum ranges from 16 gigalitres (Central Highlands Water) to 550.7 gigalitres (Sydney Water) (see table 5.3). There also is evidence to suggest that utilities suffer diseconomies of increasing water distribution networks beyond a certain size (Kim and Clark 1988).

There also is evidence of economies of scale in bulk water collection as well as water treatment and wastewater treatment operations. However, the studies of economies of scale in treatment operations are dated. There is anecdotal evidence that recent technological innovations make localised, small scale water and wastewater treatment operations increasingly feasible. For example, mobile wastewater treatment plants can now be brought in to temporarily cope with peak loads.

Economies of scope between water and sewerage services

There appears to be little research on the extent of economies of scope between the provision of water and sewerage services. Vickers and Yarrow (1989) state that, "to the extent that there are economies from the integration of the [water and sewerage industries]…. the resulting benefits are not of decisive importance."

If significant savings in contracting and transactions costs are being realised from integration of water and sewerage services in Australia, then continued integration would be justified. However, this does not appear to be the case. There do not appear to be strong transaction cost reasons for integrating the two businesses. There are no common assets, but there are similarities in assets. There may also be some economies in joint management and administration of the two businesses. There may also be synergies in maintenance and repair work since they both have similar operations and both deal with pipeline networks. This suggests that sole provision of water and wastewater services may be desirable. However, these advantages do not necessarily render separate provision infeasible.

Economies of scope between sewerage and drainage

Stormwater and sewage collection systems are usually treated separately because wastewater treatment facilities operate more efficiently when the flow and concentration of wastewater is relatively constant. Integration could cause overflow problems during periods of heavy rainfall. Also, while drainage services can be commercial, they are often considered to exhibit public good characteristics (while sewerage services do not). This means drainage may be best funded by ratepayers/taxpayers through municipal drainage businesses/explicit operating subsidies. However, there may be some (not substantial) economies in joint management and administration.

Economies of scope between water supply headworks and transmission

There is a strong relationship between headwater works and the transmission pipeline. If a pipeline business was denied access to the upstream water supply, the pipeline assets dedicated to that particular water supply would have little value. The opposite may also be true if the water provider has no alternate use for its water supply. If they were separated, parties could still contract to carry a particular volume of water. Water quality may be an issue if these functions were separate. However, these can be overcome through contracts.

Economies of scope between individual catchments

The traditional view is that there are strong economies of scope between individual catchments. The optimal management strategy in water systems is to draw on water contained in the smallest/shallowest reservoirs first (where relative evaporation is highest). However, water from smaller reservoirs generally costs more per unit that water from larger reservoirs. If reservoirs were managed individually and competed in a pool arrangement similar to electricity generators, the largest reservoirs would win the first supply contract. This would lead to sub-optimal usage of the water supply and higher costs than if the catchment were operated by one entity.

In the United Kingdom, third party access provision are expected to encourage newcomers to develop new water sources. This suggests that economies of scope between individual water catchments may not be as great as once thought. Even if sole management of water harvesting and collection facilities is considered most efficient, it is feasible for multiple firms to bid for the right to own the capacity of these facilities. The COAG national water reforms support a system whereby state governments set water allocations or entitlements, which may be traded within and across states.

Economies of scope between wholesale and retail water supply

The pipelines of the bulk supplier and retailers are interconnected. This implies a high degree of asset specificity. They do not have significant alternate uses other than carriage of water or wastewater. Quantity and quality contracts can be used to overcome co-ordination difficulties where retail and wholesale functions are separately owned and operated.

The COAG national water reforms encourage structural separation of wholesale and retail water and wastewater disposal functions. This suggests that economies of scope between the two functions do not render separate provision uneconomic. However, structural separation of wholesale and retail businesses does impose costs in an access environment, since it effectively splits the natural monopoly transportation facility in two. It is possible that, to gain access to a particular pipeline service, a declaration applicant must negotiate with more than one water business. There also is the potential for monopoly rents to be entrenched between the two facilities (see, for example, King and Maddock 1996).

Summary

It is difficult to generalise about whether it is uneconomic to duplicate water and wastewater facilities. Nevertheless, there is evidence to suggest that most transportation facilities exhibit

classic natural monopoly characteristics. It should be remembered, however, that natural monopoly relates to both technology and market demand. Consequently, new technologies can make duplication feasible by reducing economies of scale.

4.3 Identifying facilities that are least likely to be economic to duplicate

The test under Part IIIA of the TPA for whether it is uneconomical for anyone to duplicate a facility is not as onerous as it would be under a strict economic natural monopoly test (Ergas 1997). It does not appear to require that duplication be uneconomical from the community's perspective, only that an actual or potential supplier would find it uneconomic to develop another facility to provide the service.

Most water transportation facilities, particularly bulk transmission pipelines and channels, are unlikely to be feasibly duplicated. They exhibit textbook natural monopoly characteristics, including large up-front investments with relatively low operating costs. Average unit costs persistently decline as output increases within the bounds of available demand, which creates a barrier to rivals entering the market. Certainly, there are no alternative technologies to provide the same service that water and wastewater transportation facilities provide. There are some substitutes but these are individual household/business options, eg carting, that are not able to exploit economies of scale. And a duplicated set of pipes delivering water and removing wastewater to/from households and firms is considered uneconomic.

In some countries where high water quality is scarce, potable and non-potable water can be carried in separate pipelines. Competition might be possible if the two pipelines were operated by two different companies. However, at this point in time, widespread use of dual pipelines is considered uneconomic in Australia. However, recently there has been increased interest in recycling of treated wastewater for irrigation and industrial applications. In future, it may well be feasible to duplicate a potable water main with a treated wastewater main for some applications.

The bulk collection of water was also traditionally thought of as having natural monopoly characteristics. Certainly there is evidence of economies of scale and scope, though probably not as pervasive as in the network facility. This suggests sole operation of collection facilities is most efficient at this time. However, as noted earlier, this does not preclude competition in the capacity of water collection facilities.

Water and sewerage treatment facilities can be analysed in a similar way to rail terminals. In rail, the NCC has ruled that access to terminals and lifting equipment is not essential to

effective access to rail tracks. In water, it is recognised that coordination may be easier where the owner of the transportation facility also owns nodal treatment works. However, treatment works are not integral to the transportation service.

4.4 Services provided by multiple facilities

Part IIIA of the TPA requires that the NCC assess whether it is economic for anyone to develop another facility that could provide part of the infrastructure service. It is the NCC's view that if a service is partially duplicable, then that service cannot be declared. This issue is relevant where two or more infrastructure facilities, in combination, provide the service that an applicant seeks to have declared. The example used by the NCC in its guidelines relates to telecommunications:

> … a satellite communication service involves an earth station and a satellite transponder. If one of these facilities could be economically duplicated (for example, the earth station), then part of the service cannot be declared. (p. 25)

In the water industry, there are many situations where contiguous and complementary facilities combine to provide a water or wastewater transportation service. For instance, water pumping station and local water storage facilities combine with pipelines and channels to provide a water transportation service. In a sense, pumping and localised storage are integral (ie necessary and inseparable) to the pipeline service. If an applicant cannot access pumping services, there can be no transportation service. Localised storage reservoirs can be equally necessary in some cases. A similar situation arises in the context of rail. Pumping stations and local storage reservoirs are similar in many ways to signalling services in the case of rail. That is, they are ancillary facilities necessary and inseparable from the use of the track (pipeline). The same argument applies where access is sought to a drainage facility and pumping stations are integral to the transportation of water through that facility.

Notwithstanding this, there may be some cases where it is economic to duplicate a pipeline, pumping station or localised storage facility. For instance, it may be possible to duplicate particular pipelines because they do not have natural monopoly characteristics. This situation also occurs in rail, where it is possible to duplicate some spur lines. Only case by case assessment can ascertain whether a particular pipeline is duplicable.

In some situations, metering facilities may be integral to the transportation service. Access to metering services is important to the introduction of competition in retail supply of water services. A third party using access provisions to onsell water under retail licence in

competition with an incumbent cannot compete if it has no means of verifying that it has provided a service. A similar situation arises in telecommunications. To compete with Telstra, Optus required access to call records. Duplication of water metering facilities may be feasible in some cases, eg for large industrial customers. However, at this stage, it is unlikely to be feasible for residential services.

Some may argue that water and wastewater treatment facilities also are integral to a transportation service and are uneconomic to duplicate. This is unlikely to be the case as these facilities are separable from the service provided by the facility. Technological developments mean that it is becoming increasingly feasible to develop localised water and wastewater treatment facilities. Indeed, in the United Kingdom, while there is no legal framework for common carriage as yet, there is expected to be an obligation on the applicant to treat water to potable standards where they seek access to a pipeline carrying potable water.

It may be desirable for an applicant to contract with the owner of a treatment facility to undertake treatment on their behalf, for example if the applicant seeks connection to a raw water pipeline in order to supply a "downstream" customer with treated water. In fact, where there is under-utilised capacity in treatment facilities, the facility owner has an incentive to contract with the newcomer to undertake this service. However, even though a contractual arrangement is desirable, this is not the same test as uneconomic to duplicate. It is still not likely to be uneconomic to duplicate the treatment facility. In this sense, treatment facilities are akin to terminal facilities in rail.

4.5 Conclusion

Water and wastewater transportation facilities, including bulk transmission pipelines and channels and reticulation networks, exhibit many of the characteristics commonly associated with natural monopolies, including economies of scale due to high fixed costs and relatively low operating costs. These factors generally make it uneconomic to duplicate water and wastewater facilities.

There also are facilities which are integral (ie necessary and inseparable) to the transportation service that are not pipelines or channels. These can include pumping facilities, local storage reservoirs and meters. These facilities also are generally uneconomic to duplicate. For access to be effective, applicants must also be able to access services provided by these facilities. Water and wastewater treatment facilities generally are not integral to the transportation service and are duplicable.

CHAPTER 5: ARE WATER FACILITIES LIKELY TO BE NATIONALLY SIGNIFICANT?

The NCC has determined that only facilities (or parts of facilities) that cannot feasibly be duplicated are relevant to an assessment of whether the facility is of national significance. In water, this restricts the field of consideration to pipelines and channels, pumping stations and meters.

In a sense, the national significance criterion may provide the most difficult of all for an applicant to meet. To be nationally significant, a facility must be of sufficient size, be important to trade or commerce, or be important to the national economy. State regimes require only that facilities be significant to that state, which is a much lower hurdle. The likelihood that an application will meet the national significance test will depend upon the degree of access sought by an applicant — generally it is easier to prove that an entire network is nationally significant than a single pipeline or channel. It also will depend upon the importance of the downstream activity to the national economy. This will require case by case assessment.

In this chapter we establish guideposts to be used when assessing the national significance of water facilities. In the absence of any particular declaration application, we present national data. However, the same framework can be used to assess whether a particular facility (or group of facilities) is nationally significant.

5.1 The size of water facilities in Australia

Part IIIA of the Trade Practices Act provides that a facility may be deemed nationally significant on the basis of its physical size. A commonly used indicator of physical size is output or throughput per facility. In Australia, urban water businesses supplied 1.94 million megalitres of water in 1995-96. This translates to an average of around 400kL of water supplied to each property. Other indicators of size include the number of kilometres of pipelines, number of pumping stations and the number of customers connected to water systems in Australia. These are presented in table 5.1.

Table 5.1: National indicators of facility size in water supply, 1995-96

Indicator	*Quantity*
Volume of water supplied (ML)	1 942 352
Number of pumping stations	840
Kilometres of pipeline	80 445
Number of customers:	
Total	4 885 000
Households	4 348 000
Non-household	537 000

Source: WSAA 1997

Urban wastewater businesses undertook at least primary treatment of around 1.30 million ML of wastewater in 1995-96. There are nearly 70 000 km of wastewater pipelines in Australia. Table 5.2 presents various indicators of wastewater facility size.

Table 5.2: National indicators of facility size in wastewater disposal, 1995-96

Indicator	*Quantity*
Volume of wastewater treated (ML)	1 298 409
Number of pumping stations	3 220
Kilometres of pipeline	67 565
Number of outfalls	41
Number of customers:	
Total properties	4 546 000
Households	4 109 000
Non-household	437 000

Source: WSAA 1997

In aggregate, water facilities do appear to meet this criterion. However, individual applications for declaration are likely to relate to a portion of these pipelines and customers. It may be easier for a declaration application to meet this criterion if applicants seek access to a service involving a pipeline facility that is several hundred kilometres long rather than one that is only a few kilometres long. Otherwise, it may be that only the largest urban trunk pipelines and channels, and some large irrigation pipelines and channels, will meet this criterion. Applicants may therefore seek to gain access to an incumbent water business' entire pipeline network. We present facility size indicators for each urban water business in table 5.3. Detailed volume of wastewater treated data is not available.

Table 5.3: System indicators of facility size, 1995-96

Water Business	*Water supplied (ML)*	*Water main (km)*	*Sewer (km)*
ACTEW Corporation	53 254	2 877	2 784
Barwon Water	32 622	1 939	1 508
Brisbane Water	185 615	1 703	1 230
Central Gippsland Water	65 069	1 703	1 230
Central Highlands Water	15 960	1 700	820
City West Water	109 800	3 200	2 900
Coliban Water	33 371	1 662	999
Gold Coast Water	56 439	2 159	2 177
Hunter Water Corporation	74 502	4 081	3 486
Melbourne Water Corporation[a]	463 615	1 340	380
Power and Water Authority	34 723	995	586
SA Water	173 000	8 676	6 294
South East Water	148 500	7 010	5 997
South East Queensland Water Board[a]	264 573		
Sydney Water Corporation	550 746	21 020	21 840
Water Corporation (WA)	213 660	11 003	7 824
Yarra Valley Water	195 091	9 377	7 510

a denotes wholesale only business.
Source: WSAA (1997)

5.2 Do facilities engage in or support constitutional trade or commerce, high levels of trade?

Part IIIA of the Trade Practices Act provides that a facility can be found nationally significant if it is important to constitutional trade or commerce. To meet this criterion a water facility must either be responsible, in its own right, for a substantial volume of water trade or the activity that access is intended to support must involve high levels of trade or exports. In their own right, it is likely that only the largest urban, industrial and irrigation trunk pipelines and channels will be involved in high levels of water and wastewater disposal trade.

However, there are many users of water who are involved in high levels of trade. These water users may not find it difficult to meet this criterion. To do so they should demonstrate that:

- the good or service produced by the water user is highly traded in inter-state or export markets; and
- there is a high degree of connectivity between that activity and the services provided by a water facility where access is sought.

Generally, it will be easier for large agriculture, industrial or commercial users of water and wastewater disposal services to meet this criterion. Consider a hypothetical example of a group of orchard owners seeking access to a trunk pipeline to transport a bulk water entitlement to its point of use. If the water is used to irrigate orchards, then it is relevant to consider the volume of water trade they account for. It also is relevant to consider the volume of trade that the orchards account for in wine grape and wine production markets, including export markets. Evidence should also be presented that the orchard's owners a greatly reliant on the transportation service provided by the trunk pipeline.

5.3 Are facilities important to the national economy?

Part IIIA of the Trade Practices Act also provides that a facility may be nationally significant if it is important to the national economy. There are several indicators of the importance of water facilities to the national economy that the NCC should use as guideposts when considering declaration applications against this criterion. They include:

- connection to the national economy;
- the value of water and wastewater assets;
- the contribution that water and wastewater services make to GDP;
- the contribution of water as an input into production of other goods and services; and
- employment.

As shown below, water facilities in aggregate make a substantial contribution to the national economy. However, whether a particular facility (or group of facilities) meets this criterion must be considered on a case by case basis.

Connection to the national economy

There is some overlap between the indicators that can be used to demonstrate the connection between water and wastewater facilities and the national economy and those use to demonstrate that these facilities are significant in terms of size. The key indicator of connection is the number of customers that use the relevant facility, including all downstream users. It also is relevant to consider whether those customers rely solely on the relevant facility for their water or wastewater disposal requirements.

Value of water and wastewater assets

There is a considerable investment in water and wastewater assets in Australia. The replacement value of assets across the industry was estimated to be $50 billion in 1995-96 (WSAA 1997). This excludes drainage assets, which are not valued on a replacement value basis across Australia. However, the current cost of drainage fixed assets was $1.083 billion in 1995-96.

While dams, pumping stations, water treatment works, wastewater treatment works and wastewater outfalls involve substantial investment, water and wastewater pipelines account for as much as 70 per cent, or $35 billion, of industry assets. This investment compares with $43 billion for electricity, around $25 billion for Telstra and $2.2 billion for Australia Post for the same period (BIE 1996, Telstra 1997, Australia Post 1997).

Contribution to GDP

WSD services directly contributed around 0.94 per cent or $4.03 billion to Australia's GDP in 1995-96. This contribution is less than that of the electricity industry (2.14 per cent in 1995-96) but greater than the contribution made by the gas industry (0.34 per cent in 1995-96).

Water as an input to production

While the majority of water and sewerage service customers are residential dwellings (around 90 per cent), the WSD industry makes a small but significant contribution to input costs across Australian industries. In 1992-93, WSD services comprised around 1.5 per cent of total industry input costs. The agricultural sector is the greatest user of water, particularly raw water. The WSAA estimates that the 4 largest raw water customers in Australia individually account for between 2 300 and nearly 26 000 megalitres of water per annum. In contrast, the 5 largest treated water customers in Australia individually consume between 2 300 to 14 500 megalitres of water per annum.

Employment

The urban water and sewerage industry employed 10 580 full time equivalent employees in 1995-96. Generally, the number of full time employees in the industry is declining. A large part of this reduction reflects an increased tendency for utilities to contract out various functions.

5.4 Conclusion

It will be difficult for most water and wastewater facilities to meet the national significance test in their own right, that is without reference to the market that the water user operates in (referred to here as the downstream product market). If a water facility is found to be nationally significant in its own right it is likely that it will be under criteria relating to the size of water facilities or contribution to the national economy. It is possible that the point of interconnection will affect the likelihood that a declaration application will be found nationally significant. For instance, a bulk transmission pipeline is likely to have greater national significance than a street level reticulation main.

Generally, it will be easier for large agricultural and industrial water users (eg irrigators, electricity generators, pulp and paper manufacturers and breweries) to demonstrate that a water facility is nationally significant on the basis that they rely on it to support a high level trade in inter-state or export markets.

CHAPTER 6: ARE THERE HEALTH AND SAFETY REASONS FOR DENYING ACCESS?

Under Part IIIA of the TPA, access can be denied on the grounds that it poses undue risk to human health or safety. For any declaration application, the onus is on the infrastructure operator to demonstrate that access to the service would compromise existing health and safety standards. Care needs to be taken that this criterion is not used to unnecessarily prevent access. That said, there are legitimate human health and safety concerns in WSD. This chapter identifies key elements of the facilities that might affect human health and safety. It also examines options to allow access without compromising existing water quality and safety standards. As explained, none of the health and safety concerns raised in this chapter are insurmountable. The costs of introducing or supplementing measures to protect human health and safety will vary across water systems. In some cases, it is possible that the cost of overcoming health and safety concerns could outweigh the benefits that access may generate. Whether costs outweigh benefits can only be determined on a case by case basis.

6.1 Hydraulic and network management factors which affect human health and safety

There are potential hydraulic and network management problems associated with the introduction of alternative sources of supply into transportation systems. These can affect reliability of supply and the level of safety in transferring water around the network.

For example, it is important that existing mains and channels have the capacity and integrity to cope with the increased loads that can accompany access. Additional transfers of water or wastewater can alter pressure in bulk transfer mains and in the reticulation systems connected to these mains. In water and wastewater systems it is important that the pressure in the receiving system is lower than in the supplying system. Higher flows cause greater pressure loss through pipes and lower pressures at properties. Pumping can raise pressure. However, there are limits on the maximum operating pressure for the material and class of pipe, join or fitting. Raising pressures above these limits could jeopardise safety. These problems can be avoided with the installation of technology to monitor pressure fluctuations and system operations (Ofwat 1996).

Various mechanisms are used in transmission and distribution systems to stabilise supply patterns, including pressure reducing valves, non-return valves, pumps and surge suppression measures. These can be disrupted or become inadequate in the event of access. However, these mechanisms can be augmented to prevent failure.

6.2 Water quality concerns

The primary health and safety issue arising in the consideration of common carriage in the UK concerns water quality, or the perception of water quality. When common carriage provisions become operational, there will be an obligation on the applicant seeking access to treat raw water to required standards before it enters potable water mains. As discussed in chapter 4, localised, smaller scale water treatment facilities are increasingly feasible with new technologies.

However, even where the newcomer treats water to existing standards before mixing with existing water flows, additional water quality concerns can arise from increased water flows. For example, where access involves the introduction of new customers who are remote from headworks, it may take longer for water to travel through the system. This can lead to excessive concentration of chlorine within the transportation network. Ofwat estimates the transit time over a 20km main could be between three hours and two days, depending on the system in question. The problem of chlorine build-up can be overcome by realignment of blending ratios.

Increased flows could also dislodge sediment in the pipeline network, causing discoloration of tap water. However, it is possible to predict and control the critical velocity which will dislodge particulates. This can be resolved by relining or cleaning critical mains (Ofwat 1996). Increased water flows also can promote corrosion of mains. Corrosion of iron pipes can be avoided by ensuring that added water is not softer than original water through treatment (Ofwat 1996). Corrosion of copper pipes also can be avoided through treatment.

Low pressures that can accompany access can cause contaminants from the soil to infiltrate pipelines through joints or cracks. If access causes a reduction in pressure to very low levels this can become a problem. Maintenance or replacement of mains and filtration can overcome it.

CHAPTER 7: IS ACCESS LIKELY TO BE CONTRARY TO THE PUBLIC INTEREST?

Under Part IIIA of the Trade Practices Act, access to a service can be declared only if it would not be contrary to the public interest. This criterion is intended as a catch-all to deal with matters relevant to deciding whether access is desirable that are not dealt with by other criteria. It is expressed in the negative rather than the positive, which implies applications that are public interest neutral will satisfy this criterion.

The TPA does not define public interest. However, we encourage the NCC to adopt the broadest possible definition to encompass the welfare of the entire community. The public interest includes the interests of WSD employees as well as water consumers, businesses that use water as an input in production and all participants in the national economy.

To be contrary to the public interest, access must create a distortion in the allocation of society's resources that cannot be overcome except by denying access. The onus should be placed on the incumbent service provider to demonstrate this. To prove access is contrary to the public interest, they must show that costs of access outweigh the benefits. Benefits and costs should be broadly defined to capture both short term "static" effects, longer term dynamic efficiency effects as well as social welfare considerations. The key costs and benefits that should be taken into account include:

- *resource allocation effects*: Access should only be granted where it is economically efficient; that is, it should not preclude the production of water services at least cost (technical efficiency), the allocation of water services to those who value them most highly (allocative efficiency), or the incentives for innovation and investment (dynamic efficiency).
- *timing*: It may be sensible to deny access if an effective access regime is about to be ratified. However, this should not be used to unnecessarily delay access in the water industry. Certainly, where access regimes are distant and/or non-specific the NCC should not reject an access application on this basis. Nevertheless, there may be cases where a process for establishing access is in its final stages and it is in the public interest to let that process run its course.

- *other water reforms*: There may be situations where access is not the best option for achieving a particular outcome. For example, some may seek to use access provisions to resolve disputes over boundaries between wholesale and retail operations. This is not likely to be an efficient use of access provisions. It would be preferable for interested parties (including retail business, wholesale business, major customers and state governments) to treat problems of this kind directly.
- *destabilisation and uncertainty created by access regimes*: There is a potential that access regulation will limit, rather than enhance, the prospect of increased competition and (dynamic) efficiency. This can occur where uncertainty destabilises the market and reduces incentives to invest in infrastructure facilities. For example, uncertainty surrounding whether a facility may be subject to an access application may affect the take-up of franchising or contracting options in the industry. In part, the NCC can mitigate against this by facilitating the exchange of information between interest groups, including the NCC, state governments, water suppliers, potential access seekers and consumer groups.
- *environmental consequences*: The TPA requires that access should not compromise ecologically sustainable development objectives. In water, one of the greatest environmental concerns is salinity. If access promotes the development of saline groundwater sources, it may actually alleviate salinity problems by lowering the saline water table. It is more likely, however, that developers of new groundwater sources would prefer to develop fresh groundwater sources rather than face the costs of treating saline groundwater (eg for use as irrigation water). Greater exploitation of fresh groundwater sources may adversely affect plant growth where root systems cannot reach the lower fresh water table. This problem may be mitigated, at least in part, by the issue of extraction licences and regulation to limit the overall volume of water extracted from fresh groundwater basins.
- *equity considerations*: The costs imposed by access may fall disproportionately on one or more groups in society. In some cases, it may be appropriate for those who gain from access to compensate those who lose out. Equity considerations need not provide grounds to reject a declaration application, but may affecting timing or terms and conditions of access.

- *regional development*: The costs imposed by access regulation may fall disproportionately on one region. This need not provide grounds for rejecting an access application, but may affect access terms and conditions.
- *transitional effects*: Some parties may require time to adjust to an access environment. Again, this need not provide grounds for rejecting a declaration application, but may affect the timing of access. The NCC should exercise care to ensure that parties with a vested interest in delaying access do not do so unnecessarily.
- *health and safety implications*: Chapter 5 outlined health and safety issues. We are confident that health and safety standards need not be compromised by access, although this will require investment in treatment facilities by parties seeking access and may involve refurbishment or upgrading of existing transportation facilities. Many of these costs will be relevant to negotiation of access terms and conditions.
- *consumer interests*: Assessment of costs and benefits should be sensitive to the interests of consumers generally. It should also be sensitive to the impact of access upon consumer groups (eg industrial, commercial, residential, irrigation customers)
- *competitiveness of Australian businesses*: Access can lead to increased choice of supplier, the development of differentiated services, and lower prices. These can increase the competitiveness of businesses that rely on water services as an input to production. These should be included in any assessment of the public benefits of access.

PART 2: OVERSEAS EXPERIENCE

Government owned utilities dominate the provision of water and wastewater services in most countries. Where there is private sector involvement, it takes one of four forms:

- full private ownership and management;
- partial private ownership;
- public ownership and private management of assets through franchising; and
- public ownership and management with some functions contracted to the private sector.

Full private ownership of large scale WSD businesses is rare, except in the United Kingdom and the United States. However, private sector involvement in the industry is increasing. There are several explanations for this. First, in many countries there is a perception that the institutions that have developed under public provision are inadequate. In many cases, a lack of accountability and monitoring has encouraged mis-management and poor performance. Private participation in the industry is one way of placing pressure on water utilities to act commercially and improve performance. Second, in many systems environmental and water quality standards are being increased. This requires investment in new facilities and substantial upgrades of existing systems. Constraints on public finance have prompted governments to look to the private sector to provide the necessary investment. Finally, in some systems there is a backlog of refurbishments, the result of deferred expenditures in the past that must be overcome. Again, financial constraints have prompted governments to turn to the private sector to clear the backlog.

The United Kingdom has the most private sector involvement in water and wastewater services. No other country has fully privatised its water supply. As far as we have been able to ascertain, the United Kingdom is also the only country considering third party access, other than Australia. However, third party access or "common carriage" arrangements are still in their infancy. Currently in the United Kingdom, there is no legal framework within which access can occur.

Private sector involvement in water and wastewater services usually requires regulation to limit monopoly power. The type of monopoly regulation tends to vary with the nature of private sector involvement. There are three basic regulatory models used for water services overseas:

- privatised utilities and price cap regulation (the UK model);
- franchise contracts with municipalities (the French model); and
- rate of return regulation of investor owned and public monopolies (the US model).

This section of the report describes experiences with private sector involvement in water in the United Kingdom, the United States and France. It identifies the types of services that are provided by private sector water facilities in these countries and the extent to which there is competition in water service provision. It also describes overseas experience with third party access in water and outlines different regulatory approaches to limit the market power of water service providers.

THE UNITED KINGDOM

From 1973 until 1989 there were ten vertically integrated water authorities in the United Kingdom, each responsible for providing water, sewerage and drainage services in England and Wales. These water authorities provided services within their respective monopoly areas, except where supply was arranged though one of the 29 pre-existing privately owned statutory water-only companies. Local government authorities operated many parts of the sewerage system on behalf of particular water authorities.

The water industry was sold to the private sector in 1989 as part of the Conservative Government's wide ranging privatisation program. In September 1989 the assets and liabilities of the then water authorities were transferred to ten subsidiary companies within holding companies (known as Water Groups). Shares in the holding companies were sold in November 1989. Each subsidiary company was granted a 25 year operating license, making them responsible for all water and wastewater services, including extracting raw water, delivering processed water, and receiving, treating and discharging wastewater. The Secretary of State for the Environment or for Wales (depending on where the appointee operates) can terminate these operating licenses at any time, provided it gives 10 years notice.

Following privatisation, the government introduced price cap regulation to limit abuse of monopoly power. Price caps restrict the ability of service providers to increase prices. To prevent service providers from exercising monopoly power by lowering quality instead of prices, the price capping formula contains a quality factor. The government also held monopoly power in check during the first years of privatisation by holding special (or

"golden") shares in the ten water and sewerage holding companies. These special shares were redeemed on 31 December 1994 to expose water and sewerage companies to competitive disciplines through threat of merger and takeover.

At the time of privatisation opportunities for direct competition in the supply of water and sewerage services were expected to be limited. The level of network competition in electricity and gas was considered unachievable in water, due to higher costs of transportation. The Director General of Water Services therefore did not actively promote competition. Some competition was facilitated under the *Water Act 1989* (later consolidated into the *1991 Water Industry Act*) through provision for companies to apply for "inset appointments".

Initially, inset appointments could be granted to a company seeking to provide water and/or sewerage services on a greenfield site (ie one not attached or near to a public supply) within the incumbent service provider's area. Some competition already existed on the borders between regional water companies (RWC). Inset appointments allowed new suppliers to serve previously unconnected consumers within a RWC's geographic area. Inset appointments can be facilitated by:

- a direct connection to a neighbouring water and/or sewerage company's system;
- a bulk water supply/sewerage connection agreement with a neighbouring undertaker; or
- a new or existing source, sewage treatment plant or discharge consent.

Inset appointments can only be granted to a limited company. They may be granted to an existing water and sewerage undertaker. New entrants seeking an inset appointment must satisfy competence and financial viability conditions set down by the Director General of Water Services. A large customer can become its own supplier by setting up an affiliated company to act as Appointee.

In practice, the existing Appointee would normally continue to supply water and/or sewerage services) to the boundary of the inset area and would be paid for doing so by the inset Appointee. The customer would receive his/her bill from the inset Appointee. In the case of a bulk water supply or sewerage connection agreement, parties are expected to reach agreement on the terms and conditions for access. However, if they fail to agree the Director General of Water Services has powers to make a determination on terms and conditions.

The Competition and Service (Utilities) Act 1992 extended the provision for competition to allow inset appointments to be granted not only for greenfield sites but also for sites supplied with 250 megalitres or more of water a year. The process for considering inset appointments

was simplified in July 1995. This led to an increase in the number of enquiries and formal applications for inset received by Ofwat.

When provision was made in the statutes for new entrants via inset appointments, two types of insets were envisaged. One was where new resources would be developed or new sewerage services provided and the other was where a brokerage arrangement would be sought. That is, the applicant would obtain a bulk supply from a neighbouring company or, in the case of sewerage services; the inset appointee would connect to the neighbouring company's sewer. As at March 1997, only one of the inset applications received by Ofwat has involved the development of a new sewerage service and infrastructure. There were no inset applications received by Ofwat involving the development of new water resources.

When the inset applicant and the existing undertaker are unable to agree on the terms of bulk supply or mains sewerage connection, the Director may be asked for a determination. As at March 1997, Ofwat had considered 18 inset applications. In all cases the Director of Ofwat has been asked to determine the price at which the incumbent must provide the supply or connection (ie access price). The Director has made such determinations by taking into account the long run marginal cost of supply. If this differs across a region then consideration is given to local long run marginal costs.

While provision for inset appointment was made in 1989, the first inset appointment was not announced until March 1997. Anglian's water licence was varied in May 1997 to make way for this inset appointment. Anglian is to supply a chicken factory (Buxted Chickens) which presently receives a supply from Essex and Suffolk. The variation takes effect on 1 October 1997.

Although only one inset appointment has been announced to date, the threat of inset appointment has prompted some competition in water and sewerage prices. The threat of inset, usually by an agent acting on behalf of a potential applicant, has led companies to disentangle the costs associated with wholesale supply (bulk supply) business from the retail cost of supplying water. Many of the 29 water companies have introduced large user tariffs for water and some have introduced similar tariffs for dirty water.

Recent attempts to increase the scope for competition

Ofwat considers that further competition in the water industry is more likely to evolve if suppliers or potential suppliers have reasonable access to water. Access or "common carriage" arrangements will foster competition from newly developed water sources and

reused treated wastewater. Development of markets for trading abstraction licences is expected to stimulate people to find new sources of supply.

In April 1996 the Department of the Environment (DOE) issued a consultation paper proposing common carriage — third party access to water networks — and competition in water supply to large industrial customers. The DOE consultation paper published on 1 April 1996 had a three month consultation period. It proposed legislative changes for inset appointments, cross-boundary supplies, common carriage and liberalising the making of connections. These proposals (described below) were broadly supported by the industry regulator and most were implemented on 28 January 1997. They are expected to generate a limited form of competition, relative to electricity and gas, in the water industry, albeit slowly.

Inset appointments

Until recently, once an inset appointment was granted the Appointee remained in place unless another replaced it. The consultation paper proposed that inset appointments could be made for limited periods and the Director General be given powers to nominate an undertaker to replace the appointee at the end of the period. To increase the number of customers who can benefit from inset arrangements, the 250 megalitre test was amended to include premises that consume 250 megalitres that are commonly owned but separated by highways, railways and or watercourses. The government also announced in January its intention to consider whether the level of water supply at which inset appointments would be available to large customers should be reduced below 250 megalitres per annum.

In August 1997, Ofwat announced plans to allow Anglian Water to act as sewerage undertaker for a former Royal Air Force site in Severn Trent Water's sewerage area. Water services to the site are currently provided by Yorkshire Water. The Ministry of Defence has sold the site including land and improvements (including sewerage pipelines and a sewerage treatment works) for a private housing development. The system operates on a standalone basis and does not require connection with Severn Trent's or Anglian's own sewerage system. Ofwat has required that a locally based customer service committee[2] serve customers from the new development. This committee already represents the site's water customers and is different to the one that usually serves Anglian's customers.

Cross-boundary supplies

[2] There are 10 customer service committees appointed by the Director of Ofwat to represent the interests of consumers of water and sewerage companies.

Until January 1997, any customer wanting to take a supply of water for domestic purposes could approach any undertaker for a cross boundary supply. The undertaker had a duty to supply that customer, although the customer was required to meet the costs of any required pipelaying. Customers could not require a cross-border supply of water if the water was intended for non-domestic purposes. The consultation paper proposed legislative changes to extend cross-boundary supplies to cover non-domestic use (Ofwat April 1996).

Common carriage

Common carriage was proposed by the Department of Environment in April 1996 to further increase competition. It was envisaged that common carriage would occur where an Appointee's pipes are used to transport water owned by a different supplier.

Consultation revealed two key obstacles to the opening up of existing water networks to common carriage. One concerned water quality and the question of whether water quality standards could be safeguarded[3]. A report commissioned by the Department of Environment and Ofwat by the Water Research Centre concluded that the difficulties in this area, while presenting a challenge, are not insurmountable (Ofwat 1996). The second obstacle concerned customers' perception of changes in taste and hardness that will lead them to regard the product as inferior. The Director General of Ofwat considered that attempts to ensure taste and hardness do not change as a result of common carriage are likely to ensure that competition could not occur. Changes in taste and hardness would therefore have to be accepted, as they are already when the source of supply is varied within an existing network (Byatt, ICR 1997a).

The paper proposed legislative changes to allow any existing water undertaker (including new Appointees) or new supplier holding a direct supply licence from the Director General, to supply customers by means of common carriage across any water undertaker's system. It was intended that from January 1997, large users in England and Wales (ie those with demands of 250 megalitres or more of water per annum or those that dispose of a similar amount of wastewater) be able to take advantage of common carriage provisions. The Director General will have the power to determine, in the absence of agreement between a prospective incoming supplier and the incumbent undertaker, the terms on which water should be supplied.

[3] Water quality was already an issue in the UK before common carriage proposals were aired. Between privatisation in 1989 and March 1996, 9 billion pounds (1995-96 prices) was spent on asset maintainance, refurbishment and construction. Nearly 40 per cent of this expenditure (3.4 billion pounds) went to improving drinking water quality. Capital expenditure of around 4 billion pounds is planned for the 10 years 1995 to 2005 to further improve drinking water quality.

By September 1997, Ofwat had received two applications for common carriage of water. However, the government is yet to endorse a legal framework within which access can occur.

Connection charges

Prior to January 1997, customers did not have a choice over who connected their premises to the water mains. Water companies effectively had a monopoly on this and were allowed to charge reasonable costs. Companies insisted on making the physical connection, though in practice many allowed the customer or their contractor to carry out the trenchwork and lay pipes. In the consultation paper, the Director General pressed for changes to the legislation to allow other parties such as developers and builders to make the physical connection to the mains (Ofwat, April 1996). These changes were implemented early in 1997.

Structural change since privatisation

There has been some structural reorganisation of the UK water system since the water companies were sold in 1989. Mergers to April 1996 include:

- Severn Trent and East Worcestershire Water (September 1993)
- East Surrey Water and Sutton Water (October 1995)
- North West Water and NORWEB (November 1995)
- Northumbrian Water and North East Water (December 1995)
- Welsh Water and SWALEC (January 1996)

Some utilities work together to share research and development, procurement, engineering and fleet management resources and costs, eg Severn Trent and Anglian Water.

Between September 1989 and April 1996, twelve of the water only companies (commonly owned) were brought under five single licences. These are known as grouped appointments. Horizontal integration is beginning to occur with the emergence of multi-utilities. United Utilities now provides water and electricity services in the north west of England. The government is considering a proposal to merge the gas, electricity and water industry regulators.

UNITED STATES

In the United States, water and wastewater operations are highly fragmented. There are around 52 500 water systems. Of these, around 46 per cent are publicly owned, 28 per cent are privately owned and 26 per cent are ancillary systems associated with schools, hospitals, caravan parks etc.

Privately owned companies serve around 15 per cent of the US population. Most private water companies are investor-owned, though there are some mutuals owned by shareholders. Private companies operate the majority of smaller systems in the US. There are very few privately owned systems serving a population of more than 1 million people (Beecher and Mann 1990). In some cases, privately owned companies own combined water and electricity businesses.

Publicly owned companies, usually municipalities, serve around 85 per cent of the US population. Municipalities dominate the provision of services to larger urban areas. Publicly owned companies also traditionally have dominated the provision of wastewater services. These services have been substantially subsidised by governments. Competition between publicly owned companies is deterred by regulation. For example, if municipalities choose to serve customers outside their jurisdiction, they become subject to state regulation. Many municipal water supply systems face serious problems associated with capital deterioration, deferred maintenance, unreliable water supply and under-pricing of services.

Most of the government owned systems price on the basis of estimated usage or on the basis of political considerations. In many systems, including New York City, water meters are only just being installed for usage based charging. This has provided an incentive for overuse of water by consumers. Water suppliers are not able to identify where system losses and excess demand are occurring and therefore find it difficult to improve efficiency.

Mounting regulatory pressures (costs of complying with regulation), and budgetary problems prompting greater consideration of private sector contract operations and maintenance of water and wastewater facilities. In 1992 there were around 300 operations and maintenance competitive franchising contracts between private operators and municipalities. The contracts generally run for five years. It is estimated that these contracts have achieved cost savings of between 20 and 50 per cent (Haarmeyer 1992).

Performance comparisons of private investor-owned water utilities versus public water utilities have found that the two types of companies generally provide comparable services, though

investor owned companies pay taxes and do not receive non-operating income like public utilities. The government owned water utilities receive generous tax subsidies that investor owned utilities do not. A study by Neal, Maloney, Marson and Francis (1996) found that investor owned utilities generally had a lower net cost of capital, lower real water bill and greater efficiency in their operations than government owned utilities.

Public and private water utilities in the US face pressures associated with increasing urbanisation, deteriorating infrastructure, and increasingly stringent drinking water quality regulations. The ability of utilities to respond to these problems is partly constrained by regulations in the industry (Mann 1993).

Government involvement and regulation

Water services are highly regulated in the US for both investor-owned and government-owned companies.

There are many federal laws affecting water supply in the United States. Historically, the Federal Government was responsible for project development and financing, for example of storage and flood control systems. During the 1980s the federal role moved toward issues of water resource management and drinking water quality. The federal government also provides funding programs for wastewater treatment. These programs discourage the take-up of new approaches to meet the community's treatment needs. Federal government grants also create disincentives for companies to comply with water treatment standards, as failure of the government to provide funds was an acceptable excuse for non-compliance (Stiefel 1994).

Federal laws are enforced by a plethora of agencies. Federal agencies include the American Water Works Association, National Institutes for Water Resources (NWIR), National Association of Regulatory Utility Commissioners, American Water Resources Association, and the Water Quality Association. These federal agencies usually have state-based counterparts.

While the federal government plays a large role in water matters, the states have primacy over the federal government in planning, management and regulation matters.

States have authority to create, allocate and regulate water rights. Different rules have evolved concerning the ownership of surface water versus groundwater (Berg 1997). Surface water accounts for 60 per cent of public supply, while groundwater accounts for around 40 percent of public supply. Groundwater has been the subject of a common property resource dilemma.

Each state has authority to create and regulate water rights within its boundaries. However, groundwater does not conform to state boundaries and common property issues arise because one form of usage of groundwater generally precludes another. This has been a source of conflict between states (Berg).

State governments generally have primacy in the control of utility operations, including prices. The states regulate public water utilities through state public utility commissions (PUCs). There are 46 PUCs in the US, regulating around 20 per cent of water systems. PUCs determine revenue requirements and rate structure design. Companies must apply to PUCs for rate of return and price increases. Such applications often are evaluated using formal judicial processes with hearings and rules of evidence and procedure. At these hearings, utilities must prove that price increases are justified by an increase in costs. Investor-owned utilities are regulated through 40 state-based commissions. These commissions regulate the finances of investor-owned utilities to some degree through approval of: debt-equity ratios; issue of stocks, bonds and dividends; and financial arrangements for water projects. Investor-owned utilities usually require prior approval for a major change in a utility's corporate structure or ownership. They also require utilities to file annual or period reports with financial, operating and planning data.

Monopoly power is controlled primarily through rate of return regulation. Rate of return regulation seeks to control a monopoly's behaviour by defining maximum allowable profits, having regard to the utility's costs. This regulation has generated several forms of inefficiency. First, poorly designed rates misallocate water among users. They also have created situations where revenues do not cover costs. There is not widespread use of marginal or incremental costing in the rate design process. Pricing mechanisms often do not allow for cost variations due to seasonal, geographical and availability factors. Second, there is no incentive to minimise the costs of providing water services. In fact, rate of return regulation can have the opposite effect by encouraging utilities to maximise the value of their asset base to allow higher profits. Third, the costs of regulation often exceed the benefits, which leads to a misallocation of utility and regulatory resources. The potential for distortion through rate of return regulation is affected by how utilities' costs are measured. Most PUCs base their decision on an historic cost accounting standard. Some use replacement cost.

Cross boundary trade in water

There is interest in establishing a quasi national market within the US by piping, or delivering by tanker, water from Alaska to the US West Coast. Alaska legislature has passed a law that sets up a mechanism for cross-border water sales. It is envisaged that purchasers of water from Alaska will be able to trade Alaskan water with other water companies. For instance, Nevada could buy water from Alaska and trade it to California in exchange for a portion of California's Colorado River water (Bradner 1993).

There is also interest in importing water from Canada in future once internal debate within Canada is resolved (Berg). Canada, for the most part, is water rich. There is an interest in selling this water to the US and even water poor countries overseas. One proposal involved the export of water to Saudi Arabia by a company called Alaska Glacier Beverages (Bauman 1994).

FRANCE

France has a 150 year history of private sector involvement in the water industry. Today, private water operators serve around 75 per cent of the population and private sewerage operators serve around 40 per cent of the population. Four major private suppliers serve the bulk of the market. The largest private supplier is the Compagnie Genérale des Eaux which serves 40 per cent of the market. The second largest water company is Lyonnaise des Eaux-Dumez which serves 23 per cent of the market. The next two largest companies serve 7 per cent of the market between them. Several small companies have been bought out by one of the big four, who are also involved in waste disposal, television broadcasting, mortuary services, construction and electrical contracting businesses (NZ Business Roundtable).

Although the 36 000 local municipalities have the option of providing water services themselves, private sector involvement has about doubled since 1950. Where municipalities are involved, they often combine to form water syndicates. The majority of private sector involvement is through franchising contracts.

Franchising allows competitive disciplines to be introduced even where there is substantial market power. It can be an alternative to regulation to limit monopoly power. Rival companies bid to take over the management and operations of water facilities for a fixed period. Firms compete on price, subject to a range of non-price considerations including past experience, stability and quality assurance. Franchising contracts often specify service quality

requirements, maintenance obligations, the scope for price increases, the property rights that apply to parties once the contract expires. Competition occurs at the initial contracting stage through bidding. It also occurs, though to a much lesser extent, at contract renewal since there is some (albeit small) prospect that the contract may be re-let to another contractor. (In practice, re-letting a contract to another contractor rarely occurs.)

The franchising model usually takes one of three basic forms:

- Management contracts — These contracts provide for the most limited form of private sector involvement. Government owned utilities contract out specific functions to private companies. The public company retains ownership of assets, accepts general responsibility for the system and responsibility for billing customers. The private company accepts responsibility for a series of specified tasks for the duration of the contract.
- Affermage contracts — These contracts are also known as leasing contracts. They give a private company responsibility for asset operation and maintenance, billing and collection of fees from customers. The contracted private company has discretion in the day to day management of assets and staff and accepts responsibility for financing investments with lifespans that fit within the contracted period, which typically is around 10 years. The government utility accepts responsibility for financing construction and operations with a lifespan greater than the contract period. Contracts usually specify the private contractor's responsibilities for maintaining quality. This type of contract is the one most commonly used in France.
- Concession contracts — These contracts devolve further responsibilities to the private contractor. The contractor can assume responsibility for financing, maintaining or refurbishing assets with long lifespans. Consequently, contract periods usually are longer (typically, 15 to 30 years) to allow the contractor to earn an appropriate return on investment. At the end of the contract period the ownership of assets is notionally transferred to the government utility. In practice, the franchise is usually renewed and the relationship is ongoing.

Water fees are established through negotiated or competitive bidding. Water charges usually are usage related. Concession contracts usually specify initial prices and the scope for price increases based on inflation and increases in input costs. Contracts often contain five year "break points" where either party can request to renegotiate prices. The Ministry of Economy and Finance monitors fee levels. There is no explicit rate of return regulation. However, price

negotiations between contractors and the government utility are often based on each party's perceptions of an appropriate rate of return.

Variations on the French model

Variations on the French model are found in Argentina, Guinea, Ivory Coast, Macao, Mexico, Germany, the Philippines, Indonesia and Fiji.

Argentina

In Buenos Aires, a 30 year concession for all water and sewerage services was awarded in 1992 to a consortium of companies including French company Lyonnais des Eaux-Dumez, English company Anglian Water, Aguas de Barcelona and local investors and employees. The private company is responsible for operating, maintaining and investing in water system assets. It accepts all financial risks and is responsible for billing customers. At the expiry of the concession, the franchisor forfeits all property rights in system assets and operations. There is little evidence of the success of these arrangements as they are relatively new and there is little information available on the performance of the system under government management. However, measured labour productivity has improved with the retrenchment of around 2000 employees.

Guinea

The government of Guinea in West Africa began restructuring water supply in 1987 by introducing competitive bidding for affermage leases. The system now comprises public and private enterprises. A public water authority (SONEG) owns urban water supply facilities but leases the operation and maintenance of those facilities to a partially private sector company[4] (SEEG). SEEG retains a portion of the fees collected and passes the rest on to SONEG. While the government supports a policy of water pricing to recover costs, in practice operations are subsidised.

Ivory Coast

The Ivory Coast water system is a mix of concessions and affermage leases. Private companies have provided urban water services for around 30 years. SODECI was established in 1960 as a subsidiary of a large French water utility. It was subsequently floated and is 52 per cent owned by local stockholders. The industry has been self-financed since 1987, when operating subsidies were removed. The Ivory Coast privatisation experience is generally heralded as a

[4] The Guinea government is part owner of SEEG.

great success. The number of connections per employee is twice as high as any other water utility in West Africa following a substantial increase in connections. For example, in urban areas the proportion of people with access to safe drinking water increased from 30 per cent in 1974 to 72 per cent by 1989. In rural areas, the number of people with access to wells increased from 10 per cent in 1974 to 80 per cent in 1989.

Macao

During the early 1980s in Macao, the government owned water company had a large debt, antiquated facilities and high levels of unaccounted for water. In 1985, a 25 year concession contract was granted to a consortium of French and Hong Kong companies. The water system was small when the contract was awarded (around 130 000 customers) but growing rapidly. Between 1985 and 1991 the number of connections more than doubled. Today all households are connected and metered. Unaccounted for water has been reduced from 40 per cent in 1982 to around 12 per cent in 1991. Water prices have remained at 1985 levels in real terms.

Mexico

The city of Puerto Vallarta has contracted a British company to construct and operate water and wastewater facilities. In Mexico City, distribution and retail functions are contracted to private operators. The city of Monterrey is introducing the French model to produce and operate three wastewater plants.

Philippines

In August 1997, two companies took over the operations of the Metropolitan Waterworks and Sewerage System to provide water and wastewater disposal services in Manila under a 25 year concession contract. One company will pay the other for water treated at a facility within the other company's zone. New capacity is being added to increase the available water supply by 25 per cent to 800 million litres per day by 1999. The two businesses will also provide sewerage services, which also are expected to be substantially expanded over the life of the contract.

Germany

The privatisation of water assets in Germany has focused on water systems in the former East Germany, where water and sewer systems required substantial refurbishment. There also were substantial water pollution problems as untreated wastewater was often discharged directly

into rivers and lakes. Privatisation provided a means of funding substantial infrastructure expenditure requirements.

There are essentially two privatisation models. One model has private companies and municipalities jointly owning and managing wastewater treatment facilities. The other model is similar to the French franchising model. Municipalities contract private companies to maintain and operate sewerage systems, wastewater treatment facilities and provide sludge disposal services. These contracts typically are for 30 years. At the end of the contract period all assets and operations revert to municipal ownership and the contract is either renewed or re-let (NZ Business Roundtable).

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