6. UNDERSTANDING AND MANAGING RISK

6.1 Introduction

According to Cornelius Keating “Risk is the unwanted subset of a set of uncertain outcomes.” The research revealed that there is no consistent definition of risk and that this is dependent on the sector (Landsburg, 2003, Hubbard, 2009, Flyvbjerg et al. 2002 and Flyvbjerg et al. 2003). One definition is that risk is an issue, which can be avoided or mitigated (wherein an issue is a potential problem that has to be fixed now.) Risk is described both qualitatively and quantitatively. In the context of this research risk is described as a situation which would lead to negative consequences. Accordingly, proactive identification and allocation of responsibilities and risks is an essential planning tool in the successful delivery of major infrastructure projects. Whilst the contractual arrangements allocate the responsibilities of the parties, at the same time it is necessary to establish who takes the risks associated with the scheme. Commercially viable and cost-effective risk allocation between the parties is an integral part of a project’s success and is one of the most complex elements of a project arrangement. While decisions on the allocation of risks have important efficiency and distributional implications, the real challenge is to balance the private sector risks to a level at which they no longer constitute a significant impediment to private financing of infrastructure projects.

In Chapter 3 I introduced some of the typical models of PPP arrangements, showing how the differentiation between the various models could be seen through looking at the way that the Grantor and Developer shared risks. Some of the major Developer Risks for each model can be shown diagrammatically:
This chapter will explore methods of allocating the risks and responsibilities between the Grantor and the Developer along with a discussion on managing water and wastewater specific risks. Clearly, the roles and responsibilities between the Grantor and the Developer are allocated within the PPP contractual form that is chosen (as discussed in Chapter 3). So for example, demand risk affects the developer’s risk profile to varying degrees in all contractual models, except it does not have a direct impact on the Developer’s remuneration for management and service contracts. In this section I look at the most complex forms of risk that typically would be present in the concession and divestiture type PPP arrangements. Importantly, recommendations are made on how to bring out the key risk allocation issues, as an important and practical tool for effective decision making in complex PPP arrangement design.

“Risk is the chance of an event occurring which would cause actual project circumstances to differ from those assumed when forecasting project benefit and costs.” (State of Victoria, Australia. Department of Treasury and Finance. 2001)

6.2 Analyzing Responsibilities and Risks

The precise allocation of risks among various parties involved is typically defined after consideration of a number of factors. These include (UNICITRAL, 2001) the public interest in the development of the project, as well the interest of other investors and lenders (and the extent of their ability and readiness to absorb those risks at an acceptable cost). All parties involved in the PPP arrangement have an interest in identifying all risks that a project may face and an equal stake in ensuring that these project risks do not jeopardise the project.
Financing of large infrastructure projects requires a good projection of capital costs, revenues and expected costs, expenses, taxes and liabilities of projects\textsuperscript{52}. Effective risk allocation is premised upon the notion of allocating responsibility for dealing with the consequences of each identified risk to either one of the Developer or the Grantor, or through a system of shared responsibilities. Risks and responsibilities are usually allocated on the basis that (Ringskog, 2000, Smith, 1997a, Torres de Mästle and Izaguirre, 2008 and Woodhouse, 2003):

- Threats to project costs and risks to the project are minimized by allocating particular risks to the party in the best position to reduce the probability of the risk being realized and in the best position to manage the consequences of the risk after it has materialized.\textsuperscript{Fout! Bladwijzer niet gedefinieerd.}

- One party may be better placed to diversify or absorb the risks than the other parties involved in the arrangement

- Allocating a risk to a party should provide incentives for the party to spend time and resources in delivering the expected outcomes

- Not all risks can be foreseen within a PPP agreement and therefore the agreement will need to allow for mechanisms that deal with unpredictable, unforeseen or unmanageable events. This is best dealt with under the contract eg force majeure and other clauses for unforeseen events.

It must be noted however that risks are sometimes allocated on the basis of commercial and negotiating strength with the stronger party seeking to allocate the risk it does not want to bear to the weaker party. In such circumstances, the Grantor must ensure that when developing the PPP agreement it foresees such a situation and plans accordingly. The Grantor must not find itself with a counterparty that is unable to mitigate a particular risk which could lead to an unsuccessful PPP project (Gupta \textit{et al}, 2002).

An example of the format for a risk analysis matrix developed for a recent major PPP scheme is given in Annex 4. This matrix was developed at an early stage in the design and development of the PPP scheme to bring out the key risk allocation issues, and was used as an important and practical tool for effective decision making in a complex situation. In practice, risk allocation is often a product of policy considerations and the negotiating strength of the parties. In allocating project risks, it is important to analyze the strengths of each entity to which a specific risk is allocated and their ability to shoulder the consequences of the risk should it occur.

### 6.3 Common Risks and Responsibilities

Risks can be divided into three broad categories (Mandri-Perrott, 2009):

- Political and Macroeconomic Risks - Country risk refers to the possibility that changes in the business environment will occur that reduce the profitability of doing business in a country. These changes can adversely affect operating profits as well as the value of assets. This includes political risks and macroeconomic risks

\textsuperscript{52} It must be noted that all these projections are not an exact science. Developers and lenders will make assessments of the various capital costs, revenues and expected costs, expenses, taxes and liabilities for the project based on their experience and their appreciation of country, sector and other risks associated with undertaking the project.
• Sector Risks - The risk that the sector will be affected by economic or other factors which pertain to that sector more specifically than other sectors

• Project Risks - Refers to those circumstances which may have an effect on the responsibilities of each party to the PPP agreement and the benefits they may achieve from the project. These include risks related to financing, design and construction and operation and maintenance

• Counterparty Risks – Relate to specific risks arising from the counterparties to the PPP agreement not being able to meet their responsibilities under the PPP agreement (in a typical PPP agreement the main counterparty if the Grantor but there may be other counterparties such as a specific a national agency that grants the developer special permits for water abstraction).

Risk magnitudes vary depending upon the project phase: some risks are important early on in the bidding process and some will continue to exist until the end of the project life. This obviously impacts the optimum risk allocation. The four distinct periods for projects in which risks are allocated are:

• Before bid submission
• Between bid submission and financial close
• During construction
• During operation

Each category of risks contains a number of specific risks connected to responsibilities within the project environment. Variations in specific risks can have positive or negative effects on the cash flow of the project and on the total value of the business. The Grantor should not seek to transfer all risks to the Developer because the Developer will seek to recover the cost of such risk (ie price the risk). The major responsibilities and risks involved in delivering water and wastewater services are now discussed in greater detail.

6.4 Political and Macroeconomic Risks

Political Risks

The Developer and the financiers face the risk that the project may be negatively impacted by acts of the Grantor, other Government agencies or the legislature. ‘Traditional’ political risks include nationalizations, new tax regimes and other events that impact debt service and profits. ‘Regulatory’ risks include the imposition of new standards or the introduction of competition, while ‘quasi-commercial’ risks include breaches by the Grantor or interruptions due to changes in the Grantor’s plans (UNCITRAL, 2001). Other political risks include acts of war, rebellion, default or failure of public sector entities. The Grantor is normally the project participant with the greatest ability to manage the risk of change in the political climate, and so often takes this responsibility.

In some instances, the risks of disruption of construction or operation by individuals or groups against the project will be borne by the Grantor unless the disruption was caused by the Developer itself through a specific act or omission. The same risk allocation normally
applies in the case of legal challenges against the Developer that inhibit the Developer’s ability to meet project objectives\textsuperscript{53}.

\textbf{Change of Law Risk}

Changes in law including any adoption, modification, or repeal may happen at any time after a PPP agreement has been signed and become effective (the Effective date). Developers will be particularly wary of future changes in any law which might have an effect on for example standards of water and wastewater quality for which adequate planning may not have been done initially\textsuperscript{54}. It is essential that there is an effective mechanism to deal with the consequences of any change of law after the bid date (not only after the effective date\textsuperscript{55}), particularly where this may require the Developer to incur costs or which may result in a decrease in profits. Accordingly, change of law provisions that are included in the PPP agreement should deal with who should be responsible for the costs arising from changes in law and how such costs should be funded. This is further discussed in Chapter 7.

Significant changes in law could include:

- Currency or capital repatriation limitations;
- Nationalization of developed assets;
- Import/export prohibitions;
- Deprivation of Developer rights.

\textbf{Contingent Liabilities}

The United Kingdom’s HM Treasury (2003), state that contingent liabilities represent commitments to future expenditure if certain events occur. Many of the risks associated with private sector participation in infrastructure create sizeable contingent liabilities for public institutions. Because such liabilities are uncertain and do not correspond to definite cash flow events, simply relying on cash based budgetary analysis will fail to consider their potential impacts on affordability. This is an important issue for the Grantor, and a more detailed review of contingent liabilities and their impacts is given Chapter 7 on Financing.

\textbf{Risk of Change in Interest Rate}

Private investors and local or provincial governments have almost no control over prevailing interest rates, all of which are affected by central government actions. Typically loans are

\textsuperscript{53} Conventional insurance coverage by the Developer may not available to cover this risk or may be so costly that it may not be a practical alternative to cover this risk.

\textsuperscript{54} In countries of Eastern Europe this has been a particular concern as some of the national legislation under which certain PPP arrangements were made were prior to their admission to the European community. In the case of Sofia, Bulgaria and Tallinn, Estonia both countries entered into their respective PPP arrangements prior to being full members of the European Union. In particular, the Estonian government made clear that any obligations related to water quality and associated standards related to the European’s Water Framework Directive were enshrined within the PPP agreement at the time of contract award.

\textsuperscript{55} The effective date is the date in which the contract obligations become effective.
quoted in relation to a floating interest rate (based on some reference value such as LIBOR or EUROBOR) and such interest rates change with time and are not something that bidders or Developers can control. Usually, Governments are not willing to compensate Developers for changes in interest rates during construction or operation.

Since revenues cannot usually be varied in accordance with interest rate variations, equity holders, lenders and Governments usually prefer that the winning bidder - Developer sources a significant portion of debt at fixed rates through an interest rate swap. This is a financial derivative product by which the developer seeks to manage its exposure on interest rates it is being charged for the loans in the project. The swap exchanges a floating rate loan to a fixed rate loan.

However, given that the bidder/Developer does not know precisely when financial close of the PPP agreement will occur, it cannot enter into a swap agreement. Bidders must then use assumptions about applicable swap rates as part of their bids despite the fact that it cannot control the swap rate until it enters into a swap contract. More than likely, the swap rate at financial close will differ from that at the time of bidding and this variation can be a positive or negative for the bidder/Developer. Who should then take the risk related to the underlying movement in interest rate swaps? This question is true of any country and is a typical risk associated with project financing. Countries experienced in PPP transactions have generally opted for the Grantor to take the risk of changes in swap rates between bid submission and financial close.

**Risk of Change in Inflation Rate**

Under PPP arrangements, the construction and operational risks are mainly borne by the Developer. However, inflation can have a serious impact on the costs (both construction and operational) of a project. To lenders, covering this risk is extremely important in order to limit their financial exposure, maintain the project cover ratios and also the net benefit anticipated from the revenue stream. For a typical PPP project, the time period between bidding and operating is long and the cumulative impact of inflation over time will be significant.

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56 The London interbank offered rate (or LIBOR) is a daily reference rate based on the interest rates at which banks borrow unsecured funds from banks in the London wholesale money market (or interbank market). The euro interbank offered rank (or Euribor) is the rate at which euro interbank term deposits within the euro zone are offered by one prime bank to another.

57 A swap is an agreement between two parties to exchange future cash flows according to a prearranged formula. They can be regarded as portfolios of forward contracts. The streams of cash flows are called “legs” of the swap. Usually at the time when the contract is initiated at least one of these series of cash flows is determined by a random or uncertain variable such as an interest rate, foreign exchange rate, equity price or commodity price.
Since bidders have no way of managing inflation risk, if asked to bear such risk they will either refuse to bid (the risk is too high) or they will make very conservative inflation assumptions (risk pricing) which will push up project costs significantly. In the latter case it is very likely that it would have been far cheaper for the Grantor to have compensated the Developer for actual cost inflation. For this reason inflation risk is typically passed through to the end user or the Grantor through the indexation of capital grants and other contract payments (eg availability payments, fares). Typically a transparent indexation formula is applied: it may simply refer to general inflation (eg Consumer Price Index/Retail Price Index), or preferably in many cases a basket of inflation indices which better reflect specific project costs (eg construction materials, power, labour). It is important that the indices used are from public sources to ensure transparency and minimize bias.

**Risk of Change in Foreign Exchange Rates**

According to Gray et al (2003), almost all developing country currencies have a history of depreciation against the US dollar. The implications of this is that the true local currency cost of servicing debt denominated in US dollars (or other international currencies) will be higher than the interest rate on the loan. Thus estimating the cost of finance by looking only at the

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58 For example, if the interest is 10% in US dollars, but the local currency depreciates 5% per annum against the US dollar, then the local currency cost of financing is around 15%.
international currency interest rate will systematically underestimate the cost of finance, and hence underestimate the total cost of service\textsuperscript{59}.

Notably, PPP schemes in the water and wastewater sector may involve funding and procurement structures that depend on a variety of currencies:

- PPP projects are often financed with significant amounts of foreign capital, eg in the form of syndicated bank loans, bond issues, bridging and stand-by facilities, with multilateral and export credit agency loans and guarantees
- The project participants may have revenues in one currency, but costs in several currencies.
- Some of the capital and operating costs may be denominated in a currency other than that of the country in which the project is being constructed. Exchange rate fluctuations directly affect the price of imported parts or other inputs required to maintain plants and equipment or construct or rehabilitate new assets
- Project financing involving more than one currency exposes the project to changes in exchange rates
- Changes in exchange rate of local currencies will have an effect on the level of planned revenues and profit taken offshore by the Developer

As a result foreign exchange is a significant issue. Grantors and Developers may mitigate this risk by aiming to reduce reliance on imported inputs or foreign currency borrowing. However, in practice foreign exchange risk is a significant part of most PPP schemes in the water and wastewater sector.

In some instances, it is generally impractical for the Grantor to take all the foreign exchange risk. Additionally the fiscal effects of taking this risk need to be carefully considered. It is possible for the Developer to purchase protection against movement in project costs caused by foreign exchange fluctuations. This can be done through a Currency Swap which involves exchanging principal and interest payments on a loan in one currency for principal and interest payments on an equal loan in another currency.

\subsection*{6.5 Water Sector Specific Risks}

\textit{Demand Risk}

Demand forecasts form a key input to the economic appraisal of any PPP project in the water and wastewater sector. Customer demand is required for the calculation of revenue income and assessing costs for operation, maintenance, rehabilitation of assets and investments. Future demand forecasts are a fundamental input to any economic appraisal. Demand is vulnerable to a number of factors such as (Mackie, \textit{et al}, 2005):

- Economic shocks, including fuel price shocks and economic boom or recession
- Changing demographics and usage habits

\textsuperscript{59} My research suggests that this approach has been the norm as represented for example by the cases of Manila, Jakarta and Buenos Aires and elsewhere, governments and operators agreed to tariffs which were only viable if the exchange rate remained more stable than history would suggest was likely.
• Political intervention
• Random error in the forecasts

**Box 5: The case of managing demand risk in Bolivia**

A good example of the potential impact of demand risk in the water and sanitation sector is the 1997 La Paz–El Alto concession in Bolivia. The developer Aguas del Illimani, took responsibility for operating and managing of the water and sewerage systems and agreed to specified service expansion targets. The arrangement provided for tariff revisions every five years, based on a set of formulas covering the cost of repayment of capital for existing investments, the cost of operation and maintenance, the cost of expansion to meet targets set out in the contract, and commercial costs. In between tariff reviews Aguas del Illimani bore normal business risks, including demand risk. Demand growth, including demand for new connections, has been substantially lower than initially forecast. Despite requests from Aguas del Illimani for an extraordinary tariff adjustment to reduce the impact of this shortfall on its financial position, the regulator refused to review tariffs before the first five-year revision. Ultimately this PPP arrangement failed. In Argentina, the PPP agreement relied on a law which provided for a direct convertibility on a one to one basis between the Argentinean peso and a US dollar. This protected the Developer against exchange rate fluctuations as a ‘change of law’ event in the PPP agreements. Unfortunately the end of the peso-US dollar parity in 2001 and the economic crisis that ensued, led to the early termination of the agreement.

Depending on whether availability of good data on historical usage, customer numbers, and economic and demographic trends are available and accurate, will determine the extent to which demand risk is shared between the Grantor and the Developer. However, the contracts examined under this research seem to show a trend whereby in practice Developer have been reluctant to fully assume demand risk and have developer mechanisms to pass (at least partially) part of this risk on to customers in tariffs or service levels.

In discussions with sector specialists it is clear that the developer has limited ability to influence the demand for water services. This is because of the typical Developer cost structure whereby a large proportion of its costs are fixed. So when demand falls, the average cost to the Developer of delivering each unit of water rises (or the cost of treating wastewater effluent rises). It is unlikely that a Developer will be allowed to increase tariffs if demand is substantially below forecast levels. There are however some limited technical, operational and financial actions open to the developer to help mitigate the effects of demand risk which could include cutting back on capital investment if demand is reduced, or bringing forward investments or leakage reduction plans if demand increases.

**Operation & Maintenance risk**

Operational risks refer to the responsibilities associated with operating the existing and new assets and maintaining them to required standards. Depending on the type of PPP agreement, the Grantor may take less or more of the demand and revenue risk. Typically, the Developer is responsible for costs of operations and maintenance including any costs related to latent defects in the construction for which he is responsible.

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60 Discussions were had with David Stiggers, former Director for the management contract of Trinidad and Tobago, Alain Locussol former lead water specialist at the World Bank, Antonio Vives, former Vice president of the Inter American Development Bank, Chris Jennings senior water specialist of the Inter American Development Bank, Dr Geoff Thorpe Director of Regulatory affairs for Interagua, and Alain Mathis, Director for Suez Lyonnaise de Eaux.

61 If tariff setting rules leave demand risk largely with the operator rather than customers, the operator’s overall risk exposure increases significantly and the sustainability of the arrangement may be threatened.
Furthermore, and also related to foreign exchange risks described above, the exchange rate may affect the price of imported inputs required for the Developer to provide operational and maintenance activities. For example, a change in the exchange rate may change the cost of imported fuel oil, which may affect the domestic price of electricity used to pump water. Similarly, changes in foreign exchange with local currency will affect the supplies such as chlorine and other chemicals.

**Risk of increased project costs**

Given the high capital cost involved in water and wastewater PPP schemes, errors in forecasting can have a major effect on the real economic cost of construction of infrastructure, financial planning and project management. Unanticipated escalations in construction costs and higher than expected inflation rates are factors that may lead to potential overruns. Clearly, who bears this risk depends on the type of PPP agreement. For example, under a Net Cost Contract with Investment also known as a Concession (or some form of Build Operate contract), the Developer would be exposed to such escalations which may affect the Grantor. According to the United Kingdom’s HM Treasury (2003), the two main causes of bias in capital cost estimates are:

- Inadequate definition of scope and objectives of projects in the business case – Grantor risk
- Inadequate management of the project during the implementation phase so that costs are not controlled and contractual risk mitigation instruments are not adhered to – Developer risk.

Bias in capital costs can be dealt with by improved estimation of the capital costs of each option, adjusting these estimates on the basis of empirical evidence, and reducing these adjustments based on confidence in the capital cost estimates and the risk management and mitigation systems.

Demand forecasting has a direct effect on establishing capital and operating costs. When evaluating bids care must be taken to evaluate the forecasting techniques and costs used by the Developer to establish project costs.

**Project Related Risks**

Grantors and Developers face a large number of project related risks. To an extent, certain sector risks (such as demand risk) can overlap as a project risk. However, at its core a water PPP project is a ‘partnership’. Accordingly, the following key risk allocation rules should be kept in mind to balance full risk transfer against creating the right incentives between the parties to the PPP agreement:

- If a Developer perceives a risk to be outside its control, it will tend to price this risk on a ‘worst case basis’.
- Economically it does not make sense for the Grantor to pay the same price as if the problem were certain to happen, whereas it only might happen.

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62 For example, in a United States government study (Pickrell 1992) found that most cost overruns were the result of critical errors in forecasting either the volume of materials and services required to build and equip projects, or the future costs of purchasing inputs.
• For such risks, if the Grantor is not itself capable of managing those risks, the emphasis should be shifted towards incentivization (for example “cost+fee+pain/gain” approaches).

• The optimal incentive is such that the “pain/gain” is commensurate with the cost of doing one’s best

**Development Risk**

The Development phase involves the preparation and procurement of the project up to financial close of the PPP agreement. This phase includes the invitation to tender and bidding, negotiation of the PPP agreement and various project documents and obtaining debt and equity funding. Given the nature of water PPP projects, both the Developer and the Grantor will expend significant time and resources in negotiating the PPP agreement. The costs during this phase are understood to be normal development costs and generally each party bears its own risk. Occasionally, and depending on the way the bidding process is designed and what is allowed in the tender documentation, the Grantor may cover some of the Developer’s bidding costs.

It is important that the Grantor is mindful of the possible changes in costs that may arise from initial estimates to actual costs once the PPP agreement is implemented.

**Design and Construction Risk**

Design and construction risks relate to responsibilities associated with the design, procurement, engineering, construction, completion, testing and commissioning of assets (if applicable). Depending on the type of PPP agreement chosen, the Grantor will set out specifications, or sometimes outputs such as water quality standards, number of connections etc. Developers will base their bids on these specifications. The risk allocation during the design and construction phase is complex but is summarized as follows:

• Design – whichever party takes responsibility for the design, generally takes the risk of errors in design that may lead to the failure of the project to satisfy contractual requirements or laws. The risk of faults or changes in design, latent defects and asset life expectancy would have to be specified and responsibilities allocated. Where variations are required by the Grantor, it typically bears that risk.

• Permits, licenses and Access – the Grantor is responsible for providing the Developer support in obtaining the permits and licenses (eg abstraction licenses of wastewater discharge licenses) necessary for the construction and operation of the water project. However, the Developer has ultimate responsibility for obtaining such permits and licenses. The Grantor is also responsible for guaranteeing the timely delivery of land required for the development of the project, free of legal or physical encumbrances and will bear the costs of dealing with these encumbrances.

• Construction – depending on the type of PPP agreement, the Developer is responsible for constructing the project. The Developer carries the risk of increases in construction costs (price of labour, materials). The Developer is also responsible for the performance of all sub-contractors. The risk of delays is generally borne by the Developer.

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63 Financial close means that the loan agreements are in place and the first draw-down can be made on the loans.
**Financing risk**

Depending on the PPP agreement type and the corresponding level of financing, the Developer will be responsible for raising private financing necessary to complete the project. For the portion of funding that is to be privately financed, the risk of increases in interest rate or inflation rate should be borne by the Developer after financial close. This is dealt in further detail in Chapter 6.

**Government Guarantees**

Guarantees are provided by the Grantor to support infrastructure investments and transfer risks from the Developer to Grantor in order to make an arrangement more attractive to the private sector/Developer. During the construction phase of a project, Developers may be utilizing inputs whose costs depend on the exchange rate and the value of these inputs rises and falls with the local currency. In such cases the Government may provide an exchange rate guarantee to mitigate the effects of depreciation in the currency eg tariff dollarization. However, Irwin (2007) warns that Developers face reduced incentives to improve performance levels when government guarantees cover a risk which the Developer is capable of managing and controlling better than the government. Furthermore, when government guarantees are provided, the contingent nature of the guarantees makes valuing them difficult and this raises issues over how they are to be accounted for within the government’s financial and budget reports (Ter-Minassian 2005).

**Environmental risk**

Generally the Developer will be considered responsible to meet environmental norms and standards eg water discharges, over abstraction and pollution. However, the Grantor will retain certain responsibilities related to specific issues such as pre-existing conditions or special compliance waivers\(^{64}\).

### 6.6 Risks Associated with Managing the PPP agreement

The mechanism for implementing and monitoring risk allocation rules has to balance the required certainty of the PPP agreement in the future with a need for possible adjustment if there are unanticipated changes in laws, indexation and value testing – all critical factors in operating cost risk. Developers will be more willing to take on risks related to unforeseen changes in the operating environment provided they are given value-testing assurances that will not be disadvantaged (HM Treasury, 2007).

The type of PPP agreement will set out its respective financial implications. Put simply, the payment mechanism contained within the PPP agreement details the financial contributions which the Grantor will make to the Developer and also sets out the framework of incentives used to encourage the Developer to provide an efficient service at a cost that provides value for money. How a Grantor contributes financial support to a PPP arrangement and how much it contributes is often dictated by what is necessary to attract private sector financing and to promote the success of the project (Torres de Mástle and Izaguirre, 2008). Some of the

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\(^{64}\) In some instances the Developer may be granted special waivers that have been allowed to the Grantor for example to meet European Environmental Directives. This does not mean that the Developer does not have the ultimate responsibility to, against a pre-agreed timetable, meet such standards. In such situations the PPP agreement must specify a schedule for such waivers to phase-out.
mechanisms used by the government aimed at reducing the risk of private financing for water and wastewater schemes include:

- **One-off subsidies** usually involve capital subsidies when a large portion of the subsidy is paid after the targeted beneficiaries are connected to the water and wastewater network and connections are verified.

- **Transitional subsidies**\(^6\) will be a useful instrument under the current financial crisis as users who before the crisis could afford services, are now out of a job or household resources are so low they are no longer able to afford the tariff. These subsidies can also help ensure the Developer remains financially viable by filling the gap between what the user is deemed able and/or willing to pay and the cost-recovery level (eg, long-run marginal cost) of the tariff.

- **Ongoing subsidies** will be required in cases where there is a continuous gap between affordability and cost recovery – including for consumption costs.

- **Capital Grants** – to cover part of the infrastructure construction costs. Where customer revenues would not be enough to recover the full construction cost of a project, reducing the privately financed construction costs can make the project more financially attractive to the private sector.

Furthermore, a Grantor can use bonuses and penalties as part of a mechanism for enforcing the risk allocation rules. Additionally, they can be used to enhance Developers’ incentives to carry out their general responsibilities under the terms of the PPP agreement and to meet agreed performance targets. Penalties and bonuses should reflect the economic costs and benefits of the behaviours that they are trying to prevent or promote. Without such incentives, the Grantor reduces its ability to influence the Developer and additionally reduces its ability to demand improvements should they be required.

**Price and Tariff Variations**

The regulations for adjusting the payment structure are a critical component in the risk allocation architecture. Throughout the life of contract a number of variables, such as inflation, variables in input costs, and legal regulations, are likely to change in unpredictable ways. To reflect these uncertainties the PPP arrangement should allow adjustments to the payments over time that will ensure that the Developer continues to earn a reasonable rate of return and that incentives are maintained (Kerf, et al., 1998). The Developer should always be encouraged to control costs but mechanisms to control unanticipated increases can go a long way to reducing an excessive contingency risk pricing in the Developer’s bid.

Tariff indexation formulas alter fares to reflect changes in an index of prices and do not necessarily reflect changes to a Developer’s costs. Instead of changing in response to specific events, fares are adjusted at regular intervals (eg every six months). The indexation process aims to compensate the Developer for the effect of exogenous cost increases on the Developer’s inputs. Importantly, indices reduce the risks faced by the Developer without blunting the performance incentives (Hudson Institute, 1999). The indexation formulas

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\(^6\) Transitional subsidies are typically used to support tariff reform. Typically the subsidy is transitioned out after a specified period of time (eg, months or years) as the user contribution increases (and possibly as tariff levels required for cost recovery decrease with efficiency gains). Under the current financial crisis, it will be important that a strategy is devised to deal with the period when tariffs should be raised to ‘normal’ levels of full cost recovery.
automatically adjust tariffs according to agreed rules. Specific indexation formulas can adjust tariffs according to changes in either the rate of inflation, consumer price indices or a consumer price index (related to changes in the system’s likely costs such as a basket of prices, exchange rates or specified inputs).

A chief concern for the Developer is the risk of costs inflating over the life of the PPP agreement rendering the payments made insufficient to cover the operating and financing costs. The tariff as well as other specific payments made by the Grantor to the Developer, should be indexed and the proportion of the components of such tariff or payments to be indexed should be determined at an early stage. The choice of indices or proportion should be determined by the Grantor. Indexations which reflect the underlying cost exposures faced by the Developers can reduce the cost risks and provide large savings over the duration of the contract (HM Treasury 2007).

Cost pass-through is usually used to cover the cost of risks over which the Developer does not have any control. As may be applicable depending on the type of PPP agreement, when input costs rise, the fare adjustment rules agreed upon between the Developer and the Grantor will allow for the changes in the costs to be passed through to customers through the tariff. Changes in inputs for PPP projects can include changes in tax structures or regulations governing the operation of the water system.

Residual Value Risk

Where an asset still has value (not fully depreciated) after the PPP agreement has expired, the Grantor should agree how this residual value should be treated. Typically under PPP financing, assets will be depreciated against a given depreciation schedule. In most long term PPP agreements there will be a residual value at termination, especially if there have been significant investments towards the end of the contract period. If the Grantor wishes the assets to be transferred upon expiry at zero value, then accelerated depreciation would be required and result in large increase in the availability payments to cover this. Alternatively, if the assets are transferred at expiry at net book value (ie the residual value) then the Grantor would pay this residual value to the Developer at expiry, but would not have to suffer large availability payments in the final years of the PPP agreement. This residual value would be easily audited from the financial project accounts of the Developer (ie it is a transparent and fully auditable transfer value). Other issues that the Grantor should consider include how the residual value transfer impacts any termination payments upon the termination of the PPP agreement. Other risks related to the implementation of the PPP agreement such as early termination and associated triggers are dealt with in the chapter on contractual recommendations – Chapter 9.

6.7 Summary and Conclusions

Once the appropriate service delivery scheme has been chosen, identification and allocation of responsibilities and risks between the private and public sector parties is an essential step in the successful planning and delivery of major infrastructure projects. The chapter looked at the importance of analyzing and allocating these risks in light of the need to balance the private sector risks to a level at which they offer optimal benefits to the Grantor, but no longer constitute a significant impediment to private financing of infrastructure projects. The main PPP arrangement types can be analyzed to show how the level of risks to the developer increases according to type of arrangement type chosen. Within these types of PPP schemes the Concession (or BOOT model) and Divestiture type arrangements generally
involve the most comprehensive array of risks and responsibilities to be taken by the private Developer. The comprehensive nature and the extent of allocation of risks and responsibilities is one of the main reasons why these contract forms have been used as the starting point to develop recommendations for contractual issues (Chapter 9).

A variety of ways are used for allocation of responsibilities and risks and given the importance of this issue a systematic approach for registering this allocation, such as the Risk Matrix, is recommended.

In allocating risk, four basic tenets are followed:

- Allocating particular risks to the party in the best position to reduce the probability of the risk being realized and in the best position to manage the consequences of the risk after it has materialized.
- One party may be better placed to diversify or absorb the risks than the other parties involved in the arrangement.
- Allocating a risk to a party should provide incentives for the party to spend time and resources in delivering the expected outcomes.
- Not all risks can be foreseen within a PPP agreement and therefore the agreement will need to allow for mechanisms that deal with unpredictable, unforeseen or unmanageable events.

Variations in specific risks can have positive or negative effects on the cash flow of the project and on the total value of the business. The Grantor should be selective as to which risk he transfers to the Developer, as often the Developer will increase his rate to cover for the perceived cost of the risk, adding to project cost.

In this chapter I have developed some of the main risks to be expected in any PPP arrangement.

I look at risks commonly encountered in three main areas:

1. **Political and Macroeconomic Risks**

   The Grantor is often the party best placed to carry any political risk that may impact the project. However, where risks, such as impact of change of law, are included in the PPP arrangement the contract provisions need to clearly define who will be responsible for any cost implications. The risk to the Grantor of commitments to future expenditure, or contingent liabilities, has potential major impacts on funding and financing arrangements. A series of economic risks such as inflation, interest rates and foreign exchange rates are generally of importance in water and water projects and ways of mitigating the effects of these should be incorporated into the arrangement.

2. **Water Sector Risks**

   Demand risk is perhaps the most major risk central to all Water and Waste Water Sector schemes. Demand forecasting is notoriously difficult, yet the level of actual demand has a major influence on both the scheme effectiveness and the scheme costs and, through potential impact on revenue generation, scheme financing. The type of PPP model determines the level of risk taken by the Developer, including Operational risk, and risks related to project financing, construction risk and risk of increased project costs. Whilst the Developer is generally considered liable to meet existing environmental norms and standard, the Grantor is normally considered liable to meet pre-existing conditions, and arrangements included to take account of any future adverse change in law or requiring operation to meet higher standards.

3. **Risks Associated with Managing the PPP agreement**
The mechanism for implementing and monitoring risk allocation rules has to be capable of adapting to meet potential changes over the very long life of a PPP agreement. Payment mechanisms have to be clearly laid out, and ways of dealing with the risks of key financial areas defined eg the method for meeting financial shortfalls (such as subsidies and price and tariff variations. The value of the assets is generally important to both parties, and may be an important issue in project financing – but the risk taken by each varies according to the contract model, the asset condition and the time in the project cycle.

These risks and others, and their risk allocation and means of mitigation need to be dealt with effectively in the PPP contractual arrangements, and recommendations for detailed ways to deal with this contractually are give in Chapter 9.