The objective of this research is to determine, and make recommendations on, means of optimizing the use of Public Private Partnership (PPP) in development of infrastructure whilst ensuring the sustainable long term provision of water and waste water services. The outcome of this research is focused on providing detailed recommendations on contractual issues and contract structures to achieve this objective. These recommendations are primarily aimed at developing countries but in some instances their applicability may be considered for developed countries.

The use of the term Developed or Developing country is a hotly debated one. In reality there is no one definition and it depends on who and in what context the definition is being applied\(^1\). In the context of this research in general, a developing country is a term generally used to describe a nation with a low level of material well being, although the levels of development may vary widely within so-called developing countries. However it must be noted that depending on who makes the definition, different classifications are used. For example, the World Bank uses a strictly numerical classification, considering all low- and middle- income countries as "developing". These categories (low, middle, high income) are based on the Bank's operational lending categories (World Bank, 2009). In its most recent classification, economies are divided using 2008 Gross National Income (GNI) per capita, and divided further into four income groups. Low income countries have GNI per capita of US$975 or less. Lower middle income countries have GNI per capita of US$976–$3,855. Upper middle income countries have GNI per capita between US$3,856–$11,905. High income countries have GNI above $11,906. The World Bank classifies all low- and middle-income countries as developing but notes, "The use of the term is convenient; it is not intended to imply that all economies in the group are experiencing similar development or that other economies have reached a preferred or final stage of development. Classification by income does not necessarily reflect development status". The International Monetary Fund, on the other hand uses a flexible classification system that considers "(1) per capita income level, (2) export diversification—so oil exporters that have high per capita GNI would not make the advanced classification because around 70% of its exports are oil, and (3) degree of integration into the global financial system." According to the classification from IMF before April 2004, all the countries of Eastern Europe (including Central European countries which still belongs to "Eastern Europe Group" in the UN institutions) as well as the former Soviet Union (U.S.S.R.) countries in Central Asia (Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan) and Mongolia, were not included under either developed or developing regions, but rather were referred to as "countries in transition"; however they are now widely

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\(^1\) Other institutions such as the World Trade Organisation (WTO) leaves the definition of “developed” and “developing” countries to its members to decide. Members announce for themselves whether they are “developed” or “developing” countries. However, other members can challenge the decision of a member to make use of provisions available to developing countries. Developing country status in the WTO bring certain rights. There are for example provisions in some WTO Agreements which provide developing countries with longer transition periods before they are required to fully implement the agreement and developing countries can receive technical assistance. That a WTO member announces itself as a developing country does not automatically mean that it will benefit from the unilateral preference schemes of some of the developed country members such as the Generalized System of Preferences (GSP). In practice, it is the preference giving country which decides the list of developing countries that will benefit from the preferences (UNCTAD, 2009).
regarded (in the international reports) as "developing countries". In the 21st century, the original East Asian Tiger countries (Hong Kong, Singapore, South Korea, and the Taiwan) are considered "developed" region or areas, along with Cyprus, Israel, Malta, and Slovenia, are considered "newly developed countries". The United Nations on the other hand according states that there is no established convention for the designation of "developed" and "developing" countries and that this classification system is intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process. Notwithstanding this fact, the UN does note that Japan in Asia, Canada and the United States in northern America, Australia and New Zealand in Oceania, and Europe are considered "developed" regions or areas. In international trade statistics, the Southern African Customs Union is also treated as a developed region and Israel as a developed country; countries emerging from the former Yugoslavia are treated as developing countries; and countries of Eastern Europe and of the Commonwealth of Independent States in Europe are not included under either developed or developing regions. In this research developing countries are considered those as per the World Bank classification.

In the course of this research it became apparent that one risk issue, the problem of imperfect data, is not adequately addressed in the existing contractual approach to PPPs and has resulted in failure or ineffectiveness of many PPP schemes, and so a specific recommendation on a contractual remedy for this has been included.

In this Chapter, I present an Introduction to this research, starting with a background note on the major problems resulting from the increasing demand for more and better water and waste water services and the associated and massive demands for investment and effective management. The public sector funding and resources are often inadequate to meet these demands, and a growing case history shows increasing involvement by the private sector in provision of infrastructure and services through PPP arrangements. The aim of this research is to identify best practice in legal and contractual arrangements, and identify ways that these can be best structured and procured to ensure long term viability and sustainability of effective provision of water and wastewater services.

In order to establish some of the key determinants of a PPP arrangement, we look briefly at some of the key PPP and financing issues affecting both public and private sectors. These include roles of the public and private sector partners and allocation of risks, project financing issues, the broad types of PPP contractual arrangements, as well as the issue of ownership of all or part of the assets.

The next section introduces the chosen Research Problem, and the Key Research Questions to be answered relating to this. There is also a definition of some supporting questions used to develop the research including: Government issues in developing sector reform, ensuring benefits of private sector reform and Value for Money issues.

Next, the methodology of the research is outlined, developed from research using international case history, literature and contractual document review, review of expert opinion and some fact finding missions. The approach is based on:

- review of water and waste water sector issues, and general review of use of PPP taking into account levels of service and cost implications
- establishing key issues in effective PPP development,
- review and recommendation of detailed contractual issues for optimal and sustainable long term provision of water and wastewater service,
Finally:

- recommendations to improve critical contract provisions including maintaining the economic and financial equilibrium of the PPP agreement,
- recommendation of an approach for dealing with limited or unreliable data, to ensure long term contractual sustainability
- suggestions for improved contractual structures.

In any reform process in the water and wastewater sector there are a number of terms that are used to describe the actors and their relationships. For consistency, throughout this research, the public sector or government entity which is buying the service to be developed under any specific form of PPP is referred to as the Grantor, Contracting Authority or Government. In those instances of general policy setting, the reference is made to Government. However, the entity that is responsible for establishing the PPP scheme can either be Government or a Grantor, a delegated entity that is responsible for awarding and managing the agreement. The counterparty to the public sector entity is referred to as the Developer. The Developer is a private party responsible for all or part of the development, construction and operation of the PPP scheme. The contractual arrangement detailing the roles and responsibilities of the Grantor and the Developer is referred to as the PPP agreement.

1.1 Public Private Partnerships - Solutions to Meet Infrastructure Investment and Management Improvement Needs

The Infrastructure challenge

It can be said that the provision of physical infrastructure to support public water and wastewater services has been at the core of the development of many great civilisations. Massive works of water irrigation date back to the times of the Egyptians, Greeks, Aztecs and Incas. In modern times the provision of water and wastewater services has been a necessary pre-requisite for the effective economic and social development of modern urban centres. Yet, over the past 50 years, governments have neglected investment in these basic infrastructure services. Not only has this resulted in an inability to meet a growing demand for services and for higher service standards, but the existing water and wastewater structures and networks are deteriorating as they age and typically lack investment in necessary structural maintenance. As a result they require even more investment to bring them back to meet existing requirements. The resulting effect is a huge backlog of investment needs. A recent report by the European Commission estimates that for the ten countries of central and eastern Europe alone, the cost of all investments needed to comply with European environmental requirements will exceed euro 120 billion in the next five years. In the United States alone investments in basic water and waste water infrastructure are estimated to be over US dollars 325 billion today, and the rest of the world's investment needs estimated at US dollars 1.8 trillion (World Bank, PPIAF PPI Database, 2009).

The lack of investment in public water and wastewater services is not just limited to expansion or renewal of existing systems, but often continues with limitations on public funding for the management, operation and maintenance of the systems. Several studies (Johnstone, 2007, Whittington, 1994 and Vives, 1999) also suggest that, under public management, water utilities are sometimes exposed to short-term political agendas that restrict funding available. This situation, coupled with governments' inability to fund massive investments required for upgrading infrastructure, has made it apparent that new and innovative structures need to be
devised to "bridge" these funding and management gaps. One main option for national and local governments is to turn to the private sector for help to close these gaps. As a result, between 1990 and 1997, the cumulative expenditure in new private sector capital in water projects in developing countries, for example, increased from US$ 25 billion up to a staggering US$ 297 billion (World Bank, PPIAF PPI database 2009). The investment picture varied across sectors in 2007 where telecommunications saw an increase of 13% to US$75 billion, the sector’s highest level ever, and accounted for 47% of investment commitments for the year; energy had growth of 96% to US$50 billion, the sector’s second highest level since 1990; Transport had a decline of 7% to US$29 billion, but remained at the second highest level in real terms since 1990; and Water investment amounted to US$3 billion, well below the peak of 1997 but within the US$2–3 billion range of the previous three years.

The provision of a public service requires a careful balance between the potentially divergent interests of the public and private sectors\(^2\). On the one hand, the public sector has a responsibility and an obligation to provide services to its inhabitants and ratepayers. At the same time the private sector is entitled to receive adequate compensation for the risk of managing the provision of that infrastructure service, as well as being compensated for putting its Private Capital at risk. Since, 1989 we have seen a surge in the number of "Public Private Partnerships" (or PPPs). The considerable case history that has been amassed shows that these PPP arrangements can be an effective tool for water and waste water scheme development and long term management and operation. However, it is also clear that there is a considerable range of levels of effectiveness of these PPP arrangements, including some outright failures.

We should be clear that the PPP approach is not the only potential solution for effective reform and provision of water and waste water services. Policymakers and governments need to find the most adequate solution and mechanism to allow for public reform. In this respect,

\(^2\) The main challenge facing policymakers in meeting ever-increasing demands for good public services is how to balance the level of service provided against the massive costs required to provide the infrastructure to support this. If partnering between the public and private sectors is to be effective, the main consideration is to ensure that these “partnerships” are sustainable. Involving the private sector implies cost. How can policymakers balance in their responsibility to provide basic infrastructure with their limited public funds? How can public funds be best utilised, and how can these funds leverage private funds? How best to ensure that governments meet their social obligations and keep control of the provision of basic services? Sustainability of the proposed public-private partnership is at the heart of this response.
and in an effort to improve the provision of public services, a number of public sector reform strategies are being developed. For example, instruments for public reform can include creation of autonomous public service organizations, development of industry service agreements to ensure accountability, and growing use of financial incentives for managers and staff.

Very similar reform strategies are necessary to implement PPP arrangements for private provision of public services, and increasingly the additional benefits of including the private sector as part of the reforms for provision of these basic infrastructure services are seen as offering a practical and effective alternative to public sector management.

In the absence of a uniform legal framework for PPPs and in view of the diversity of national laws, the challenge is to ensure transparency and effective competition between market participants and at the same time to ensure the most effective provision of the water and waste water services.

**Public Private Partnerships – a possible solution**

Countries in the developed and developing world are increasingly interested in developing arrangements that will enable them to better meet the challenges of developing basic infrastructure. Public interest in cooperation with the private sector is driven by budgetary constraints as well as the search for increased efficiency, in terms of levels service (such as quantity and quality of water and wastewater) and the allocation of finite financial resources.

I noted previously that in the last two decades there has been a general surge in use of PPP arrangements for provision of public services. The water and sanitation sector has developed a considerable PPP experience in this time, but in parallel many other infrastructure sectors linked with public service provision have also made use of the PPP approach. The level of capital investment, materials and technology transfer, as well as the level of management and operational resources involved varies with each sector. PPP arrangements have been used in a variety of forms in infrastructure sectors including capital investment heavy projects for instance related to Ports, Airports, Roads, Bridges and Power Generation and Distribution projects, right through to more highly service oriented PPP arrangements such as those in Education and Health services projects.

PPPs can take many forms. In its simplest form, the term PPP refers to a structure of cooperation between a public authority or authorities and the private sector (Kerf et al, 1998). Its primary aim is to fund, construct, renovate, manage and, or, maintain a given piece of infrastructure or the provision of a service. A PPP is a cooperative partnership between the private sector and the government, which can contribute to the economic growth and quality of life in urban centres. Involving the private sector in the delivery of water services can also serve to eliminate the problems that typically blight public sector run utilities, such as patronage and short-termism. Efficient, cost-effective and sustainable water delivery systems require long term planning systems and government support to promote. Crucially, private sector involvement in water services broadens the range of policy options available to the government.

PPPs are typically arrangements of relatively long duration, involving cooperation between the public partner and the private partner on different aspects of a planned project. Funding typically involves a combination of sources, both public and private which in some instances means complex arrangements between the various players. Notably, the role of the private sector is as a Developer, who participates at different stages in the project eg design, completion, implementation and long term management, operation and funding (Klein, and Hadjimichael, 2003). In its recent interpretative communication the European Union (2008)
defines PPPs as a form of cooperation, which is generally geared to the longer term, where the role of the private partner (the Developer), who is involved in the various phases of the project (planning, implementation and operation), is intended to bear risks that are traditionally borne by the public sector and who often contributes to financing the project. I should make it clear that this term Developer is used throughout this research to describe an ‘economic operator’ who can carry out all these functions and is not just solely responsible for technical operation of plant and equipment. In some of the literature reviewed the word ‘operator’ is used without this distinction being made. This distinction is important as it reflects the key contractual responsibilities under PPP arrangements. The public partner or Grantor focuses primarily on defining the objectives to be attained in terms of public interest, quality of services provided and pricing policy, and it takes responsibility for monitoring compliance with these objectives.

For the PPP arrangement to be effective, the design of the structure for private sector involvement involves a clear definition of the roles to be played by the government and the private sector, the type of structure to be adopted for private sector participation, the applicable regulatory regime and its effects, and also the influence of the specific current economic and political conditions. The type of PPP structure chosen will have a direct influence on the provision of services and it is essential that an adequate legislative and regulatory framework be in place to ensure the long term sustainability of the chosen PPP arrangement.

The PPP design should seek to strike a balance between establishing incentives for the private sector to invest and operate efficiently, and protecting the interests and responsibilities of the public sector (Camdessus and Winpenny, 2003). Additionally, the types of risks involved in the provision of water and wastewater services need to be adequately quantified, qualified and, most importantly, mitigated, as these are elements that will determine the success of a PPP project. All risks must be properly understood and allocated in an equitable manner between all the parties (Cowan, 1997a). This is a key issue and will be looked at in some detail in this research.

The allocation of risk between the parties is generally considered on the basis of specific risks being taken by the party best able to manage them, and within the overall context to suit the conditions relevant to the specific project, sector and economy. Projects which involve PPPs need to be ‘bankable’ (Stiggers, 2004). A ‘bankable’ project is one that is considered to combine key characteristics in a way that gives both for the public and the private sector partners an equitable balance of risks and rewards and that the overall result include overall human, social, economic and environmental sustainability. Typically projects which are considered as bankable include those projects which have characteristics that include clear contractual structures, a stable economic and financial basis and a clear definition of roles and responsibilities (Hodges and Dellacha, 2007, UNIDROIT, 1995, Salacuse, 2000, and Shirley and Patrick, 2000).

Typically PPP projects are done on a project finance basis in which a private operator is granted a right and, in return for that right, has the obligation to provide a service (Seidenstat and Hakim. eds. 2002). Under a project finance scheme, the right that is granted by the public sector is the right to expropriate, use, treat and sell water, in exchange for charging tariffs to consumers for such services. The types of PPP structures are defined in Chapter 3.

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3 Project Finance is a method of funding in which the lender looks primarily to the revenues generated by a single project both as the source of repayment and as security for the exposure.
Risks, asset responsibility and types of PPP structures

There is an array of options for involving the private sector, characterised by a variety of contractual forms. These contractual forms differ in the degree of responsibility and risk transferred from the public to the private sector. Choosing the appropriate option depends on what the government in question requires from the private sector, i.e. the objectives to be satisfied by entering into such contractual agreements, and, as a result, how much control of the service it is prepared to relinquish (Smith, 1997a). In this research we examine the different forms of PPP based on the degree of private involvement in the development and ownership of the assets.

The research will assess the ways in which the PPP contractual arrangements can be developed to optimize the long term project viability. The PPP structures reflect not only the allocation of risk, but the manner in which asset ownership is dealt with. There are two main ways:

- In the first group, ownership of the assets remains with the government or the public sector, whereas in the second group partial or full ownership is transferred to the private sector. Each type of contract will be reviewed according to the level of private sector involvement. The first group, where the assets remain in public ownership, typically includes the following contract types: Service and Management contracts, Lease arrangements and Concessions.

- The second group, where the assets are all or partially in private ownership, include: BOOT (Build-Own-Operate-Transfer), variations to BOOT contracts such as Design-Build-Finance-Operate-Maintain (DBFOM), BOT (Build-Operate-Transfer), BOO (Build-Own-Operate) and reverse BOOT, joint ownership or mixed companies, and outright sale, or partial divestiture.

1.2 Characteristics of Urban and Peri-Urban Water and Wastewater Services

I have chosen to focus this research specifically on the use of PPP in the water and wastewater sector. Although this sector exhibits most of the characteristics of PPP in other sectors the water and wastewater sector is unique in that the service provision is seen to be a public good providing a service that is essential to life and health. In every country of the world the provision of water and wastewater services is deeply embedded as a public service obligation. As I will discuss later, the sector has a major issue of poor existing infrastructure, massive demand growth and high capital investment needs. The use of PPP in this sector has been adopted over the past two decades as a possible solution to bridge the resources and funding gap. Whatever form of PPP arrangement is developed (and even if there is no PPP) these public service obligations cannot be divested one hundred percent to the private sector, and it is this that differentiates the approach needed to ensure viable long term PPP arrangements to reflect the long term public service objectives of the water and wastewater sector. Ultimately, even under a PPP arrangement Governments cannot allow an ultimate failure of the sector arrangement to fail. In this regard, water and wastewater PPPs are more about delegated responsibilities as opposed to divesting them which is often the focus of use of PPP in other forms of infrastructure. As a consequence, the characteristics of this sector have a profound influence on the structures that are developed so therefore.

Decisions to pursue a PPP in the water services sector cannot be taken without considerable initial preparation and study on behalf of Government acting as the grantor of the proposed
PPP agreement. There are many texts and other useful aids that can guide readers through the various processes of analyzing and selecting appropriate water and wastewater solutions. The key problems and challenges faced by the sector include:

- Political interference: The monopolistic situation where services are provided by a single provider combined with the basic human need for water, makes the provision of water and waste services highly susceptible to political involvement, both in the creation or expansion of water services, but also in all aspects of the long term delivery of the services.

- High investment costs for basic infrastructure (e.g., creation, expansion or rehabilitation of pipe networks) that once built cannot be used for any other purpose.

- Typically data on the existing services, satisfying demand for services and on the condition of existing physical infrastructure is difficult to assess.

- Successful public utilities are generally the exception rather than the rule and, since most people are under the jurisdiction of public utilities, a good deal of the world’s population remains inadequately served by their water and wastewater providers (Baietti, Kingdom and van Ginneken. 2006a).

- Many public utilities suffer from weak performance incentives, low willingness of customers to pay cost recovery tariffs, and insufficient funding for maintenance, leading to a deterioration of assets and the squandering of financial resources (Baietti, Kingdom and van Ginneken. 2006a).

- The monopolistic nature of the sector along with weak and misdirected policies exacerbates the situation.

- Water by its very nature is a politically sensitive topic and policymakers have tried and, more often than not, failed to adequately balance the trade-offs between affordability and expansion of coverage to poorer sections of society against the utility’s need for financial viability.

- Water and wastewater resources are more generally suited to local management and in many cases, responsibility for these services is decentralized to local government levels.

- Policymaking in the sector is characterized by short-term political interests.

- Governments face strong pressure to keep prices below costs, and to have to make up the difference between prices and costs with subsidies. The biggest challenge for governments, with either public or private operation, is to address these problems in a way that will encourage investment to improve services.

- Corruption is also a persistent challenge within the sector from collusion between contractors and kickbacks in contracting (van Ginneken and Kingdom. 2008.)

Successful incorporation of private sector participation into these sectors depends largely on the chosen PPP arrangement’s ability to handle the above-mentioned challenges. Experience shows that efforts to reform the water and wastewater sector often face considerable hurdles.

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4 World Bank specifically offers resources for this purpose available at: www.worldbank.org/water
in the shape of opposition from those most likely to absorb the impact of reforms. Reforms are also often triggered by crises that create a consensus of opinion that the current situation is untenable. Such events can be droughts, drops in service levels or a financial crisis. Van Ginneken (2008) argues that external pressures can also trigger reforms, for instance donor pressure or political forces such as elections. The last ten years has seen a renewed effort by governments to reform their water and wastewater sectors but the vast majority have met with limited success. In some cases, systems have been “overbuilt” and do not reflect the true needs of consumers nor what they are willing to pay for. Inefficiencies and poor management often mean that the only viable reform is full restructuring – a step that most governments are unwilling to countenance. Moreover, many reform packages solely focus on reforming the utility and do not attempt to reform the business and social environment or the means of interaction with other actors in the sector. Research (World Bank, 2006a) recommends that governments first realize that their ownership interest in a utility is distinct from their policy interest. Then, the financial impact of their policy and ownership decisions should be reconsidered to emphasize the financial incentives that are required to induce poorly-performing utilities to perform better (Baietti, Kingdom and Van Ginneken. 2006a).

Wastewater Service Issues

Improved access to wastewater services in developing countries is a critical factor within the development process, particularly in the urban sphere. A World Bank assessment (World Bank Water Toolkit 2001) shows that wastewater services are often neglected when compared to the attention granted to the water sector and this can be illustrated by recent comparisons of levels of investment and coverage. The wastewater sector differs from water in the following manner:

- Wastewater services are less likely to be a networked or utility service and by nature are generally based on extremely geographically localized services
- Wastewater services are expensive and most professionals believe that a high level of government subsidy is required to maintain the sector;
- It is very difficult to achieve economic viability in the sector; and
- Wastewater services are largely the preserve of municipal government and any reform of service delivery should be linked to a wider process of municipal reform.

The technical challenges and institutional complexities of the wastewater sector have posed a challenge for the private sector. However, once the sector has become physically networked, the issues of transaction design are common to both the waste and wastewater sectors. Wastewater does introduce more challenging policy and legal issues and may require more institutional reform vis a vis establishing appropriate roles for the local governments and private operators or other entities responsible for contract enforcement. Many governments decide not to pursue PPP in the wastewater sector because they perceive it as unsuitable for such a reform, preferring local and decentralized technical solutions, and believing that the private sector will simply not be interested. Clearly the sector requires deeper thought and the solutions may appear less obvious. However, the arguments that make the case for water sector reform – such as improving levels of service, expanding coverage, adopting technical standards - are equally appropriate for the wastewater sector.
1.3 The Research Problem and Questions Arising

The past few decades have seen a growing awareness of the planet’s fragile ecological balance. Water resources are being stretched to their limits and are putting pressure on urban centres worldwide. Nevertheless, there is a growing consciousness of the need to achieve public policies that will assure the protection of the precious resources and the environment within their economic framework. Water as a resource needs to be protected and adequate strategies need to be devised to dispose of wastewater. In the context of this research we are concerned with the water and wastewater services sector.

The proposed research undertakes a detailed examination of the factors that lead to the decision to develop a public-private partnership and that can ensure an effective and appropriate contractual arrangement. The rationale behind the proposed research is that public-private partnerships have become an increasingly important mechanism in the provision of long term water and waste water services, and that they are ‘here to stay’. However, PPPs are not a panacea for all situations. Experiences over the past two decades demonstrate that there has been a considerable range of effectiveness of these long term PPP arrangements. At the best they have provided all the required investment and services efficiently and effectively, in a sustainable manner, but there have also been some less effective cases, and even some catastrophic failures. However, given the current reality experienced by the world’s infrastructure sectors, public funds will be insufficient to meet the growing demands of the world’s population. The public purse cannot fund all investment needs, and the demand for greater use of private sector involvement is increasing.

Given the varied effectiveness of the many and various PPP examples over the last decade, there is a clear need to provide practical guidance on how best to structure PPPs to obtain optimal performance. Successful contracts require a careful selection of appropriate and robust contractual mechanisms, but at the same time allow for sufficient flexibility to deal with changing circumstances and conditions.

The Key Research Questions

In this research I will seek to answer the following questions related to the effective design, development and implementation of PPP arrangements for the Water and Wastewater Services Sector:

1. How do we best capture the benefits of the private sector and blend it with the strengths of the public sector?
2. What PPP arrangements work and what does not?
3. Are there any common lessons that can be derived?
4. What special legal and financial instruments need to be developed in order to deal with PPPs in infrastructure, particularly when applied to the socially sensitive sector of water and sanitation services?

There are a number of other questions used in the development of this research that support these key research questions:

Supporting questions: Informing Governments’ reform strategies

The use of PPPs alone does not guarantee resolution of the inherent problems of the sector. Key issues Governments consider when seeking improvements in water and wastewater services include a reform strategy that takes account of key management and financial issues, an understanding of the state of the existing water infrastructure and systems, and the system of rules and incentives governing the sector. Typically, developing a strategy to deal with the
problems that beset the water and wastewater sector will require Governments to answer the following questions (World Bank Water Toolkit, 2007):

- How can competent managers and management systems be developed and handled?
- How can the services provided by the water and wastewater company/utility be made efficient?
- How can the utility’s solvency be ensured in order for it to cover all its costs (tariffs and subsidies)?
- How can the utility guarantee that new capital expenditure is directed to the most pressing areas?
- How can service expansion be financed in the absence of sufficient internally generated funds?

This research will establish the approach to answering these questions in respect of reform strategies involving PPP.

Supporting questions: Ensuring benefits from private sector involvement

Furthermore, this research will test how the use of a PPP scheme can bring tangible accountability and decision-making benefits to the water and wastewater utility. In particular, the research will test whether the private sector can bring:

- More focused service and commercial performance?
- Easier access to finance?
- A more disciplined approach to tariff and subsidy levels to ensure long term sustainable service delivery?

Supporting questions: Achieving Value for Money in PPP arrangements

A widely used measure of economic effectiveness for governments implementing water and wastewater PPP projects is the Value for Money (VfM) obtained from the project. VfM is defined by the United Kingdom’s HM Treasury (2006) as “the optimum combination of whole-of-life costs and quality (or fitness for purpose) of the good or service to meet the user’s requirement”. VfM is not solely focused on the lowest financial cost. Accordingly, throughout this research I have focused on answering questions related to ways that the drivers of VfM can best be achieved in any PPP arrangement, and these include:

- What should the optimum allocation of risks between the various parties be?
- Does the PPP focus on whole life cycle costs of the asset rather than only the upfront costs involved?
- Is there use of an outputs specification approach to describe the Grantor’s requirements which, amongst other things, allows potential bidders to develop innovative approaches to satisfying the service needs of the Grantor?
- Does the PPP rigorously transfer risks to the parties which are responsible for them, ensuring that the allocation of risks can be enforced and that the costs associated with these risks are actually borne by the parties in the manner allocated and agreed?
- Are there sufficient incentives within the procurement structure to ensure that assets and services are developed and delivered in a timely, efficient and effective manner?
• What is the most suitable term of the PPP agreement?
• Are there sufficient skills and expertise on both public and private sectors, and how can these be utilized effectively during the procurement process and subsequent delivery of the project; and
• What are the most appropriate strategies to managing the scale and complexity of the procurement to ensure that costs are not disproportionate to the underlying project(s)?

1.4 Methodology of the Research

This research is based on a detailed analysis of the considerable international case history and sector experience in public-private partnerships in the Water and Waste Water Service sector since the late 1980’s. Case study research means single and multiple case studies, can include quantitative evidence, relies on multiple sources of evidence and benefits from the prior development of theoretical propositions (VanWynsberghe and Khan, 2007). Rather than using large samples and following a rigid protocol to examine a limited number of variables, the case study approach I have chosen involves an in-depth, longitudinal examination of a single instance or event represented by different PPP agreements in different countries across the world. Quantitative and qualitative research is used and involves the discussion on, and analysis and dissection of, various PPP contracts (Yin 2003). Data is collected through an examination of the historical evolution of PPPs, the implications of PPPs against the national legal contexts in which they are set, and the contractual structures available for private sector involvement in the provision of water and wastewater services. These provide a systematic way of looking at events, collecting data, analyzing information, and reporting the results as suggested by Flyvbjerg, (2006). A review of literature on water issues from various disciplines including technical, engineering, legal, political, economic and social development is included. Where possible, existing contractual documents have been used as the basis for analysis and a number of case studies are reviewed. Predesigned interviews have been conducted with sector leaders and specialists. As a result my research seeks a sharpened understanding of why the instance happened as it did, and what might become important to look at more extensively in future research. By looking at various case studies analysing what has worked and where there have been failures (Flyvbjerg, 2006), I draw lessons learnt and suggest improvements for sustainable PPP design. Thus my research combines the 'case study' as a 'research strategy', an empirical inquiry that investigates a phenomenon within its real-life context.

The following diagram shows in a schematic way the overall methodology used. It starts with an analysis of the PPP experience to date seeking to determine what has worked and what key lessons can be learnt. Given that PPP agreements are typically of a long nature, sometimes of 25 years or more, the research draws out main characteristics of successful PPPs and develops a series of practical recommendations that address the challenges faced by policymakers in seeking to improve public services in an effective and sustainable way.

The analytical framework used investigates and compares two main areas:

1. Substantive facts provided in legal documentation, technical approaches to deal with specific engineering issues, and economic aspects related to the provision of services.
2. The procedure used to develop and procure specific PPP arrangements. This relies on review of available literature and other information sources such as review of expert opinion and review of other documentary evidence, including detailed contractual
documentation as available. Wherever practical the desk research has been complemented by field research\textsuperscript{5}, undertaken through visits to specific cities where these PPPs are being implemented (and as applicable where they are no longer in operation such as the case of Buenos Aires – Argentina) and key actors and stakeholders have been interviewed.

\textsuperscript{5} Field research carried out in the period 2006 – 2009, with interviews with key actors and stakeholders for major PPP water and wastewater schemes in Sofia (Bulgaria), Buenos Aires, Tucuman and Salta (Argentina), Tallinn (Estonia), Bucharest (Romania), Jakarta (Indonesia), Guayaquil (Ecuador), Manila (Philippines).
Overview of the Research

The objective of this research is to determine, and make recommendations on, means of optimizing use of PPP in development of infrastructure and for the long term provision of water and waste water services. The work focuses on providing practical recommendations and guidance that can be used by sector policy makers and sector practitioners.

With the aim of achieving effective infrastructure development and long term service provision, sector best practice is to use the following steps for scheme development:

Step 1. Determine need.

Step 2. Consider what have been the past experiences good and bad and from this consider what lessons can be learnt.

Step 3. Determine which form of PPP is most suitable (adjust and accommodate according to specific use, maximise benefits of all stakeholders, minimise harm, weighing all relevant factors).

Step 4. Using a pragmatic approach, develop the optimal solution for the long term provision of the water and waste water services through developing and implementing a bankable PPP scheme and contractual arrangement. This involves balancing such factors as stakeholders’ interests, affordability, raising finance, allocation of risk and effective long term service provision.

In line with this approach, the research has been structured in the following manner:

1. Review of the water and waste water sector, the use of PPP arrangements and the means of monitoring and controlling their outcomes.
2. Development of key issues to be addressed in establishing effective and sustainable water and waste water service reform when using a PPP arrangement, and those issues that needs to be addressed contractually.

3. Selection and procurement of Contract Structures for the PPP Arrangement,

Finally, and in conclusion, we look at the outcomes of the focus of this research:

4. Development and recommendation of a comprehensive and detailed approach to contract drafting to ensure effective, sustainable and long term provision of water and waste water services, including an approach for adaptation of public procurement procedures for PPP arrangements.

5. Recommendation of a proposed approach to dealing with the influence of imperfect or unavailable data on the long term effectiveness or sustainability

1.5 Plan of this Research

This research is presented in three main parts:

**PART 1 - Background to the sector and PPP**

The first part, Chapters 2-4, presents background information on the urban and peri-urban water and sanitation sector to give an understanding of some of the sector specific issues. Following this, there is a review of the use of PPP in the sector, the issues to be considered when developing a bankable project, and some of the key requirements for success. The potential relationships between the Public and Private institutions are looked at and the staged approach to PPP development and Implementation is described. The key subject of Levels of Service, the associated costing and funding issues, and ways of measuring the PPP's performance in the longer term are reviewed.

**PART 2 - Main factors influencing effective development and operation of PPP schemes**

The second part, Chapters 5 – 9, looks at the main factors that can influence the effective development and operation of water and waste water service reform when using a PPP arrangement.

I start, in Chapter 5, with the Legal, Regulatory and performance monitoring issues, looking at how the planned service provision can be ensured in the longer term within a specific legal regime. The issue of economic regulation, and how it can best be effected through policy and contractual provisions, is considered, and the effects of the regulatory framework and institutions for setting and revising economic and service standards, monitoring and controlling, are described.

Chapter 6 looks at the issue of Understanding and Managing Risk, which is at the core of the development of a successful and sustainable PPP project. Through review of methodologies for analyzing responsibilities and risk I look at common risks and responsibilities, as well as risk associated with political and macroeconomic factors, water sector specific issues and risks associated with project development and implementation.

Funding and Finance (Chapter 7) are two of the key drivers for choice of PPP for Water and Waste Water Sector schemes. This section revolves around issues related to bankability of PPP projects: sources of funds (public and private funds, multilateral and bilateral institutions); structuring finance, as well as the potential (and possibly major) effects of
contingent liabilities for the Grantor. I look at some financial issues that may not occur in all schemes, but may require consideration (eg hedging and refinancing).

The section on General Procurement Issues of PPP's (Chapter 8), covers issues that are a major concern of the Public Sector when implementing large infrastructure projects. Generally existing public procurement methods have to be adapted to ensure most effective design, implementation and regulation of PPP projects. I look at issues that can arise over the whole of the procurement process, and look at best practice options for dealing with PPP procurement. This process includes: choosing the right method for Developer selection; management of the bidding process, setting selection criteria and bid evaluation, establishing pre-qualified bidders, selecting the appropriate bidding process and developing the request for proposal; submission of bids, and how they are evaluated and finally the selection of the successful Developer. The process of negotiating with bidders and a number of ‘non-standard’ issues that can occur with these schemes are looked at. Also given the importance of the European Union and how it has developed specific procurement issues related to transparency and competition, I also briefly review the EUs position on PPPs and how national and EU legislation deals with the monopolistic nature of the water and wastewater sector.

In the final section, recognizing the fact that large numbers of water and waste water PPP arrangements have had to be renegotiated within a few years of contract award (Guasch, Laffont and Straub, 2005), I look at some of the practical provisions for establishing contractual and legal mechanisms to allow for potential future renegotiation of new contracts, as well as ways of dealing with bidding for existing PPPs in Chapter 9 (Dealing with Existing PPPs and Renegotiation).

**PART 3 – Developing Sustainable PPP arrangements**

In this third part (Chapters 10 – 14) I detail specific recommendations for improving the design and sustainability of PPP arrangements, dealing with key issues through detailed contract drafting, in order to ensure most effective procurement and implementation of the chosen PPP scheme, to achieve optimal results. Sustainability in the context of water and wastewater services should be considered in its broadest of interpretations i.e. it is not only about financial sustainability but should also include overall human, social, economic and environmental sustainability. In the context of a sustainable PPP arrangement, it is important to integrate and reconcile the human, social, economic and environmental aspects within a holistic and balanced sustainable development framework (Munasinghe, 2008). Although it may appear that my research focuses only on the financial aspects of a PPP transaction, in effect the ‘bankability’ concept that is discussed within this research to achieve in sustainable PPP arrangements includes adequately addressing human, social, economic and environmental issues.

The water sector by its very nature involves human, social, economic and environmental aspects. A good – and therefore bankable - PPP arrangement should be inclusive of these. Human sustainability means maintaining human capital. Access to basic services such as water constitutes human capital. Investments in education, health, and nutrition of individuals have become accepted as part of economic development (Goodland, 2009) and as such access to water and wastewater services has a demonstrable effect on human and economic sustainability. Similarly, social sustainability means maintaining social capital (Goodland, 2009), and social capital is investments and services that create the basic framework for society (El Serafy, 1989). Water and wastewater services are key to society’s basic framework. Last but not least, environmental sustainability itself seeks to improve human welfare by protecting natural resources (a definition of environmental sustainability has been given by Daly (1973, 1974,
1992, 1996, 1999) and Daly and Cobb (1989)). In this respect, an adequate PPP arrangement will seek to ensure that the water resource as well as water ways are protected as part of the contractual obligations.

The contractual arrangements for the PPP scheme have to embody ways of dealing with the long term nature of the provision of water and wastewater services (determined in the previous section), as well as the main factors influencing effective and sustainable development as described above. The long term success of the PPP arrangement will in a very large part be determined by the way that these factors are dealt with contractually.

Chapter 10 (Contracts: Key Contract Provisions) contains the bulk of the work in this section, and works on the basis of an outline contract form developed for the most complex types of PPP arrangements (i.e. the Concession contract). This is developed as a practical checklist covering all the typical contract elements presented in the order typically expected. I note but do not cover in detail standard or project specific clauses. However I do give suggested ways of dealing with all clauses that are considered to potentially influence contractual and scheme performance.

The importance of ensuring the continuing success of PPP schemes during their long term implementation and operation phases is recognized by a separate Chapter 11 (Maintaining the Economic and Financial Equilibrium of the PPP arrangement). Over long periods it is inevitable that changes will happen and that not all can be anticipated at the contract design stage and which may materially affect the financial and economic equilibrium of the arrangement. Accordingly, adequate flexibility needs to be allowed for in the design and implementation of the PPP agreement. At the same time, it is important that this flexibility does not open the door for full re-negotiation of the basic terms of the contract. Adequate balance needs to be struck between price, long-term flexibility and certainty of whole-life costs. There are certain costs associated with the financing structure of the PPP agreement that need to be included so as to provide for changes that cannot reasonably be foreseen by the Developer either at the time of bidding or during the implementation of the PPP agreement. All these issues require a pragmatic solution that implies including in the PPP agreement specific mechanisms that allow for these changes. These issues are explored and specific recommendations made.

In Chapter 12, I review all the contract recommendation made in the previous sections, and building on some of the contractual and structural limitations of the ‘traditional’ contract forms, propose new contractual models namely Output Based PPP agreements and long term PPP agreements incorporating the use of Trust structures to more effectively leverage financial resources.

Many PPP schemes are designed around information on conditions of existing and future water and waste water systems using available data and estimates that are less than perfect. In particular this applies to the considerable element of the underground assets (eg pipe work, water mains and sewers) associated with provision of water and waste water services. Chapter 13 (Dealing with Imperfect Data) looks at effective ways in which risks of underground asset condition and other imponderables can be transferred to the Developer in a systematic and sequential manner. This can have a major impact on the execution of the agreement, and this section looks at ways that bidding and contractual mechanisms can be incorporated that will handle this and any future improvements in data. This is an important subject as case history shows how lack of these mechanisms has affected PPP performance adversely, and in some cases has led to outright contract failures.

Arising from the specific issue of Imperfect Data and the particular characteristics of water and wastewater PPP schemes, there is a particular need to improve public bidding and
procurement procedures to deal with this in the bid process (Chapter 14). Given that there will be gaps in the information on which Developers will make their proposals; the procedures can be strengthened by use of an approach that recognizes the need for data improvement and validation in a structured way through an improved bidding and procurement approach. I give a recommendation for a structured approach that runs through the pre-qualification process, the development of the bidding process to incorporate revisions and improvements in data and assumptions, and finally continues to deal with improved data in the initial period of the PPP contract. In regard to this last point I include a proposal for dealing with the adjustment of the Developers’ risks and payments as the improved information becomes available during these initial years of the contract.

**Summary Conclusions and Recommendations**

In this final part I review the work covered by this research, concluding with some thoughts on optimizing the PPP approach for long term provision of water and waste water services. I summarise some of the key recommendations made primarily in Part III which include contractual clauses and provisions, specific strategies to ensure the long term financial and economic equilibrium within the PPP arrangement, overall PPP structural improvements in the form of new structures (OBA and Trust), how to deal with imperfect data and how procurement processes can be re-engineered to allow for progressive and systematic approach to improved data. Some areas for future research are explored as well.