Developing a commercial and legal model for multi-sector reservoir systems

RAPID

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FINAL REPORT

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EXECUTIVE SUMMARY

Multi-sector reservoirs (MSRs) or MSR systems are collections of reservoirs and associated developments, that collectively work together on an integrated basis to provide multiple benefits to multiple stakeholders and to the environment. Such systems have the potential to provide such benefits more cheaply than the alternative of several single-purpose schemes, by leveraging economies of scale or economies of scope between the various developments. Additionally, such systems may provide further benefit that would not otherwise be possible, e.g. using an open water transfer instead of a pipeline for transporting water may provide navigation opportunities.

Proposals for MSR systems are being actively considered in the context of the development of water resources solutions, where designs for new reservoirs required for public water supply purposes are being extended to incorporate multi-sector and wider public and environmental benefits. Two such proposals are the Fens Reservoir being developed by Affinity Water and Anglian Water Services, and the South Lincolnshire Reservoir being developed by Anglian Water Services and Cambridge Water.

CEPA and Agilia have been tasked with developing a usable commercial and legal model for developing such MSR systems, under the backdrop of existing commercial models for developing public water supply only reservoirs. Within the regulated water sector, water resources options such as reservoirs can either be developed in-house by regulated water companies or can be procured by the regulated water company through the Direct Procurement for Customers (DPC) or Specified Infrastructure Projects Regulations (SIPR) processes. The reservoirs are privately financed and funded through charges on water customer bills. Reservoirs built by other sectors for other purposes are developed under other commercial models for financing and funding them.

The key purpose of this study has been to:

- examine issues that emerge when funding, financing, and developing an MSR system, both from a commercial and legal perspective; and,
- consider the extent to which a model (or models) can be developed to address these issues.

We have been asked to develop models which will function within the existing legal framework as far as possible, and with reference to the existing regulatory framework.

Different use cases for MSR systems

The different use cases for MSR systems vary in their characteristics and requirements from the reservoir system.

- **Usage of water and reservoir capacity** – The main purpose of a reservoir is to allow for the storage of water. Public water supply, irrigation, and industrial reservoirs all store water so that it can be consumed at a later point. Certain power sector users on the other hand, only require water temporarily either for cooling purposes or for hydropower generation. Flood storage reservoirs store water to prevent flood damage rather than to consume water, and other use cases (e.g. environmental) do not involve any water consumption or use of reservoir capacity.
  These use cases can be complementary or rivalrous depending on whether use cases require reservoir capacity, and on the timing and scale of water needs.
- **Water quality requirements** – Where different use cases require water, the quality of water required from the reservoir may differ. For example, water companies and certain agri-food businesses are likely to require reservoir water that can be treated relatively easily to meet drinking water quality standards, whereas other use cases may have limited water quality requirements.
- **Scale** – The scale of reservoir capacity and water needs may also differ by use case. While the water needs of an individual farmer is likely to be greater than that of an individual water customer, water companies typically aggregate the needs of several hundred thousand water customers and collectively represent the vast majority of water consumption.

Table E.1 summarises the use cases and beneficiaries that we have considered:

Table E.1: Summary of use cases and beneficiaries

Use case	Public water supply	Flood storage	Irrigation	Large water users (power, commercial and industrial)	Energy sector (no water use)	Leisure and tourism	Navigation	Environment
Beneficiary	Water customers	Local residents and businesses	Farmers	Industrial and commercial businesses	Energy or water customers, or industrial user	Public	Public	Public
Use of reservoir capacity	Yes	Yes	Yes	Yes	No	No	Sometimes	No
Marginal cost of incorporating use case	Very high	Medium	Medium	Medium	Low	Low	High	Low to medium
Form of funding	Regulated revenues of water company	Grant funding, payments for flood services	Grant funding Large supply agreement	Large supply agreement	Lease fees	Lease fees	Transfer fees, usage fees	Grant/charitable funding, payments for ecosystem services
Scale of funding contribution	Large	Medium	Medium (if numerous)	Medium (if numerous)	Very small	Very small	Very small	Small
Potential off-takers	Water company, New appointments and variations (NAVs)	EA, LAs, IDBs, water companies	Farmers* or farming groups, IDBs, EA, water abstraction groups	Private companies	Energy or water company, or industrial user	Private companies	Canal & River Trust, EA	Project dependent
Credit risk**	Very low	Very low	High	Low	Low	High	Unknown	Off-taker dependent
Likely length of commitment**	For length of the project	For length of the project	Long-term	Long-term	Long-term	Short-term	Unknown	Off-taker dependent

Note: EA – Environment Agency, IDBs – Internal Drainage Boards, LAs – Local Authorities
** Farmers may be too small and too numerous to contract directly with the reservoir operator and may require an intermediary.*
*** Our assessment of credit risk and contract length is on the basis that the benefits from the MSR are funded through on-going revenue streams rather than an upfront capital contribution.*
Source: CEPA and Agilia analysis

In the table above, we summarise the potential use cases of MSR systems, identifying who the beneficiaries are under each use case and assessing the likely impact of incorporating each use case on the cost of the MSR system. We also present key characteristics associated with the funding of each use case and the associated benefit, and the likely impact of incorporating the use case on the financeability of the scheme when compared against a public water supply only scheme.

Public water supply reservoirs can be financed efficiently over a long duration at relatively low cost, as they are ultimately funded by water customers through their bills under a supportive regulatory regime. The current regulatory regime provides the long-term certainty that investors will get their money back, either through the regulatory capital value (RCV) construct or by allowing water companies to sign long-term contracts for the use of the reservoir.

Similar efficient financing can likely be achieved for use cases and associated benefits that are ultimately funded by the taxpayer via a public authority. However, the beneficiaries from other use cases may be unable or unwilling to make the same long-term commitment that the water regulatory regime or public authorities are able to make. The risk of such beneficiaries being unable to meet their payment obligations for the benefits they receive (i.e. credit risk), is likely to be greater and may increase the cost of finance.

Our view of the credit risk and likely commitment length of each use case are highlighted on a Red-Amber-Green (RAG) scale within the table, where green implies there is likely to be sufficient revenue certainty to support the financing of an MSR project.

The inclusion of use cases that are not green rated in our classification pose a greater challenge to the financeability of an MSR project, particularly if those use cases drive a material portion of the cost or are a source of a large proportion of the funding. If the delivery of benefits associated with these uses cases drives capital costs, their inclusion in the design will require an entity to take on the associated revenue risk.

Key considerations when developing a usable model

In our analysis of the potential issues that emerge when developing an MSR system incorporating the different use cases, we have found that the issues will likely depend on the specific use cases being considered. Some issues may present more of a challenge if certain use cases are incorporated into the design, particularly if they are considered relatively higher risk and drive a substantial proportion of the cost. For example, it may be more challenging to integrate a navigational component to an MSR system where an existing canal cannot be used. The most appropriate commercial model for developing an MSR system will, in turn, depend on the issues at play. There is unlikely to be a single one-size-fits-all commercial and legal model that will be applicable to all types of MSR system developments.

Nevertheless, there are several key considerations to be made when preparing a multi-sector proposal that will help inform which use cases are most suited to being incorporated into the scheme, and which commercial and legal models are likely to be most appropriate. These are summarised in Figure E.1 below.

These issues will need to be considered on a case-by-case basis as the nature of each proposed scheme will likely differ substantially. For example, the geography of a location may make it particularly well suited to providing both flood alleviation and water storage benefits, while the presence of an existing canal may allow it to be rehabilitated and used for transferring water to the reservoir in place of pipelines. Alternatively, a lack of large water users nearby may mean that the water storage needs of the MSR system are largely determined by the public water supply requirements.

Figure E.1: Key issues to be considered when developing a proposal for an MSR system

Value for money – When proposals for MSR systems are being developed, the value for money case for incorporating each use case needs to be tested thoroughly to ensure the anticipated economies of scale and scope can be realised. This should be an assessment of whether the additional cost of incorporating a use case is outweighed by the additional benefit (to society). This should also take into account issues such as overall readiness of the various stakeholders to make the required commitments at the appropriate time.

The value for money of the scheme as a whole should continue to be tested as the design matures and as the commercial model is developed in detail. This approach would align with that of HM Treasury's five-case business case model,[1] which encourages revisiting the value for money or 'economic' case at key stages. In particular, the value for money case should test the potential cost of additional financing where the additional risks associated with a multi-sector solution are borne by investors or lenders. This would need to be considered alongside the value for money assessment of competitive delivery versus in-house delivery. Both assessments would need to consider the risk profile and the allocation of risks.

Funding adequacy – Ensuring adequate funding is core to developing a commercially viable scheme. Funding streams need to be identified at the outset to provide confidence that the scheme being proposed is commercially viable.

Central or local government funding may be required to pay for certain benefits where for example those benefits fall to society as a whole. Scheme sponsors will need to consider whether such funding will come from existing funding schemes, or whether a bespoke funding arrangement will be required. If it is the latter, early engagement will be required to test the government entity's willingness to provide funding.

[1] HM Treasury (2020) The Green Book: appraisal and evaluation in central government. Available at gov.uk

Consideration must also be given to how the cost of a scheme will be allocated to the various parties, and how to secure funding commitments that provide sufficient certainty while remaining flexible to changing requirements.

Financeability – MSR systems with a public water supply component are likely to be large (likely over £1bn) and privately financed over a long (e.g. 25+ years) period. This means the main source(s) of funding must be both large, reasonably certain, and long standing.

The projects will require a bankable offtake arrangement that supports debt servicing costs, coverage of agreed financial ratios, and provides a sufficient return on equity. Funders of the reservoir systems must have sufficient credit standing, longevity and liquidity, and be willing and able to commit to a long-term contract. Water companies, energy companies, and public bodies typically have these characteristics, other private entities less so.

Delivering additional benefits may drive additional capital costs. If the beneficiaries do not have an appropriate credit standing and/or are unwilling/unable to commit to long term contracts, another entity would need to take on their revenue risk. This raises questions around the extent to which certain investors/funders would be willing to take such risks, and under what risk structure.

Assuming a project is bankable (i.e., the debt service is sufficiently covered), any risk around uncertain revenue will represent an equity risk. The reward/return for taking that risk must be commensurate with it. A higher level of uncertainty will demand a greater financing cost and affect the project's value for money, but the extent of this will depend on the risk-absorbing entity. For example, the financing cost of a private investor's risk will likely be greater than if that risk were borne by water customers or by a public authority.

Delivery models – We consider that best value to water customers and other beneficiaries will be secured by using a competitive procurement delivery model such as DPC or SIPR. This provides an appropriate structure to promote cost efficiency and low-cost financing. We also consider that a late tender model is likely to be more suitable than an early tender model given the scale of uncontrollable design and consent risks associated with MSR systems. A key question is whether the MSR system ought to be procured by the water company or by a joint venture between the key stakeholders.

We have ruled out many of the other models as we consider them to be unfinanceable, not to promote value for money, or to be insufficiently flexible to accommodate multi-sector participation. This includes in-house delivery by the water company, a pure merchant delivery model, and a split delivery model where the MSR system is split into a public water supply component and a multi-sector component, each to be delivered independently.

Risk allocation – The effective allocation of risk will be essential to ensuring an MSR project is financeable and provides value for money, while protecting the interests of water customers. On that basis, we consider that construction risk and performance risk should primarily be held by and managed by the special purpose vehicle competitively procured to build, finance and operate the MSR, though as with the Thames Tideway Tunnel project and other previous projects, there may be a case for limiting this exposure.

We consider the risks associated with undertaking initial development activities prior to obtaining planning consent is best managed by a water company, given the scale of investment required at these initial stages and the relatively high termination risk. Again, however, there may be a case for some of this risk to be held by other multi-sector beneficiaries under a joint-venture model, particularly if non-water sector usage forms a large part of the MSR system design.

Finally, revenue risk presents a major challenge in the context of MSRs, given that many of the other contract off-takers are unlikely to share the same revenue characteristics as regulated water companies, energy companies, or public authorities. We consider that, for more complex multi-sector solutions involving less credit worthy off-takers, a risk sharing approach is likely to be required to ensure the project remains financeable, with some of the risk potentially held by water customers and/or taxpayers.

Legal considerations

As set out above, there is unlikely to be a one-size-fits-all model for MSRs or MSR systems. As such our analysis of the legal issues does not represent due diligence on any specific model. Instead, our analysis has set out some of

the legal issues that may arise or require consideration when companies undertake MSR projects. This includes consideration of whether any parties other than the water company would require powers to supply water, how abstraction rights and water trading will be managed, the preferred method for obtaining planning consent and whether this is done through a single application or multiple applications.

The list of issues presented does not imply that any of them are insurmountable or that they will always be relevant. Indeed, we are of the view that any number of MSR solutions could be deliverable in the right circumstances.

The list of potential legal issues presented in our report can serve as a checklist of considerations for those developing MSR systems. It may not be exhaustive as different models may present different challenges depending on risk allocation, participants, and counterparties. However, we have tried to set out some of the key considerations – in particular considering the likely involvement of or intersection with the regulated water sector.

Proposed models

As stated above, we consider that MSR systems are likely to be well suited to a model involving competitive procurement. In developing potential models, we began with use cases that are straightforward to incorporate into an MSR project, considering what adaptations would be necessary relative to a water sector only DPC or SIPR model. From there, we sought to incorporate other use cases that do not offer the same funding characteristics and have considered what further adaptations are necessary to ensure the model remains viable.

This resulted in six MSR models.

Model 1: Incorporating use cases with low marginal cost

Participants: Public water supply | Energy sector (no water use) | Leisure and tourism

In this model, the use cases in addition to public water supply have a relatively small impact on the cost of the reservoir system and can be incorporated following system commissioning. Such MSR systems are already widespread within the regulated water sector.

There are three options for incorporating such use cases into our competitive procurement model:

- **Incorporate other use cases at the outset** and include them in the upfront cost of the scheme, with revenue risk sharing specified through contractual arrangements. This would be advisable where revenues are sufficiently certain and large enough to offset scheme costs for customers, though this appears unlikely for these use cases.
- **Incorporate other use cases on an ex-post basis,** through a change event within the SPV contract (DPC model) or an additional capital allowance (SIPR model). This would be advisable where the commercial opportunities are unclear when the SPV is procured but can be retrofitted post commissioning.
- **The SPV being responsible for determining whether to incorporate the additional use cases provided the commercial case is positive.** This model is suitable where Ofwat would prefer to fully insulate water customers from the other use cases.

Model 2: Incorporating flood alleviation benefits

Participants: Public water supply | Flood storage

This MSR system model includes a flood storage and public water use cases, where the former is supported by a positive business case and will receive public match funding (grant) for flood benefits, limiting the associated credit risk. The match funding can be used in this model, either through:

- an ongoing revenue stream; or
- an upfront capital contribution, which would provide maximum benefit through the consequential reduction in the financing requirement.

As long as a contribution is viewed as certain, project mechanics can be designed to facilitate different means of contribution. The cornerstone of this option is the credit standing equivalence of the public authority providing grant funding with the water company.

Model 3: Incorporating water storage for large water users

Participants:	Public water supply	Large water users	Irrigation (large-scale)

Within any catchment, there likely exists a handful of large water users with own-supply or private supply, who could potentially benefit from a water storage reservoir. These users may have a reasonably strong credit standing and may be willing and able commit to long-term contracts. There are a variety of ways this could be structured.

- These users could pay through either a) an upfront capital contribution, or b) an ongoing revenue stream.
- The payment(s) could be tied to a) reservoir capacity; or b) volumetric water delivery and be dependent on whether water supply is interruptible or not.

Paying through an ongoing revenue stream introduces a level of revenue risk. The large water user would enter a contract with one of the following two entities, which would need to be willing to bear this risk, to the extent that such risk cannot be mitigated through other means:

- the SPV. A large water user represents greater off-take risk than a water company, meaning the cost of the scheme would increase and differential charging would be required.
- the water company, acting as an intermediary between the user and the SPV, which could apply the existing regulatory framework for arrangements with large users. This arrangement avoids polluting the contractual arrangement between water company and the SPV, maintaining the efficient financing achievable via competitive procurement.

Model 4: Incorporating water storage for small-to-medium scale agriculture

Participants:	Public water supply	Irrigation (small-to-medium scale)

The dispersed nature and individual small scale of need of small to medium agricultural farmers leads to challenges around coordination, creditworthiness and willingness/ ability to commit to long term contracts.

In an MSR arrangement these entities would require an intermediary to represent their collective interests. Potential intermediaries include:

- Water retailers
- Environment Agency
- Water Abstraction Groups
- Internal Drainage Boards
- New appointments and variations (NAVs)

The intermediary would act as off-taker and require an appropriate level of credit standing to essentially ‘wrap’ the obligations of the smaller agriculture users. Even with individual risk mutualised, there may be residual revenue risk that is beyond the intermediary’s ability to absorb, this would need to be absorbed by the water company or SPV (which may lead to inefficient pricing), or require an explicit government backstop.

Finally, developing this model further would also require consideration of distribution of water to farming customers i.e. to establish on what basis any distribution network would be developed, maintained, and funded.

Model 5: Incorporating environmental benefits

Participants:	Public water supply	Environment

The delivery of ambitious environmental improvements, over and above those required by planning, will likely require additional funding / financing.

Currently, this would most likely be funded by public agencies or environmental charities through capital contributions. In the future, MSR systems may provide an opportunity for other sectors to meet their environmental commitments (e.g. carbon reduction, biodiversity net gain). The funding of environmental improvements could be used as the basis on which financing is raised and be paid directly to the SPV or via the water company.

Given the markets for these revenue streams are still being developed, such revenues are likely to be perceived as risky, which could be reduced through government intervention. The inclusion of these benefits in MSR systems therefore remains subject to the future development of and regulation around environmental markets.

Model 6: Navigation

Participants:	Public water supply	Navigation

Navigation benefits would involve widening existing canals for leisure as well as for water transfer between companies, requiring additional financing/funding. Such a design element would likely need to be included in the project from the outset.

The revenue streams associated with navigation are likely to be short term and small, making it very challenging to raise financing on the back of them. This suggests a need for a capital contribution in order to finance the channel.

Conclusions

The models we propose above have been developed in abstract form as the Fens and South Lincolnshire multi-sector reservoir proposals are still in early stages of options development. The most appropriate commercial model will be dependent on the combination of use-cases that form an MSR proposal, the additional cost associated with each use case, and the sources of funding for each use case. This report provides a framework for working through the issues associated with developing an MSR proposal:

- supporting discussions around which MSR use cases, if developed jointly as part of a single system, would provide enhanced value; and
- supporting thinking and discussions around the funding of such use cases, and the extent to which the introduction of such funding streams introduces revenue risk.

The outcome of such discussions can then inform the design of a commercial model to support the financing and delivery of the MSR system.

1. INTRODUCTION

CEPA and Agilia have been commissioned by a partnership of RAPID, Anglian Water, Northumbrian Water, Yorkshire Water and Water Resources East, to develop a usable commercial and legal model for the development of multi-sector reservoir (MSR) systems. By MSR systems, we mean a combination of reservoir(s) and associated infrastructure, such as pipelines, pumping stations, treatment works, etc, that collectively have multiple purposes and beneficiaries. They will be used by and provide benefit to multiple stakeholders both within and outside the water sector.

In this report, we consider the underlying requirements of a viable legal and commercial model, potential use cases, and we develop a potential model to support the delivery of benefits to multiple users and for the environment within a single reservoir system. Our analysis has been supported by stakeholder engagement, precedent, and case studies.

1.1. CONTEXT

Multi-sector reservoir systems

Reservoir development provides an opportunity to capture and deliver a wide variety of benefits that extend beyond the water sector. While new reservoirs offer conventional benefits, such as raw water storage for public water supply or flood storage capacity, they can also be designed to deliver benefits that extend beyond public water supply. These might include, for example, flood risk alleviation, biodiversity enhancement, carbon reduction, water supply to agricultural customers, leisure opportunities (whether commercial or otherwise), power generation using hydro power or floating solar panels, and/or navigation through one or more channels to/from the reservoir.

If structured efficiently, these projects have the potential to be more cost effective or offer greater value than delivering each benefit separately. Ultimately, they represent an opportunity to develop strategically important infrastructure that can support adaptability and contribute to meeting future water needs.

MSR systems are likely to span various legislative and regulatory requirements and involve a wide variety of potential beneficiaries, creating both commercial and legal complexities. They require an effective commercial and legal model which supports cross-sector collaboration and alignment of parties whose diverse interests might otherwise present an obstacle. Importantly, the model must ensure both water companies and the water regulators are able to discharge their duties towards water customers.

Two water supply solutions are being developed as part of the RAPID Gated Process – the Fens Reservoir by Affinity Water and Anglian Water Services and the South Lincolnshire Reservoir by Anglian Water Services and Cambridge Water – which will be multi-sector in nature. The solutions being developed have the potential to deliver benefits such as water supply, flood storage, navigable water transfers and environmental benefits. These projects are large, with capital costs expected to exceed £1 billion per project. The findings presented in this report are intended to support the development of these projects, as well as initiate the development of a more widely applicable framework for MSR systems.

Direct procurement for customers (DPC) and specified infrastructure projects regulations (SIPR)

Our report has been developed under the assumption that many of the MSR systems considered in future would be suited to competitive procurement, as they are large and relatively discrete.

Within the regulated water sector, there are two key models for competitively procuring new infrastructure as opposed to in-house delivery of such infrastructure by the incumbent water company – DPC and SIPR. Competitive procurement has the potential to provide benefits by promoting innovation, enabling capital and operational cost savings, and potentially reducing financing costs relative to in-house delivery by a water company.

DPC involves a water company competitively tendering for a third party "competitively appointed provider" (or CAP) to design, build, finance, and operate certain large infrastructure projects. DPC embraces a wide variety of delivery structures and may or may not necessarily involve the outsourcing from the water company of all aspects of a project's lifecycle. To date, early-stage activities such as obtaining planning consents have been retained by water companies, however, this is context dependent and may not be the case in the future.

The **SIPR** model is an alternative approach to enabling direct procurement of new infrastructure in the regulated water sector. SIPR allows the Secretary of State or Ofwat to specify a particular project for delivery by an infrastructure provider if that project satisfies certain criteria related to size, complexity, and value for money. For an infrastructure project to be specified, the Secretary of State or Ofwat must be of the view the project is of a size or complexity that threatens the incumbent water company's ability to provide services for its customers; and specifying the infrastructure project is likely to result in better value for money than would be the case if the infrastructure project were not specified.

There are two key distinctions to note between DPC and SIPR. The competitively appointed infrastructure provider under SIPR is granted its own license by Ofwat and regulated directly. Under DPC, the activities of the CAP are regulated indirectly via the contractual relationship between the CAP and the water company. We assume that one of these procurement processes will underpin the MSR models that we develop in the subsequent chapters.

1.2. Report structure

The findings of our analysis are presented as follows:

- Section 2 sets out a broad grouping of potential use cases of MSR systems and how these deliver benefits to various parties;
- Section 3 considers key issues for the development of a viable MSR model, drawing on findings from relevant precedents and case studies;
- Section 4 describes potential models that support the delivery of a mixture of benefits; and
- Section 5 presents our conclusions.

2. UNDERSTANDING THE USE CASES

In the following section, we present our understanding of the various use cases or benefits that an MSR project could be designed to deliver. The features of each use case or benefit are summarised in Table 2.1, with further detail provided in the narrative below.

2.1. PUBLIC WATER SUPPLY

Typically, the main purpose of a raw water storage or service reservoir from a public water supply perspective is to provide the capacity to store water during periods of high flow, when abstractions tend to have relatively lower environmental impact, and to supply water during periods of low flows or drought, when the negative environmental impact of abstractions is large.[2] Water stored in reservoirs needs to meet criteria set out in the relevant Drinking Water Safety Plans (DWSPs), meaning that water quality within the reservoir must be managed to ensure that potential issues such as stratification or eutrophication do not occur or are appropriately dealt with. Reservoir water quality also needs to be maintained to meet the relevant environmental criteria to minimise any negative impacts on ecosystems within the catchment. Poor water quality in raw water storage reservoirs can result in a requirement for increased water treatment processes and / or a lowering of available deployable output (DO).

The capital cost of constructing a large capacity (>10Mm^3) raw water storage reservoir for public water supply can be large (>£100m) due to the large area of land and earthworks likely to be required. In addition to this, large investments may be required in assets such as water transfer pipes and pumps and additional water treatment to construct a wider reservoir system. Operational costs are likely to be dependent upon the specific features of the wider reservoir system, including pumping involved with water transfers and any additional water treatment capacity required for potable water supply.

The ultimate beneficiaries of a raw water storage reservoir are water customers (i.e. users of water receiving a supply from a water company or retailer), ranging from households to industrial and commercial users. The benefits of providing storage for public water supply purposes are ultimately funded by water customers via water companies, through the economic regulatory regime. We expect the scale of revenues from water companies to be relatively large, forming a substantial component of total scheme revenues.

The financing for a new reservoir can be raised by the water company itself, underpinned by the water company's regulatory capital value, or it can be raised by a special purpose vehicle, underpinned by a long-term contract with the water company. Either way, the financing is supported by water customers and as such the credit risk is considered by investors and lenders to be low. Funding for a reservoir can also be committed over a long-term period and is supported by a stable economic regulatory regime.

2.2. FLOOD RISK ALLEVIATION

From a flood management perspective, raw water storage reservoirs can provide storage capacity and protect vulnerable areas during periods of flooding, whether from high river flows, surface water or groundwater. There is likely to be a trade-off between using a single reservoir for flood storage purposes and using it for water supply purposes, as flood benefits are maximised when reservoirs contain relatively little water and water supply benefits are maximised when water volumes are maximised. Nevertheless, dependent upon the catchment and level of resilience required, there may be opportunities to share benefits given flood storage is primarily needed during wet winter months, whereas water supply constraints typically arise during drier summer months.

[2] Whilst this design applies to service reservoirs such as those being proposed in the Fens and in South Lincolnshire, other types of reservoirs (e.g. impounding reservoirs) may be designed to capture water under all flow conditions. Further, in certain areas, any level of abstraction from a watercourse may be deemed to have unacceptably large environmental impact.

Examples of reservoirs used for flood management

Below we set out two examples where flood management is or is becoming a normal part of reservoir operations:

- **Hebden Bridge:** Since 2017/18 Yorkshire Water has been reducing the water levels by 10% in the Hebden Water reservoir group, over the winter period, in an effort to manage flooding in the Calder Valley area. This comes in response to a number of significant floods over the past decade. Yorkshire Water has pointed to the difficulty in balancing the need to retain water for supply resilience through the summer months whilst creating sufficient capacity in winter to support flood management. The Environment Agency is continuing to monitor rivers to assess the impact.
- **Villerest Reservoir:** The Villerest Reservoir in France has developed operational guidelines and allocated water rights to ensure appropriate reservoir management under different contexts (e.g. normal operation, low water levels, flood risk and flooding). These rules are based on priorities and operational principles for all foreseeable periods and are fully defined in the Water Regulation or through River Basin Management Plans. Such operational guidelines can be important in the context of flow management and water supply where effective operation of a reservoir can allow both benefits to materialise simultaneously (i.e. reservoir acts as flood storage for winter and acts as water storage for summer).

Both examples demonstrate that water storage reservoirs can provide flood alleviation benefits, but this needs to be carefully balanced and managed alongside water supply requirements, the needs of which can potentially run counter. Clear operational guidelines based on sound principles, mutually agreed by all parties, can support the effective management of such multi-benefit reservoirs.[3]

There are broadly two ways flood storage could be incorporated into an MSR system:

- An expanded reservoir could be developed to be used for both public water supply and flood storage purposes, or
- Two separate reservoirs could be developed, one for public water supply and the other dedicated to flood storage. as part of an integrated MSR system.

The cost of constructing flood storage capacity within a reservoir system will vary depending on whether it is incorporated into the public water supply reservoir or developed as a separate dedicated reservoir, and on the scale of capacity required. A 2015 Environment Agency report found that flood storage reservoirs developed to date have often been smaller scale, typically designed to hold volumes less than 1Mm^3, with the largest schemes having a capacity of 6Mm^3.[4] This is substantially smaller than public supply reservoirs, with both the Fens and South Lincolnshire reservoir proposals being designs with a capacity of 50Mm^3. However, there do exist some large flood storage areas in the UK, typically washlands such as the Ouse Washes which has a capacity of 90Mm^3.[5]

A combined water supply and flood storage reservoir is likely to have more complex operational requirements than a reservoir dedicated specifically to achieving either objective. This may be the result of issues such as a requirement for increased active management of the reservoir to cope with flood events or maintenance of the reservoir to mitigate higher sediment loading from flood water. Another driver of cost for a combined reservoir as opposed to separate reservoirs may be the limited flexibility around choice of site location, which is an important consideration for determining whether a reservoir is able to provide flood storage benefits.

The ultimate beneficiaries of flood storage capacity are households, farms, businesses, and utility providers (including water companies), who are less likely to incur costs associated with flood damage to their premises or assets. Such benefits are typically funded through a partnership arrangement with contributions from the Environment Agency, Internal Drainage Boards and/or Local Authorities, which each have statutory functions in relation to flooding, as well as private developers, and other private businesses. As these contributions typically

[3] Environment Agency (2016) Design, Operation and Adaptation of Reservoirs for Flood Storage. Available at gov.uk

[4] Environment Agency (2015) Cost estimation for flood storage – summary of evidence. Available at gov.uk

[5] Environment Agency (2017) Great Ouse Tidal River Baseline Report. Available at eastcambs.gov.uk

come in the form of capital contributions rather than on-going funding commitments, there is less credit risk associated with them. In some instances, the Environment Agency or Internal Drainage Board may be willing to provide an on-going funding commitment instead of a capital contribution. However, credit risk will likely continue to be limited due to the implicit underpinning from government.

2.3. Irrigation

Agricultural users benefit from water storage in a comparable way to other water users, with reservoirs enabling both seasonal storage and long-term resilience to drought events. This is particularly beneficial for farmers that are currently reliant on abstraction licences which limit the volume of water that can be abstracted during periods of low water availability, which often coincides with peak growing months. Agricultural user requirements have two key differences from public water supply: first, that demand tends to be seasonal (i.e., requiring high volumes of water during summer months), and second, that the water they intake is not often required to meet the same quality standards as are applied to public water supply.

The cost of including an irrigation reservoir within a reservoir system is likely to be similar to the cost of incorporating a flood storage component. The capacity required will likely be low relative to the capacity required for public water supply, and the water quality requirements less onerous than a public water supply reservoir. However, there may need to be substantial network infrastructure to transport the water to users, which may be less cost effective than developing small-scale reservoirs close to the land that required irrigation.[6] The location of the reservoir may also limit how many farmers can benefit from the scheme.

The ultimate beneficiaries of an irrigation reservoir will be either agricultural landowners or growers. Most irrigation water is sourced through surface water and groundwater abstraction, at 93%.[7] Approximately two thirds of this water is abstracted during the growing months as required, whereas a third is abstracted during the winter months and stored in reservoirs. Historically, landowners have invested in their own on-site reservoirs, though there are instances of groups of farmers cooperating to invest at moderate scale in a shared reservoir, and other instances where a landowner has developed a reservoir and sold on water volumes to other users.[8] However, water trades between farmers have been relatively short term, rarely extending beyond a year, making such revenues less predictable.

The scale of existing agricultural reservoirs is very small relative to the scale of reservoirs developed for water supply purposes, fulfilling the needs of at most a handful of farms. Larger on-site reservoirs typically have capacities of approximately 0.2Mm^3 with the largest having a capacity of 0.5Mm^3.

[6] Alternatively, it may be possible to develop the MSR system in a way that facilitates licence trading across the catchment. However, we have not explored this possibility in depth.

[7] Knox, J.W., Kay, M.G., Holman, I.P., and Hess, T.M. (2020) Irrigation water strategy for UK agriculture and horticulture. Available at nfuonline.com

[8] Cranfield University (2014) Water for agriculture: collaborative approaches and on-farm storage. Available at fensforthefuture.org.uk

Examples of farmer-led reservoir developments

We have identified two examples of farmer-led reservoirs, each developed under a different structure. The first demonstrates the importance of trust and context, whilst the second shows how revenue risk is managed in a smaller agricultural setting, whilst also showing the challenges associated with distribution.

- **Heronhill LLP** was formed in 2010, created by three farms in West Norfolk to manage their joint investment in the development of two reservoirs. A local grower had been searching for irrigable land on which to grow potatoes, which triggered the investment and was seen by the farmers as securing the future of their farms for 40-50 years. The water volume is split based on each farm's share of the partnership. Though there is no long-term agreement in place with the grower, the significant investment of each party (the grower developed a large-scale potato store) and local context support a mutually beneficial relationship.
- **Russell Smith Farms** in Cambridgeshire set out to develop a 0.5Mm^3 reservoir in response to an abstraction ban partway through the growing season. The intention was to share the water resource with 16 surrounding farms. This required a distribution network, which caused both delays and significant cost increases. The surrounding farmers do not have long term agreements; they agree a required level of supply on an annual basis, which is paid for regardless of whether the water used.

Irrigation reservoirs are usually financed through a mixture of farmer equity, bank loans, and grant funding from Defra (also previously, the EU), with bank loans typically secured against the value of the land. This provides evidence that irrigation reservoirs at small scale are financeable, provided adequate security is in place. However, in the absence of such security and where reservoirs are being developed on the basis of funding from water trading, we consider it will be more challenging to secure long-term financing due to the unpredictability of revenues. Consideration also needs to be given to how the relatively small-scale needs of agricultural users can be aggregated to fully participate in a large-scale MSR scheme.

Examples of financing irrigation schemes

We have found some examples of schemes where it has been possible to raise both public and private financing based on future revenue streams from farmers or larger agricultural businesses. In some instances these revenue streams are future tax revenues whereas in other instances they are based on user charges.

- **Sites reservoir project:** The Sites reservoir project is an MSR scheme in California, being developed by a joint venture of municipal and industrial water agencies and irrigation districts. It is expected that the project will be able to raise financing, partly based on expected revenues from agricultural businesses in the irrigation district. However, initial development work (e.g. design, consents) is being financed mostly through state and federal loans supplemented by a line of bank credit. The credit risk related to future revenue streams is expected to be mutualised across all participating authorities, all of whom have tax raising powers.
- **Tasmanian Irrigation Projects:** Tasmanian Irrigation is a state irrigation company in Australia, responsible for developing and operating irrigation schemes such as reservoirs. Many of these are €10 million+ projects with the largest committed scheme costing approximately $150 million. These projects have attracted private finance through the sale of 'water entitlements' to farmers, i.e. rights to reservoir volumes. The sale of these entitlements has typically funded around one third of the cost of such schemes, with the remainder contributed by the Australian and Tasmanian governments.

A key feature of both these case studies is the existence of an entity that acts as an intermediary between the scheme and individual irrigators. In both examples, the entity is either backed by the state or has tax raising powers. We expect a similar entity of sufficient scale may be needed in an MSR scheme, to act as contract off-taker for the irrigation component.

2.4. Large water users (industrial, commercial and energy sectors)

The water supply requirements for large water users share some similarities to that of irrigation users, though there may be a greater requirement for supply that meets quality standards, depending upon the industry served, and/or

more constant water supply, depending on the extent to which they have cost-effective access to other water sources. This segment represents a wide variety of potential users, ranging from hydrogen producers to food processing plants to steel manufacturers.

Teesside Industrial Water Network

The Teesside Industrial Water Network is a discrete dedicated network supplying partially treated non potable water to Teesside industry.

The network originated in 1978 with a 'club' agreement for the large process users supplied. The supply obligation was to *'supply raw water at the boundaries of stated premises…. in such quantities as will meet the requirements of the members'*. The agreement set out the charging arrangements and the way in which cost variations would be recovered.

The network currently supplies around 50 ML/d to thirteen large industrial customers. There are potentially significant new supplies on Teesside in the medium term with Net Zero carbon capture and a Hydrogen plant being considered.

The industrial raw water tariff is currently just over one third of the price of the equivalent potable large user, based on the average costs of running the network.

The users will likely require some form of distribution infrastructure unless they are situated directly by the reservoir. As they are expected to be large, single entities, requiring a significant quantity of water, any distribution infrastructure is likely to be less costly and complex relative to irrigation. Users may also require their own treatment facilities, where the quality of water required is higher than drinking water quality standards.

The creditworthiness of these entities will be variable depending on their age, size, sector, performance, and history, but all will have a lower credit rating relative to a regulated utility. Certain energy sector users, such as hydrogen producers, may benefit from a supportive regulatory regime which would reduce the credit risk.[9]

2.5. Energy sector without water usage

Reservoirs may provide commercial opportunities that do not involve water usage, such as power generation through floating solar panels. The panels are mounted on rafts which are then interlinked and anchored in situ, with a transmission cable bringing the power onshore. As such use cases do not require reservoir capacity, it appears more feasible to identify and pursue these opportunities following construction, if needed. However, if there are requirements on the reservoir design, (for example, micro hydropower) these users need to be included from the outset.

The beneficiaries may consist of the energy company developing the plant, who would then sell the energy produced to the grid. Alternatively, a user may develop the plant for self-supply. This might be the water company or a large commercial / industrial user in close proximity to the reservoir.

Example of floating solar on a reservoir

United Utilities is currently developing a solar farm that will float on Langthwaite Reservoir. The 1MW installation consists of 3,520 panels, covering an area the size of a football pitch. The intention is for United Utilities to use the power generated in its entirety to run the nearby water treatment works in Lancaster, rather than export it to the National Grid.

This is the second floating solar installation undertaken by United Utilities; the preceding one is located at Godley reservoir near Manchester. Completed in 2016, it can generate up to 3GW per year, also supporting the company's nearby water treatment works. The company believes this should help to reduce customer water bills.

[9] See Department for Business, Energy & Industrial Strategy (2021) Design of a business model for low carbon hydrogen. Available at gov.uk

Such uses cases may reduce the operating cost of an MSR by providing cheaper electricity to operate pumping stations or treatment plants or may create revenue streams in the form of leasing fees. Given existing examples of the use of floating solar panels, e.g. at the Langthwaite and Queen Elizabeth II reservoirs,[10] we expect the former is more likely to be an applicable use case.

Nevertheless, where such projects do provide revenue streams, we expect these will be small-scale but linked to long-term (25-30 year) Power Purchase Agreements.

2.6. LEISURE, TOURISM AND NAVIGATION

Reservoirs and reservoir systems can also provide leisure, tourism and navigation opportunities which may or may not be commercial. Leisure and tourism activities may include walking, cycling, bird-watching and other forms of eco-tourism, water sports and open water swimming, whereas navigation opportunities may involve designing water transfers between a river and reservoir to be navigable, or navigation authorities wishing to use water from reservoirs for use in canals. Making canals navigable benefits those using waterways for lifestyle or leisure purposes (e.g. boat users).

Leisure activities on reservoirs

Many reservoirs across the UK host a range of leisure activities both on the water and on the land surrounding the reservoir. These activities take place on reservoirs owned and operated by water companies as well as those owned privately by industry (e.g. steelworks) and landowners. A number of these reservoirs are solely used for leisure purposes, suggesting that it is possible for income from leisure activities to cover some of the costs of operating and maintaining a reservoir.

- **Eyebrook Reservoir**, in Leicestershire and Rutland, is owned by Tata Steel UK but operated as a trout fishery through a leasing arrangement with Fishery Management (UK) Ltd. Although public access to the site is restricted, the management company does on occasion allow tours of organised groups to partake in birdwatching, with the reservoir being designated as a Site of Special Scientific Interest.
- **Ulley Reservoir**, a former public water supply reservoir in South Yorkshire, is currently owned by Rotherham Metropolitan Borough Council. The reservoir sits within Ulley Country Park which hosts a range of leisure activities. Half of the reservoir itself is used for angling and sailing, while the other half is designated as a nature reserve.
- **Rutland Water**, in Rutland, is owned by Anglian Water and used as a public water supply reservoir, a water park and a nature reserve. The reservoir hosts activities including fishing, walking, cycling, birdwatching, pleasure boating, and a range of water sports.

We expect the cost implications of incorporating leisure and tourism opportunities within an MSR system to be relatively limited in instances where they do not materially affect the design of the reservoir. Additionally, many of these opportunities could be incorporated after the core of the MSR system has been developed. There are some exceptions to this, however. For example, making water transfers navigable may be require substantial additional capital expenditure. If the channels are to be newly developed, this would restrict the choice of site location and involve the construction of open water channels instead of pipelines. In other cases, it may be feasible to enhance existing channels (e.g. deepening the channel) to enable navigation. The cost of such enhancements would vary depending upon the design of the existing channel and intended future use. In either case, navigable channels would require more intensive management of water quality relative to a pipeline.

Leisure and tourism activities may provide users with health and wellbeing benefits and be associated with a user-access funding stream. However, this funding is likely to be disparate and small-scale. Where there are clear and large commercial opportunities from leisure, a business may be willing and able to support the funding of the reservoir. However, the size of any funding contribution is likely to be small relative to the cost of the MSR.

[10] Lightsource bp (Undated) Floating solar powering Thames Water. Available at lightsourcebp.com

2.7. Environment

The delivery of certain environmental benefits as part of the development of MSR systems will be required under existing legislation (e.g. biodiversity net gains through the Environment Act). There are nonetheless opportunities for benefits to be sought over and above this. This might include the creation of wetlands, preservation or restoration of peatlands, or the planting of trees, or they might be a side-effect from other developments within the MSR system (e.g. activities to manage river flows or reduce the number of sewer overflows).

Capturing the value of these benefits remains a challenge. There are existing public agencies which can provide capital contributions for the delivery of specified benefits, such as flood alleviation or wetland creation. These capital contributions are typically small scale but could become larger with the establishment of the Landscape Recovery Scheme by Defra.[11] Alternatively, or in addition, environmental charities may be willing to lease and operate areas surrounding reservoirs as nature reserves, for instance, representing a potential funding stream.

Funding streams for the delivery of 'units' of environmental benefit, however, are more challenging and must be underpinned by a stable regulatory regime that appoints them with a value. These markets have yet to be developed, but are under consideration, for example:

- The **Financing UK Nature Recovery Coalition** is working with HM Treasury and Defra to develop proposals for investable markets for environmental services
- Natural England is currently running a **Biodiversity Credits Scheme Pilot** to understand how a market for biodiversity credits could work for developers unable to achieve a 10% biodiversity net gain on their development site

Below we set out potential financing / funding streams associated with environmental benefits, and the timescales within which we consider they are likely to develop.

Figure 2.1. Expected timing of flooding and environmental benefits

Source: CEPA analysis

The extent to which financing can be raised against these potential future revenue streams will depend on the age and performance of the market, the stability of the associated regulatory regime and the extent of government support.

2.8. Summary

In the table below, we summarise the potential use cases discussed in the preceding sections, identify key characteristics related to the funding of such benefits and their likely impact on financeability. The credit risk and commitment length of each are highlighted on a Red-Amber-Green (RAG) scale, where green implies there is sufficient revenue certainty to support the financing of an MSR project.

The inclusion of beneficiaries that are not green rated in our classification pose greater challenges to the financeability of an MSR project, particularly if those use cases drive a substantial portion of the cost or are a

[11] Defra (2021) Environmental Land Management schemes: overview. See gov.uk

source of a large proportion of the funding. If the delivery of these benefits drives capital costs, their inclusion in the design requires an entity to take on the associated revenue risk.

Table 2.1. Use cases / beneficiaries

Use case	Public water supply	Flood storage	Irrigation	Large water users (power, commercial and industrial)	Energy sector (no water use)	Leisure and tourism	Navigation	Environment
Beneficiary	Water customers	Local residents and businesses	Farmers	Industrial and commercial businesses	Energy or water customers, or industrial user	Public	Public	Public
Use of reservoir capacity	Yes	Yes	Yes	Yes	No	No	Sometimes	No
Marginal cost of incorporating use case	Very high	Medium	Medium	Medium	Low	Low	High	Low to medium
Form of funding	Regulated revenues of water company	Grant funding, payments for flood services	Grant funding Large supply agreement	Large supply agreement	Lease fees	Lease fees	Transfer fees, usage fees	Grant/charitable funding, payments for ecosystem services
Scale of funding contribution	Large	Medium	Medium (if numerous)	Medium (if numerous)	Very small	Very small	Very small	Small
Potential off-takers	Water company, New appointments and variations (NAVs)	EA, LAs, IDBs, water companies	Farmers* or farming groups, IDBs, EA, water abstraction groups	Private companies	Energy or water company, or industrial user	Private companies	Canal and River Trust, EA	Project dependent
Credit risk**	Very low	Very low	High	Low	Low	High	Unknown	Off-taker dependent
Likely length of commitment**	For length of the project	For length of the project	Long-term	Long-term	Long-term	Short-term	Unknown	Off-taker dependent

Note: EA – Environment Agency, IDBs – Internal Drainage Boards, LAs – Local Authorities
** Farmers may be too small and too numerous to contract directly with the reservoir operator and may require an intermediary. We discuss this in more detail in Section 4.*
*** Our assessment of credit risk and contract length is on the basis that the benefits from the MSR are funded through on-going revenue streams rather than an upfront capital contribution.*
Source: CEPA and Agilia analysis

3. KEY CONSIDERATIONS FOR A VIABLE MODEL

In this section, we discuss key issues to be addressed in developing a viable commercial and legal model for MSR systems, and their implications for the design of a practicable model. For each issue, we also summarise the key lessons drawn for future MSR projects. These lessons are based on our consideration of the issues from a theoretical lens, learning from other sectors and from international MSR projects. Some of these issues would also exist for water company only reservoir projects, but we address them in this section where we consider them to be amplified in a multi-sector context.

3.1. VALUE FOR MONEY

One of the key theoretical advantages of an MSR solution is the potential for it to provide better value for money to society than multiple solutions that meet the respective needs of each user separately.[12] There are two ways in which this enhanced value for money can be achieved:

- **Economies of scale:** We envisage that a single large reservoir, used for multiple purposes, will likely be more cost effective than several smaller reservoirs, as it allows for more limited land take to achieve a given capacity, requires less construction activity overall, and is cheaper to operate. We also envisage there to be economies of scale gained through *developing* the reservoir as a single scheme, e.g. undertaking design work, obtaining planning permission and other consents, etc.
- **Economies of scope:** There are potential efficiencies where joint development of the different components of the reservoir system creates synergies. At its simplest, joint development may allow certain infrastructure, such as pipelines, to be shared. Further, the presence of flood storage areas or wetlands may provide water quality benefits that reduce the amount of treatment required downstream to meet drinking water standards or the presence of wetlands might provide opportunities to generate revenues from leisure and tourism. The opportunity of integrating different uses at the design stage of a project could also realise significant benefits.

Nevertheless, it is not guaranteed that an MSR solution will always be better value than the alternative. Factors such as those discussed below may inhibit value for money.

- **Insufficient benefit for certain use cases:** Certain use cases for MSR systems may not provide sufficient benefit to the users or to society to justify the additional complexity. This could be for various reasons, including the location not being well suited to that particular use case, or differing requirements for the different use cases. For example, the water quality requirements of an irrigation reservoir may be simpler than for a public water supply reservoir, meaning that the benefit of expanding a public water supply reservoir for irrigation purposes may be limited.
- **Diseconomies of scale and complexity:** Increased complexity brings with it an increased requirement to manage interfaces and potentially a different supply market. This additional supply chain and management burden may, if not properly configured, result in overall inefficiencies during the execution phase of a project. Larger schemes may also be less resilient to the financial stress of the supply chain. This complexity and further risk exposure adds to the cost and risk of the scheme potentially further undermining the value for money case.
- **Cost of more expensive financing:** As we discuss later in this report, multi-sector solutions amplify certain risks (particularly revenue risks) associated with the development of large-scale water infrastructure. To the

[12] In a water context, value for money can be thought of in two ways: a) value for money to water customers and b) value for money for society as a whole. In this section, we refer to the latter but recognise that the scheme most also offer best value to water customers.

extent that these risks are borne by those investing in or lending to an MSR scheme, they would be reflected in the cost of financing or in extreme circumstances, in the ability to raise finance. The relationship between the cost of financing and value for money is sensitive as financing costs can comprise a large proportion of overall scheme costs.

- The current (i.e. PR19) allowance for the weighted average cost of capital (WACC) for wholesale activities for water companies is at a historically low level, currently set at 2.92%. As a reservoir used only for water supply purposes would have no interface risk, we expect that a water supply only scheme would have a similar WACC, though this will partly be dependent on the financing model used. An MSR could introduce risks such as interface or additional credit risk, we therefore imagine that a blended cost of capital could be higher for an MSR compared to a single-sector only solution.

Key lessons for MSR systems: value for money

When proposals for MSR systems are being developed, the value for money case for incorporating each use case needs to be tested thoroughly to ensure the anticipated economies of scale and scope can be realised. This should take into account issues such as overall readiness of the various stakeholders to make the required commitments at the appropriate time, and the likelihood of the benefits materialising given climate change related uncertainties.

The value for money of the scheme as a whole should continue to be tested as the design matures and as the commercial model is developed in detail. This approach would align with that of the five-case business model, which encourages projects to revisit the value for money or 'economic' case at key stages. In particular, the value for money case should test the potential cost of additional financing where the additional risks associated with a multi-sector solution are borne by investors or lenders. This would need to be considered alongside the value for money assessment of competitive delivery versus in-house delivery. Both assessments would need to consider the risk profile and the allocation of risks.

3.2. ADEQUACY OF FUNDING

Determining that an MSR system is value for money is the first step in ensuring that any model is considered commercially viable. The next step is ensuring that the scheme is fully funded – in other words, there exists a source of funding associated with each benefit or use case so that, total revenues received covers the total cost of the scheme including financing costs throughout the life of the financing requirement.

We would expect funding to be broadly arranged on a user pays basis. In other words, where the benefits of the reservoir or of the wider system accrue to a private user, that user would ultimately be responsible for funding their portion of the benefit. However, there are three key challenges associated with the user pays approach:

- In some instances, a beneficiary's willingness to pay or ability to pay may not match the required revenue from that user. This creates a **revenue gap** that must be filled by another party. In some instances, where there is a public policy rationale for doing so, the government may be willing to fill this gap through the provision of additional capital in the form of grants or subsidies. For example, in the rail sector, farebox revenue from passengers is often insufficient to cover the costs of providing the rail service and as a result, subsidies from government bridge the funding gap. In the absence of government support, the specific use case would need to be excluded from the scheme.
- In other instances, the benefits accrue to society as a whole (e.g. environmental improvements) or to a specific community (e.g. flood benefits) such that it is not possible to identify specific individuals or organisations to meet the additional costs of the project in order to secure the benefit. Such **public benefits** would typically be funded by central or local government, or by charities. However, in some instances it may be possible for them to be funded directly by those interested in seeing such benefits materialise. We explore this further in the context of the funding of environmental improvements in Section **Error! Reference source not found.**.

- Finally, it may not be possible to identify at the outset the scale of the benefit that is likely to be received, or such benefits may not be certain. For example, it may not be possible to accurately predict how much flooding benefit will be received by adding a flood storage reservoir, particularly where it is a dual-use water supply / flood storage reservoir.

For water resources schemes like reservoirs, the user pays approach implies that water customers should only fund benefits that directly accrue to them and that there should be no cross subsidy between water customers and other users. This is consistent with the approach proposed by RAPID in its December 2021 consultation document on the regulatory and commercial framework for strategic water resource solutions.[13] Nevertheless, it is necessary to distinguish between benefits that accrue to other users or to the public, and additional expenditure required to mitigate the impact of the reservoir scheme. For example, reservoir developments will be required to mitigate their associated environmental impact through the Environmental Impact Assessment process, land use planning requirements, biodiversity net gain requirements, and other environmental regulations. We consider the costs associated with such mitigations to be intrinsic to the scheme and, therefore, funded by all beneficiaries including water customers. More ambitious environmental improvements that go beyond legislative, planning, and regulatory requirements, would need to be separately funded.

The allocation of costs to the various beneficiaries is another key funding consideration. This is relatively straightforward in instances where all the users benefit from the reservoir system in the same way – for example, where all of the users receive access to a portion of reservoir capacity, either for water supply purposes or for flood storage purposes. Cost allocation is more challenging where there are different types of benefits accruing to different users, such as water storage benefits for irrigators and water customers, navigation benefits for boat users, and environmental benefits for the wider public.

There are different approaches to cost allocation in such circumstances, though in practice a combination of all three approaches will be required:

- The entire cost of the scheme could be split based on the proportional **value of the benefits received by each user**, with public benefits allocated to public bodies, central government, or local government. This will require a relatively well-developed business case such that each type of benefit can be quantified in monetary terms. The business case would also need to distinguish between environmental mitigations required as part of the scheme and further environmental improvements that require separate funding.
- Alternatively, it may be possible to **identify discrete elements of the scheme that have only one or two direct beneficiaries**, with each discrete element funded by the direct beneficiaries. For example, within a reservoir system, a water storage reservoir may be funded by users requiring water access (e.g. water customers, irrigators), a flood storage reservoir may be funded by those receiving flood benefits (e.g. public via government funding, and possibly water companies), etc. This may also be assessed on an incremental cost basis; such that other users are liable for the incremental cost of a scheme that incorporates their specific use case, starting from a water only base case.
- Another approach may be to allocate costs based on the **outcome of bilateral negotiations** between each beneficiary and the lead sponsor.

It is likely that Ofwat will need assurance that the interests of water customers are protected during these negotiations. We consider it essential that funding arrangements are well progressed before the authority to

[13] RAPID - The regulatory and commercial framework for strategic water resource solutions – a consultation - Ofwat

proceed with the scheme is given following planning consent, as the incentive for other beneficiaries to engage following a final investment decision becomes more challenging.[14]

Key lessons for MSR systems: revenue availability and certainty

Ensuring adequate funding is core to developing a commercially viable scheme. Funding streams need to be identified at the outset to provide confidence that the scheme being proposed is viable.

Government funding may be required to pay for certain benefits where for example those benefits fall to society as a whole. Scheme sponsors will need to consider whether such funding will come from existing funding schemes, or whether a bespoke funding arrangement will be required. If it is the latter, early engagement will be required to test the government's willingness to provide funding.

Consideration must also be given to how the cost of a scheme will be allocated to the various parties, and how to secure funding commitments that provide sufficient certainty while remaining flexible to changing requirements.

3.3. Financeability/Bankability

Provided an MSR system has a positive business case and is able to secure sufficient funding, the third key pillar for ensuring a viable commercial model is for it to be financeable, i.e. the project is able to attract sufficient debt and equity finance to cover its cost.[15]

The potential pool of investors that will be both willing and able to finance an MSR system will be constrained in part by the large cost of the system, which can range from several hundred million to more than a billion; and the complexity of the system, which requires management and supply chain capability to ensure that the risks of the project are effectively managed. The newly developed UK Infrastructure Bank could potentially play a role here provided project proposals demonstrate that they fall within the scope of the Bank's mandate and investment principles. Nevertheless, the length of the construction period, particularly where there is no return until the asset is operational, may also present challenges for certain types of investors. As such, there are several conditions that need to be met for an MSR to be considered financeable:

- **Limited revenue risk:** For lenders to provide finance, particularly at the cost of capital that the sector is accustomed to or is expecting in the context of a DPC model, the expected revenue streams from a project must be adequate across a number of dimensions:
    - **Size**: The expected sources of funding (e.g. user charges) must be sufficient to cover all of the initial capital costs, as well as the on-going operation and maintenance costs, and cover financing costs, including providing a suitable headroom against key financial ratios (e.g. debt service cover ratios).
    - **Credit standing:** Investors in the Competitively Appointed Provider (CAP i.e. the SPV within a DPC model) will use the credit standing of a contract off-taker to assess its capacity to meet its payment obligations. Investors will be averse to a counterparty which is below a strong investment grade rating given the potentially long-term exposure to credit-risk.
    - **Time exposure**: Where a water company raises finance for the reservoir using its own balance sheet, the economic regulatory regime, through access to customers over time, provides certainty that revenues will be available (subject to bad debt etc). Revenue sources that are not underpinned by water customers will be of increased risk, particularly where the source of revenue is static – i.e.

[14] Even when funding commitments are made, disputes can still arise subsequently. As an example, the Department for Transport (DfT) entered into an agreement with Heathrow Airport Limited (HAL) for a funding contribution of £230m towards Crossrail's extension to the airport. A dispute arose following the cancellation of Heathrow's third runway proposals, which led HAL to argue that the size of its contribution was no longer justified from an airport and airport user perspective. This created a £160m funding shortfall that had to be covered by DfT following the CAA's decision to only allow only a £70m contribution into HAL's regulated asset base. See crossrail.co.uk and parliament.uk.

[15] We are assuming here that a fully publicly financed option is not an option.

a particular customer, rather than a customer base. The static customer base, overlayed by a contractual arrangement (as compared to a regulatory arrangement) imports further risk to the project structure, as the commercial contract and credit support mechanics need to stand the test of time.

Ideal participants in an MSR would therefore tend to be those with big water volume requirements. Government involvement would not typically be required but lends legitimacy where revenue streams are insufficient to service a project's capital and operational requirement.

- **Appropriate risk reward ratio for any revenue risk that does exist:** Where part of the funding is less certain, either because it does not come in the form of a long-term contractual commitment signed before financing is arranged, or because the contract off-taker does not have sufficient credit standing, there needs to be a party willing to take on the risk of that revenue not materialising.

  Any party taking on such risk will need to be appropriately rewarded through a higher return (i.e. through the possibility of receiving higher revenues) or through lower charges (if water users take on the revenue risk), commensurate to the volume of revenue at risk and the degree of revenue risk.

Key lessons for MSR systems: financeability

The reservoir systems being developed through RAPID are large (potentially over £1bn) and the financing will likely be repaid over a long period (e.g. 25+ years) to make these projects affordable. This means **the main source(s) of funding must be large, relatively certain, and long standing**.

The projects will require a **bankable** offtake arrangement that supports debt servicing costs, coverage of agreed financial ratios, and provides a sufficient return on equity. Funders of the reservoir systems must have sufficient credit standing, longevity and liquidity, and be willing and able to commit to a long-term contract. Water companies and public bodies typically have these characteristics, private entities less so.

Delivering additional benefits may drive capital costs. If the beneficiaries do not have an appropriate credit standing and/or are unwilling/unable to commit to long term contracts, another entity would need to take on their **revenue risk**. This raises questions around the extent to which certain investors/funders would be willing to take such risks, and under what risk structure.

Assuming a project is bankable (i.e., the debt service is sufficiently covered), any risk around uncertain revenue will represent an equity risk. The **reward/return** for taking that risk must be commensurate with it. A higher level of uncertainty will demand a greater financing cost and affect the project's value for money, but the extent of this will depend on the risk-absorbing entity. For example, the financing cost of a private investor's risk will likely be greater than if that risk were borne by water customers or by a public authority.

3.4. DELIVERY AND CONTRACTUAL MODELS

Several delivery models are available for the development of MSR systems. These models are briefly described below, with a more detailed description of each model provided in Appendix B:

1. a **public sector delivery model**, as commonly used for transport infrastructure and flood defence, where project sponsorship, financing and delivery is led by a public authority;
2. a **pure merchant delivery model**, where the reservoir is delivered by an entity that is not a water company, nor owned by one, nor procured by one, with the project receiving revenues through water trading and other non-water revenue raising activities;
3. a **water company *in-house delivery* model**, whereby the water company delivers the project as part of its business-as-usual functions, and finances the project against its regulatory capital value (RCV);
4. a **split delivery model**, where the water storage component or public water supply component of an MSR is delivered using one of the above models, and all of the other multi-sector components are delivered using another model.

5. a **Joint Venture *delivery* model,** whereby a joint venture established by a water company and other multi-sector participants raises additional financing to develop, own and operate the reservoir;
6. a **Joint Venture *contracting* model using DPC**, whereby a water company and other multi-sector participants input equity, or makes other contributions under the umbrella of a joint venture, which then competitively procures an SPV to design, finance, build and operate the reservoir, with the water company and other multi-sector participants acting as off-takers;[16]
7. the **SIPR model**, e.g. the Thames Tideway Tunnel, whereby the incumbent water company is required to run a competitive procurement exercise to appoint a third-party company to finance, build and operate the reservoir, with the third-party company being separately licensed by Ofwat and having direct access to customer revenues to fund the project; and
8. a **water company *contracting* model using DPC**,[17] i.e. where a water company competitively procures an SPV to design, finance, build, maintain and operate the reservoir, under contract to the water company.

Key characteristics required for a viable delivery model

In a multi-sector context, the key characteristics that the delivery models need to reflect are:

- flexibility to allow non-water sector participants to be introduced at the start of the project or at later stages;
- ensuring financeability (see section 3.3); and
- ensuring best value to consumers and to society (see section 3.1).

Delivery models that do not meet key characteristics

We do not consider a **public sector delivery model** (#1) any further as it is infrequently used in the water sector and there is unlikely to be a strong public policy case for adopting such a model. However, should any of the remaining delivery models prove unviable for a particular MSR scheme, and there remains a public policy case for pursuing such a scheme, the public sector delivery model may need to be reconsidered.

Based on the above characteristics, we also rule out some of the other models from detailed consideration:

- We consider a **pure merchant delivery model** (#2) to be unlikely to be viable in the context of a large-scale MSR. While merchant reservoirs do exist, these are orders of magnitude smaller than would be required for an MSR. The high costs associated with development, the complexity of incorporating multiple use cases, the requirement to interface with the water network, and the exposure to full revenue risk, would likely make the project unfinanceable. Nevertheless, for substantially smaller schemes, it may be possible to deliver an MSR system using a pure merchant delivery model.
- We also consider **in-house delivery by a water company** (#3) to be less suitable in an MSR context. Such a model is relatively inflexible at accommodating other MSR participants. Given that water companies will have established governance arrangements for how business is conducted, the introduction of additional stakeholders into the governance structure may present further difficulties. If the project is placed entirely within a water company's regulatory ringfence, water customers would be exposed to all of the project risks, including those that are introduced or amplified by the presence of other stakeholders. On the other hand, treating part of the project as a non-regulated activity would require complex arrangements around cost and risk allocation. There are also weaker incentives to meet the needs of other sectors given the statutory duties towards the water sector.

[16] Note under these arrangements the operating arrangements and the financial arrangements do not have to follow – i.e. parties that are not contributing equity/or other financial contributions may still benefit from use of reservoir.

[17] See ofwat.gov.uk

Furthermore, given the potential scale and complexity of a major project, an in-house delivery model may present risks and management distraction that diverts the focus of the company away from its core purpose of supply to customers.

- For similar reasons, we consider a **Joint Venture delivery model** (#5) to also present a challenge, creating a management distraction and diverting focus away from the water company's core activities. Without strong governance arrangements, water customers are at risk of being exposed to all of the risks during the development phase of the MSR project.[18]
- Finally, we have found it challenging to perceive of an instance where a **split delivery model** (#4) would continue to provide the economies of scale and scope that drive the value for money case for an MSR rather than a single-sector reservoir.

Delivery models for further exploration

This leaves a shortlist of three delivery models for further consideration: Joint Venture contracting model using DPC; a water company contracting model using DPC; and the SIPR model.

Flexibility – Of the remaining models, the Joint Venture contracting model (#6) provides the most flexibility to accommodate multi-sector participants, as it creates a new structure to govern overall project arrangements during design, procurement, construction and operation, and allows for the sharing of risks and rewards. Such a Joint Venture could be structured as a community interest company, allowing participants other than equity stakeholders However, as noted in the recent RAPID consultation, *'a joint venture of water companies may be complicated to regulate, especially if the joint venture is incorporated, unlicenced and not subject to direct regulation.'* Developing a joint venture in an MSR context would introduce even more complexity. The water company DPC or SIPR models have less flexibility to accommodate MSR participants, but we consider they can be accommodated through contracting arrangements with the SPV or with the lead water company sponsor.

Financeability – Each of the three shortlisted delivery model structures are considered to be capable of preserving the financeability of the project as a whole. However, this would be subject to an appropriate reflection of revenue risk within the models and as more fully set out in Sections 3.3 and 3.5 of this report.

Best value – All three models create strong incentives to secure best value to the beneficiaries by introducing competition in the design, delivery, and operation of the MSR. These models also have the greatest potential to secure low-cost financing, by seeking a cost of finance that is market tested and unencumbered by embedded debt.

Key lessons for MSR systems: delivery models

We consider that best value to water customers and other beneficiaries can best be secured by using a competitive procurement delivery model such as DPC or SIPR. This will create the right structure to promote cost efficiency and low-cost financing. We also consider that a late tender model is likely to be more suitable than an early tender model given the scale of uncontrollable design and consent risks associated with MSR systems. A key question is whether the MSR system ought to be procured by the water company or by a joint venture between the key stakeholders.

We have ruled out many of the other models where we consider them to not be financeable, to not promote value for money, or to not be sufficiently flexible to accommodate multi-sector participation. This includes in-house delivery by the water company, a pure merchant delivery model, and a split delivery model where the MSR system is split into a public water supply component and a multi-sector component, each to be delivered independently.

[18] Here it is assumed that the projects pursued under this model would be predominantly for water supply, and thus funded by customers. If projects were to instead obtain large portions of their funding from public sector off-taker(s), such assumptions may no longer hold.

3.5. APPROPRIATE RISK ALLOCATION

At various stages in a project's development, there are different types of risk that it is exposed to. Each has the potential to affect the project's financing. The more risk an investor or lender is expected to take, the greater the cost of financing and potentially, the smaller the pool of potential lenders. With MSR systems, many of the risks of typical project financings are compounded, making financeability more of a challenge.

Below, we consider the allocation of such risks and the extent to which allocation will affect a project's financing.

Design and consent risk

Depending on the design of MSR systems, our current assumption is that planning consent will require a Development Consent Order (DCO), though some smaller MSR systems may obtain planning consent through the Town and Country Planning Act 1990.[19] There are two key risks that can materialise at this stage:

- **Consent risk**, i.e. the possibility of the project failing to obtain the necessary planning and regulatory consents to continue.
- **Design risk**, i.e. the possibility that the design of the scheme changes (e.g. during the planning process) such that it is more costly or more complex to deliver than was originally envisaged or costed.

Under a competitive procurement model such as DPC or SIPR, it is unlikely that infrastructure investors will be willing to finance a scheme, at a relatively low cost of capital, where they are expected to take on **planning consent risk** without appropriate protections. While it may be possible to attract development capital, the upward pressure on pricing as well as the risk accommodation that will need to be provided, may not represent value for money. One particular issue that will need to be taken into account in the overall value for money assessment is how to mitigate the unwind costs of the overall project transactions if planning consent was to ultimately be unsuccessful. This type of issue was a key consideration when deciding on an optimal approach to reaching financial close for Waste PFI contracts.

The scale of investment required, and the materiality of planning consent risks makes it challenging for an entity other than a regulated water company or public authority to lead on these initial activities. Where reservoirs are primarily for water supply purposes, water companies would be responsible for taking the project through the consenting process. Should the project fail to progress, Ofwat would then need to take a view on the extent of costs that the water company could pass through to customers. In other words, the consent risk would be held by water companies with a portion of that risk potentially underpinned by customers. Alternatively, where a reasonably large proportion of the cost of the reservoir is driven by multi-sector usage (e.g. flood risk alleviation), there may be a case for a proportion of the consenting risk to be held by another public authority.

Similarly, it is unlikely that infrastructure investors will be willing to take on any **design risk** during the planning process. In other words, they are unlikely to commit to a price for the scheme before the scheme has received (or is close to receiving) planning consent. For large-scale infrastructure, the likelihood of scope and design changes during the planning process is large, introducing a material risk of cost overruns. As a result, such projects would better lend themselves to a late tender model, where initial activities are undertaken the procuring authority and the scheme is procured once the scope, design, and cost of the scheme is relatively mature.

Implicitly, this means the design risk would need to be borne by the ultimate beneficiaries of the project, potentially spanning multiple sectors, with cost increases during the planning process shared between them. Consideration would need to be given to the treatment of instances where, following design changes during the planning process,

[19] The Planning Act 2008 currently considers a development a Nationally Significant Infrastructure Project (NSIP) and, therefore, subject to the DCO process if it designed to store more than 10Mm^3 of water. Defra has previously consulted on raising this threshold to 30Mm^3 of water and introducing a new threshold based on the deployable output of the reservoir, set at 80ML per day.

the scheme becomes unaffordable for certain beneficiaries. In such circumstances, the scheme could potentially be descoped to exclude such use cases, or other users may be required to bear the risk of closing the funding gap.

Construction risk

During the pre-commissioning stage, the project will be subject to construction risk, i.e. the risk of delays and/or cost overruns. The level of construction risk will depend in part on:

- **Construction complexity:** The higher the complexity, the greater the uncertainty of final cost and schedule to complete construction.
- **Contractors' experience and project readiness:** Contractors and project entity staff with greater experience in construction and project oversight, respectively, will be deemed to pose relatively less construction risk.
- **Contractor's resilience to cost overruns**: The project size, the robustness of the construction budget, profit margins, contingencies and the credit quality of the constructor or its guarantor will have implications for the level of construction risk.
- **Project resilience to delay:** The extent to which a project can manage delays before the contracted date will also have implications for the level of construction risk. Project resilience will depend in part on slack in the construction schedule, distance to the long stop date and the level of liquidity on the project.

Reservoir design, construction, operation, and maintenance is heavily regulated with a range of complex and high-risk activities in the construction phase. These activities lend themselves to target cost type construction arrangements such as NEC Engineering and Construction Contract Option C, with a pain/gain share mechanism (e.g. Havant Thicket Reservoir and Thames Tideway Tunnel). One of the key advantages of a competitive procurement model, such as DPC or SIPR, is that it can, in theory, insulate water customers from construction risk relative to in-house delivery. This will depend on the contractual terms agreed with the SPV, which should ideally allocate risks to the parties best able to manage them, allowing construction risk to be shared between the customers, the SPV and contractors.

While investors are willing to take on construction risk, the pool will narrow as the size and complexity of the project increases. However, we do not see MSRs as being sufficiently different from single-sector reservoirs, to warrant a different allocation of construction risk to a standard DPC model.

Revenue risk

An MSR will be more exposed to revenue risk than a water sector only reservoir, due to the participation of other benefits with uncertain revenue streams. Many of the off-takers associated with these other benefits are either unable or unwilling to commit to long-term take or pay contracts, or do not have the same level of credit standing as a regulated water company, or both.

As a way of dealing with this revenue uncertainty, the off-taker could provide an upfront capital contribution to the project. However, most off-takers will be unwilling to provide a capital contribution while there remains a risk of the project being terminated before completion, and the associated loss of their capital. Therefore, any capital contribution would only likely come once construction is complete and the MSR system begins to operate. And due to the long lead times associated with reservoir development, a capital contribution at this time would have a limited impact on reducing the uncertainty around future revenues at the point of raising finance.

There are several options for where some or all of this revenue risk could be held:

- The SPV could absorb the revenue risk, with investors pricing it into the cost of capital. The advantage of this approach is that it would insulate water customers from the revenue risk introduced by other off-takers. However, it would lead to a more expensive scheme, potentially undermining its value for money. Depending on the scale of revenue risk, it may also not be possible to attract investors willing to take on the risk. This is especially likely in instances where investors are unable to estimate the risk introduced by certain types of off-takers.

- Alternatively, it may be possible for another corporate entity or organisation to act as an intermediary between some of the users and to hold the associated revenue risk. However, this presents a similar challenge to instances where the SPV absorbs the revenue risk, given the challenge in estimating risk exposure. It may not be possible to identify a corporate entity willing to take on the risk associated with high-risk users.
- The third option would be for water customers to hold the revenue risk. This potentially exposes water customers to large additional costs but would also allow them to share the benefits should the revenues materialise.
- A final option would be for certain revenue risks to be underpinned by taxpayers. This may be an option where there is a public policy case for providing a revenue backstop.

Regardless of how the revenue risk is shared between different parties, the contribution of each off-taker would need to reflect the uncertainty they introduce into the financing structure, to avoid low-risk water customers cross subsidising other higher risk users.

Example models for managing revenue risk

There are several models in existence that encourage private investors to take on a degree of revenue risk. These models take various forms, but all of them use mechanisms to limit investor exposure, with the remaining risk underwritten by utility customers or by government.

- **Electricity Interconnector Cap and Floor model:** Prior to the introduction of the Cap and Floor model, investors were generally unwilling to finance and develop electricity interconnectors under an arrangement where they were fully exposed to revenue risk. However, the introduction of the Cap and Floor model has led to the development of several interconnector projects. Under the model, power sector customers absorb some of the downside revenue risk, such that revenues covering operating costs and the cost of servicing debt are guaranteed by the floor.
- **Third-party income from waste:** Many PFI waste schemes undertaken by local authorities have contract structures that incentivise the Contractors to maximise other revenue streams, including from markets that may not have existed when the contract was signed. These structures include gainshare arrangements so that any third-party income generated is shared with the local authority.
- **Airport hybrid till:** Most airport economic regulatory regimes allow airports to invest in other revenue generating assets (e.g. retail spaces, car parks, etc.). Under a hybrid till model, the financing of these assets sits partially within the regulatory ringfence and partially outside, with revenues apportioned accordingly. Revenues apportioned to the regulatory ringfence are used to offset regulated charges.

Performance risk

In a competitive procurement model, such as DPC or SIPR, performance risk would likely be passed through to the SPV through contractual or regulatory incentive mechanisms. Performance risk refers to instances where the SPV is unable to deliver the volumes of water contracted. Where these risks materialise due to action or inaction by the SPV, it is appropriate for such risks to be held by it. However, if extraordinary risks materialise that are outside of the SPV's control, this might be considered equivalent to force majeure.

We do not see a major case for performance risk being treated differently in an MSR compared with a single-sector reservoir. Nevertheless, contractual arrangements with the SPV would need to consider appropriate compensation arrangements should an SPV be unable to deliver on contracted volumes, and appropriate sharing arrangements between the various users.

Key lessons for MSR systems: risk allocation

The effective allocation of risk will be essential to ensuring an MSR project is financeable and provides value for money, while protecting the interests of water customers. On that basis, we consider that construction risk and performance risk should primarily be held by and managed by the special purpose vehicle competitively

procured to build, finance and operate the MSR, though as with the Thames Tideway Tunnel project and other previous projects, there may be a case for limiting this exposure.

We consider the risks associated with undertaking initial development activities prior to obtaining planning consent is best managed by a water company, given the scale of investment required at these initial stages and the relatively high termination risk. Again, however, there may be a case for some of this risk to be held by other multi-sector beneficiaries under a joint-venture model, particularly if non-water sector usage forms a large part of the MSR system design.

Finally, revenue risk presents a major challenge in the context of MSRs, given the many of the other contract off-takers are unlikely to share the same revenue characteristics as regulated water companies or public authorities. We consider that a risk sharing approach is likely to be required to ensure the project remains financeable, with some of the risk potentially held by water customers and/or taxpayers.

3.6. LEGAL CONSIDERATIONS

In **Error! Reference source not found.**, we set out a summary of the legal issues pertinent to the development of MSR systems. We have not identified any legal issues that act as specific barriers to their development. Many of the issues we highlight are also relevant in the context of single-sector reservoirs developed through SIPR or DPC, and they are already being actively considered in the context of other schemes.

Of the particular issues identified in **Error! Reference source not found.**, we consider the following will require careful consideration in the context of MSRs:

- **Powers to lay pipes** – Water companies and licensed infrastructure providers (under the SIPR model) have powers to lay pipes in streets or in third-party land connected with their regulated functions. Any other entity would need to make alternate arrangements for the laying of pipes, such as by private treaty with the relevant landowner or highway authority. We note that in DPC and in the case of other sub-contractors for water company's agency arrangements might be possible. We also note that even where water companies and licensed infrastructure providers (under the SIPR model) have relevant powers, they would need to consider whether the power was being exercised pursuant to regulated functions.

- **Financing restrictions and ringfencing arrangements** – Financing restrictions placed on water companies by their lenders and by Ofwat may restrict their ability to participate in an MSR. Such restrictions may prevent certain delivery models, for example, they may prevent a water company from inputting equity into an MSR joint venture. Similarly, the financing restrictions may prevent water companies from materially participating in non-regulated activities.

  Additionally, the presence of a regulatory ringfencing arrangements raises a number of complex issues should an MSR project sit partially within the regulatory ringfence and partially outside, including – financing, cost and revenue allocation, and the regulation of outcomes.

- **Obtaining planning consent** – In our stakeholder engagement, an issue that has frequently been raised is an MSR potentially requiring separate planning applications for the water resources aspect of the development and for the non-water resources aspect of the scheme. We have reviewed this in the context of planning guidance around associated development applications for major infrastructure projects.[20] Associated developments can be submitted alongside a principal development as part of a single development consent application.

  The consideration of what constitutes an associated development is considered on a case-by-case basis by the relevant Secretary of State. Despite this, and despite the fact that multi-purpose developments such as MSRs were not necessarily envisaged within the guidance, we consider that the principles outlined within

[20] Department for Communities and Local Government (2013) Planning Act 2008: associated development applications for major infrastructure projects. See gov.uk

the guidance are supportive of a single application being submitted for the whole MSR scheme. In particular, many of the use cases we have identified either assume a single asset (e.g. a reservoir) is used for multiple purposes, or it assumes that there are economies of scope such that the other use cases help achieve the water supply objective.

4. MODELS

In this section, we discuss how we approached devising a set of models that might support the development of MSR systems, and then go on to present each model.

4.1. Approach

We have adopted a structured approach to thinking about usable commercial models for MSR systems. We began with the use cases that are the most straightforward to incorporate as an MSR project. These are the use cases that offer tangible and secure long-term revenue streams, with off-takers that have strong creditworthiness and an interest in securing long-term access to the reservoir system. We have considered what adaptations are necessary relative to a base single-sector model, in which a water company develops a reservoir for public water supply using the DPC or SIPR model.

We have then tried to incorporate other use cases that do not offer the same funding characteristics and have considered what further adaptations are necessary to ensure the model remains viable. To inform our considerations, we have asked the following questions:

- What are the sources of funding? And do they come in the form of capital contributions or on-going revenue streams that commence once the MSR is commissioned?
- What risks does the incorporation of this use case expose? Which party would be best placed to manage that risk? What implications does that have on the ability of each party to raise finance and the cost of that finance?
- What is the financing structure?
- Given the above, how would the reservoir be designed from the outset and what benefits does this deliver?
- And therefore, what is a workable procurement process, ownership structure and delivery model?

The findings of our analysis are presented in the following subsections. The models we have identified can be combined depending on the use cases involved. For example, models 1 and 2 can be combined where a proposed MSR system incorporates both a floating solar installation and a flood storage area. All of our models assume competitive procurement and could equally operate under the DPC approach or SIPR. However, as we explain in the next section, we are assuming a late contracting approach, where initial design and planning activities are undertaken by the procuring authority.

4.2. Project sponsorship, initial design and surveys, and obtaining planning and regulatory consents

In the models we have developed, we assume that an early contracting model is unlikely to be feasible given the likelihood of large scope changes during the planning and consenting process. This means that investors in the SPV are unlikely to be willing to commit to a price prior to the design being close to finalised, which will only be feasible once the planning process is close to completion. It may be possible to implement a risk sharing mechanism for any cost overruns beyond this or create a contractual structure that allows for certain cost increases to be added to the contract price. However, this would be complex and risks undermining the cost efficiency benefits from competitive procurement.

We also expect that in most instances it would be most appropriate for a water company (or multiple water companies, in the case where the public water supply benefits are shared across two or more sets of water customers) to lead on developing the initial design and obtaining planning consent. The design and planning consent risk is then underpinned by the water customer and managed through the regulatory regime (see Section 3.4). Provided that the water company is confident of achieving planning within a reasonable time frame, we

consider that it generally provides an overall benefit to run the procurement process in parallel to obtaining consents. If the procurement process is run in parallel with the planning process, flexibility can be built into the contract to reflect potential planning variations, provided these are not material.

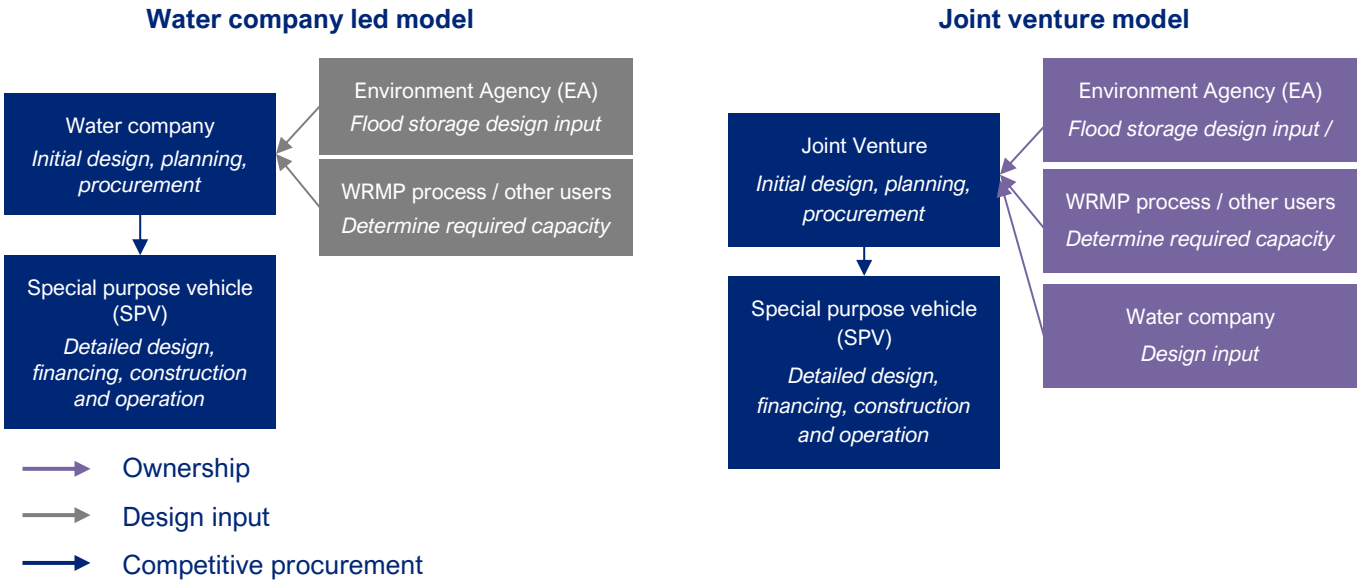
Other beneficiaries or users will engage with the water company and input into the design as necessary, though the exact nature of the engagement will depend on the scale of the non-public water supply elements, and whether the multi-sector elements are designed into a single reservoir or as part of an integrated MSR system. A contractual arrangement between the water company and the beneficiary may be needed to ensure that the needs of other beneficiaries are secured in the design of the scheme, and the beneficiaries share some of the costs involved with undertaking these initial activities. We consider this model is likely to be feasible where the public water supply component of the MSR scheme forms the most substantial element.

Alternatively, where other use cases form a large part of the scheme, it may be possible for a joint venture between the water company and other entities (e.g. the Environment Agency, large water users, etc.) to act as project sponsor. This would allow more flexible risk sharing arrangements, managing water customers' exposure to consent risk. It would also allow other users to participate in the design process more actively. For example, the joint venture members could be involved in:

- the design of the scheme, to ensure it reflects the needs of their users/beneficiaries; and
- creating the governance arrangements – for example in relation to water supply rights and priorities, or when scheduled maintenance is to occur.

We expect the joint venture model to be most applicable where there are more than one 'anchor user' or 'owner,' i.e. more than one user who will be required in order to meet the majority of the funding requirements for the project. The participants in the joint venture would then be the primary contract off-takers with the SPV and following the end of the initial contract-term with the SPV, the joint venture would own the MSR.

Figure 4.1: Diagrammatic representation of water-led and joint-venture led models for developing MSRs



4.3. Model 1: Incorporating use cases with low marginal cost

Multi-sector participants:	Public water supply	Energy sector (no water use)	Leisure and tourism

In this model, we incorporate use cases that have a relatively small impact on the cost of the reservoir system that can, if necessary, be incorporated into a scheme following the commissioning of the wider system. This form of MSR usage is already widespread within the regulated water sector, with many existing water supply reservoirs hosting a range of leisure activities. The costs and revenues associated with such activities largely sit outside of the price control.

For most leisure and tourism activities, there would not be any additional capital requirements on the SPV, though it may introduce some additional operating costs. A clear example would be leisure / tourism opportunities where land by the reservoir is leased to build a café or water sport rental. This might also encompass other commercial opportunities such as the development of floating solar panels.

There are three options for incorporating such use cases into our competitive procurement model:

- **Incorporate leisure, tourism or other smaller scale commercial opportunities at the outset** and included in the cost of the scheme. This would be advisable where the commercial case for incorporating these use cases is relatively certain and with the revenues providing some opportunity to offset the cost of the scheme to consumers. The latter requiring these funding streams to be of sufficient scale, which appear unlikely for these use-cases.

  The contractual arrangements would need to specify how the revenue risk from these third-party income streams would be shared between the parties. The SPV could hold the entirety of the revenue risk, which would mean that any benefit to water customers would come from a lower bid price. Under this arrangement, the contract would need to ensure that the SPV is not unduly incentivised to seek out third-party revenues at the expense of the services to water customers.

  An alternate arrangement would be for there to be a gain-share mechanism between water customers and/or the water company and the SPV. This would be more suited to instances where the revenues are less predictable or forecastable.

- **Incorporate such smaller scale commercial opportunities on an ex-post basis,** through a change event within the contract with the SPV (under a DPC model) or through an additional capital allowance (under the SIPR model). This option would be advisable when the commercial opportunities are unclear when the SPV is procured. This model would allow further capital investment to be retrofitted once the reservoir system has been commissioned, potentially reducing the interface risks of undertaking construction all at once.

  Under the DPC model, the contract structure would need to be sufficiently flexible to allow such change events. Specifically, contractual provision may be necessary to oblige the SPV to raise additional finance for any new capital spend.[21] Again, however, a number of different revenue sharing arrangements are possible. Under a the SIPR model, the retrofitting of additional use cases would need to be managed through the regulatory price control process, which would need to be sufficiently flexible to allow for third-party income.

- **The SPV being responsible for determining whether to incorporate the additional use cases provided the commercial case is positive.** This model is suitable where Ofwat would prefer to fully insulate water customers from the other use cases. Water customers would not be required to fund any additional expenditure related to these other use cases, but depending on the terms of the contract and the terms of water company licences, customers may stand to benefit from a proportion of the revenues received.

[21] This type of provision appears in other contractual provisions. For example, UK Offshore Transmission Owners are required under licence to raise up to an additional 20% of the initial asset value as directed, should capacity increases be required.

4.4. Model 2: Incorporating flood alleviation benefits

Multi-sector participants: Public water supply | Flood storage

In this model, we develop an MSR model that allows for the inclusion of another party with similar levels of creditworthiness as a regulated water company. The main example we use is an MSR system which includes a flood storage component as well as a public water supply reservoir (and potentially other use cases), with the flood storage component match-funded by a public body. We assume the incorporation of flood storage is supported by a positive business case, and that an arrangement for public match funding for flood benefits has been agreed by the Environment Agency or the relevant Internal Drainage board (and possibly the local authority).[22] As the flood benefits are publicly funded, we assume that the associated credit risk is limited.

A grant from the EA (or from an IDB or LA) can be used in this model in at least two ways, as an upfront capital contribution (as shown in Figure 4.2) or as an ongoing revenue stream (Figure 4.3):

- **A capital contribution** from the EA needs to be structured in a manner that does not distort construction phase incentives on the SPV (i.e. full revenues are only available once the asset is operational). Guidance relating the structuring of such capital contributions has been provided by HMG in the context of PPP projects, which in broad summary is to structure the capital contribution commensurate with milestones in the project and to mindful of the overall size of the capital contribution when compared to the financing requirement.
- The timing of **an ongoing revenue stream** will have to be agreed upfront taking funding cycles into consideration i.e. Ofwat operates on a 5-year cycle and the EA on a 6-year cycle with respect to grant-in-aid funding of flood management projects.[23]

The maximum benefit to the project would come from an upfront contribution given the consequential reduction in the financing requirement and associated cost savings. However such upfront contributions may not be consistent with the funding cycle for the grant making body. As long as a contribution is certain or viewed as certain, project mechanics can be designed to facilitate different means of contribution. The cornerstone of this option is, however, the credit standing equivalence of the other funding contributors (e.g. a public authority) with the water company. Ultimately which option (upfront or revenue, or even a combination of the two) will be dependent on the funding availability of the contributing body.

Figure 4.2: EA or IDB capital contribution towards flood storage benefits

[22] Flood management projects are typically match funded through the Environment Agency grant-in-aid scheme rather than fully funded. We assume that the remainder could potentially be funded by water companies where water infrastructure stands to benefit from the reduced risk of flooding, or by local authorities, or by other local beneficiaries. Match funding from the latter may introduce an element of credit risk.

[23] The budgeting and funding cycle does allow for the development and approval of new schemes mid-cycle

Figure 4.3: EA or IDB providing on-going funding for the flood storage benefits

4.5. Model 3: Incorporating water storage for large water users

Multi-sector participants:	**Public water supply**	**Large water users (commercial and industrial)**	**Irrigation (large-scale)**

Within any catchment, there likely exists a handful of large water users with own-supply or private supply, who could potentially benefit from a water storage reservoir. These users have a reasonably strong credit standing and may be willing and able commit to long-term contracts.

There are a variety of ways this could be structured. Below we set out three key, interrelated issues that help to define this structure.

- These users could pay through either a) an upfront capital contribution, or b) an ongoing revenue stream.
- The payment(s) could be tied to a) reservoir capacity; or b) volumetric water delivery, and be dependent on whether water supply is interruptible or not.
- Where the user pays through an ongoing revenue stream, the user could a) contract directly with the SPV, as shown in Figure 4.4 below or b) contract with the water company, who would act as an intermediary between the user and the SPV as shown in Figure 4.5.

A capital contribution and revenue stream structure are both possible for these users; the choice will depend somewhat on the extent to which the user wishes to raise/commit its own finance up-front.

A revenue stream structure lends itself better to volumetric purchases, whilst capital contributions are better suited to capacity rights. The contract design would need to allow for appropriate sharing arrangements where drought events prevent contracted volumes from being fully delivered. We understand this is being considered by RAPID; Section 2.4.5 in the most recent consultation sets out an intention to develop a more detailed framework around the 'fair shares' approach to the allocation of water during times of scarcity.[24]

A revenue stream would also introduce a level of revenue risk, given that large water users are unlikely to have a level of credit standing equivalent to a regulated water company. This risk would need to be borne by either:

- **The SPV,** which would imply the large water users contracting directly with the SPV. Large water users represent greater risk as off-takers relative to a water company, increasing the cost of capital for the SPV and increasing the total cost of the scheme. To avoid a cross subsidy between water customers and other users, the SPV would need to implement differential charging so that the revenue risk is reflected in the charges paid by riskier off-takers and not in the charges paid by less risk water companies.

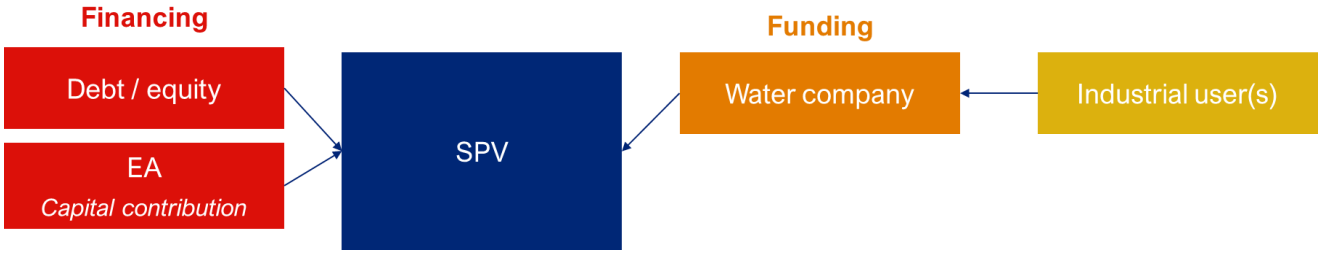
[24] RAPID (2021) The regulatory and commercial framework for strategic water resource solutions – a consultation. Available at ofwat.gov.uk

This approach presents a challenge in pricing the revenue risk. As water trades between water companies and large users are relatively infrequent, the credit risk may be difficult to estimate leading to an inefficient pricing of risk or in extremis, an unwillingness to bear the risk. This could undermine the value for money case of the scheme.

- **The water retailer,** which would imply the large user contracting via the water retailer. There exists a regulatory framework for arrangements with large users, where the large user would either need to hold its own retail licence (i.e. a self-supply licence) or be supplied by a licensed water retailer. Ofwat requires evidence of financial resilience in both cases, such as parent company guarantee, as a way of protecting other water customers. An advantage of an indirect contracting model is that it avoids polluting the contractual arrangement between water company and the SPV, maintaining the low cost of finance achievable via competitive procurement.

Figure 4.4: Funding and financing under a direct contracting arrangement

Figure 4.5: Funding and financing under an indirect contracting arrangement



4.6. Model 4: Incorporating water storage for small-to-medium scale agriculture

Multi-sector participants: Public water supply | Irrigation (small-to-medium scale)

While large farming cooperatives and agri-food businesses may be able to participate under Model 2, small and medium agricultural farmers present a greater challenge unless there is a viable entity that can act as an intermediary on behalf of participant agri-food businesses. This is because their need is likely to be small relative to the scale of the reservoir, which leads to three issues. The first is the challenge of coordinating the needs of many smaller scale farmers who have limited needs at an individual level but potentially more substantial needs at an aggregate level. Without such needs being aggregated, the economies to be gained from farmers participating in a large MSR are likely to be extremely limited. The second issue is one of creditworthiness. In the absence of land being used as security, individual farmers are unlikely to be considered sufficiently creditworthy, unless the risk is mutualised across a large number of farmers, or the risk is underpinned by others (i.e. taxpayers or water customers). The final issue relates to whether there is sufficient interest on the part of farmers in committing to long-term take or pay contracts with the water company or MSR operator, and fund associated distribution infrastructure.

We consider the main way of working around these issues is for another entity to take on the role of an intermediary, to support collaboration between farmers. Such an intermediary would plan and determine the water requirements for irrigation, representing the collective interests of agricultural irrigators. It would act as off-taker but would need to have the appropriate level of credit standing to essentially 'wrap' the obligations of the smaller agriculture users. Potential intermediaries include:

- **Water retailers.** This would be most applicable where public water is already supplied to farmers using an existing distribution network. Water retailers already act as intermediaries for agricultural customers with mains access, whether potable or non-potable. Under this approach, charging models would follow existing arrangements for the charging of non-household customers that are large users. The water company would take the lead in identifying the irrigation needs of potential agricultural customers, through the water resource management plans, and design the reservoir accordingly.
- **Environment Agency.** This would create a link with the water abstraction regime and the move towards environmental permitting, by providing farmers with alternative access to water. However, further exploration would be needed to identify whether the Environment Agency would need additional powers to take on this new function.[25]
- **Water Abstraction Groups.**[26] The continued evolution of regional water abstraction groups could see the development of a trading arm or equivalent that could act as an intermediary for farming members. This would require much closer collaboration between farmers and would require the groups to be more heavily capitalised than they currently are.
- **Internal Drainage Boards.** IDBs, where they exist, could potentially act as intermediaries for farmers. However, would need to explore further whether statutory change would be required to grant IDBs the necessary powers to act as intermediaries.
- **New appointments and variations (NAVs).** It is also worth considering whether, in the case of co-located farms, the water intermediary could also be a new water company in its own right specifically focused on that group of farms.

Under each of these arrangements, the credit risk associated with each individual farmer would need to be mutualised across all the participants. Nevertheless, even with the mutualisation of credit risks, there may be a residual revenue risk linked to either demand risk or credit risk, which is beyond the intermediary's ability to absorb. This is particularly likely where the intermediary is not a public authority. In such instances, either an explicit government backstop would need to be introduced, or the residual risk would lie with the SPV or water company.

As we note in Model 2, if these risks lie with the SPV, they may be inefficiently priced due to the difficulty in estimating demand risk and credit risk in the absence of extensive water trading with long-term take or pay contracts. However, there may be a public policy case for government acting as a backstop in these early projects, where it wishes to encourage more extensive water trading between users.

Finally, developing this model further will require consideration of distribution of water to farming customers and how any distribution network would be developed, maintained, and funded. Potential scenarios may include a NAV taking responsibility for the development of a distribution network, water being distributed using existing networks, or the role of the water intermediary being extended.

[25] Section 20A of the Water Resources Act 1991 should be considered when assessing this option

[26] Water abstraction groups or water abstractors groups are self-organised collectives of water abstractors (i.e. farmers), typically within a water catchment, who coordinate activities related to water abstraction and usage. They typically communicate with regulators such as the Environment Agency on behalf of members, facilitate negotiations between members on how best to use limited water resources in their catchment, and provide support and advice on water management.

4.7. Model 5: Incorporating environmental benefits

Multi-sector participants: Public water supply | Environment

There currently exist a number of ways through which environmental benefits may be delivered through MSR systems:

- Environmental improvements as required through legislation and as conditions on planning applications will be included in projects.
- Certain improvements may also be delivered where they have low additional resource requirements (e.g. low cost, simple to implement).

The delivery of more ambitious environmental improvements, however, is likely to require additional funding / financing. Currently, this would most likely be funded by public agencies or environmental charities through capital contributions, under schemes such as the Environmental Land Management schemes.[27] In the future, however, we anticipate that MSR systems may provide an opportunity for other sectors to meet their environmental commitments (e.g. carbon reduction, biodiversity net gain) by funding the delivery of more ambitious environmental improvements within the MSR system. As discussed in Section 2.7, this could be made possible through market-based methods.

These potential future funding streams may support the inclusion and delivery of greater environmental benefits within an MSR. Following the basic structure proposed in the preceding sections, these revenue streams could be used as the basis on which financing is raised, and be paid directly to the SPV or via the water company, depending on the most appropriate allocation of risk.

Given the markets for these revenue streams are still being developed, any revenues associated with the future development of these markets are likely to be highly uncertain, creating revenue risks. Even as such markets develop, we would expect there to still be some uncertainty. For example, revenue streams linked to carbon credits and habitat banking will depend on relative supply and demand, which will be highly uncertain where these markets remain nascent. It may be feasible to reduce this uncertainty through government intervention, such as floor pricing, to increase investor confidence and reduce the cost of capital. The inclusion of these benefits in MSR systems thus remains subject to the future development of and regulation around environmental markets. For at least the first few projects that are reliant on such funding streams, a bespoke mechanism is likely be needed to support the financing of such benefits.

4.8. Model 6: Navigation

Multi-sector participants: Public water supply | Navigation

Navigation benefits would involve widening existing canals for leisure as well as for water transfers between companies. Our working assumption is that this would require additional financing/funding over and above the cost of the reservoir, to construct the open channel or to rehabilitate an existing canal.[28] It may also introduce additional operational costs due to water quality management.

Such a design element is significant and would likely need to be included in the project from the outset (in other words, it cannot easily be retrofitted). The revenue streams associated with navigation are likely to be short term

[27] Defra (2021) Environmental Land Management schemes: overview. See gov.uk

[28] It is possible that rehabilitating an existing canal introduces cost savings relative to pipeline infrastructure, in such instances, it would be more straightforward to incorporate such benefits without relying on external funding.

and relatively small, making it very challenging to raise financing on the back of them. This suggests a need for a capital contribution in order to finance the channel.

5. CONCLUSIONS

In our report, we present a number of issues that need to be considered when developing a commercial model for delivering MSRs or MSR systems. In working through the issues, we have found that the extent to which they are likely to present a challenge will depend on the specific MSR proposal being considered. We do not consider any of these issues present insurmountable barriers, but there is unlikely to be a single one-size-fits-all commercial and legal model that will be applicable to all types of MSR system developments.

The first issue that would need to be considered relates to identifying and designing a water resources solution that **represents best value,** through the WRMP process. In the case of MSR systems, depending on the use cases incorporated into the design, there is likely to be a trade-off between economies and additional benefits from a multi-sector solution versus additional complexity and risk that is introduced. It is worthwhile testing at key stages of project development – when initial concepts are developed, when a site is identified, when a development consent application is put together, and when the commercial and contractual model is developed – that the MSR project continues to represent best value, and the respective funding contribution made by each party appropriately reflects the benefit received.

The second issue relates to translating an MSR project that represents best value, into **a financeable proposition**. One of the key challenges of developing an MSR system in a UK context is the implied requirement for the project to be partially or fully privately financed. While there are international examples of the development of MSRs and MSR systems, such schemes are supported by extensive public funding or public financing, and many of the schemes typically have two utility style off-takers – hydro power generators and water suppliers. We have not identified any instance of an MSR or MSR system being developed under a project financed structure, or with a substantial private finance component.

Given the domestic context of developing water infrastructure using private finance, there are three elements to developing a useable commercial model for the development of an MSR system:

- The first of these is **ensuring that each benefit whether private or societal is fully funded**. The use cases will need to have tangible funding or revenue streams associated with them. The funding streams need to be of sufficient scale to cover the additional cost of incorporating the use case into the scheme design and into the commercial/contractual structure.

  Potential funding streams for each use case, and the potential scale of such funding, needs to be identified at the outset to ensure the use case is appropriately reflected in the MSR scheme design. Where the scale of funding is relatively small, the design ambition for the particular use case needs to be similarly limited. And where public funding is assumed, engagement with the relevant public authority should start early, especially where a bespoke funding arrangement is required. Finally, funding for each use case needs to be sufficiently certain before a final investment decision is made to incorporate the use case into the MSR scheme.

- The second key challenge is **creating a financeable structure when non-water company and non-public sector off-takers are added to the scheme**. Other off-takers, regardless of size, import additional revenue risk into the project structure as they are not supported by customer revenues or taxpayers. This risk must either be absorbed by the project's financing or held by the more creditworthy off-takers, such as the water company or the public authority. Depending on the degree of revenue risk the financing is expected to absorb (in addition to other risks such as construction and performance), the impact on the cost of financing may be very large, or it may make the project unfinanceable.

  In this report, we explore a couple of different options where the risk could be held. While the revenue risk being absorbed by the project's financing is attractive, the feasibility of this would need to be market tested for each MSR proposal. For the first MSR projects, we expect that this approach will be unfeasible or very costly, due to the lack of experience in estimating and pricing such risks. This means that in some limited instances, the revenue risk may need to be held by the water company as the primary off-taker (and by

extension, the water customer) or by a public body (and by extension, the taxpayer), to make the model commercially viable.

- The final challenge is **creating a structure that allows small scale users such as irrigators to participate in an MSR project**. We previously note that the storage needs for individual agricultural irrigators is very small relative to the water storage needs for public water supply resilience. Given this, it is unlikely to be logistically feasible for an SPV to contract directly with individual irrigators, nor is it likely to be commercially attractive. We have identified several potential water intermediaries who would be able to contract with the SPV and with the individual agricultural customers. The role of the intermediary would be to 'book' storage capacity and to ensure the capacity is paid for.

The models we have presented in this report show the range of potentially feasible options. However, detailed consideration of their feasibility will depend on the specifics of each individual MSR scheme. For example, an MSR scheme that includes a navigation component is likely to present fewer feasible options than an MSR scheme with a flood storage component. These models would need to be explored further as the proposals for the South Lincolnshire and Fens reservoirs develop. For each scheme, selecting the most appropriate model will require balancing the need to ensure the project remains financeable, ensuring the project continues to provide value for money for all users, and avoiding cross subsidies between the beneficiaries.

Generally, we have not identified any specific legal or regulatory barriers to the development of an MSR system Most of the models we have identified can be made to work under existing arrangements, though we have identified issues that are also pertinent to the development of single sector reservoirs. The one area where policy change may be required is around the establishment of a water intermediary for agricultural users. None of the potential water intermediaries we have identified, other than water companies, currently provide this function. We would expect that specific policies would need to be implemented to facilitate the development of these functions. And in instances where the intermediary is a public authority, there may be legislative change required to give them the requisite powers.

5.1. Next steps

Our analysis of the issues has been developed in the abstract as the Fens and South Lincolnshire reservoir proposals are still in early stages of options development. We consider this report provides a framework for developing these proposals further:

- supporting discussions around which MSR use cases, if developed jointly as part of a single system, would provide enhanced value; and
- supporting thinking and discussions around the funding of such use cases, and the extent to which the introduction of such funding streams introduces revenue risk.

Once the scope of each of the two MSR proposals are more mature, and the funding packages are further developed, detailed consideration can be given to the most appropriate commercial model.

Appendix A CASE STUDIES

A.1. THAMES TIDEWAY

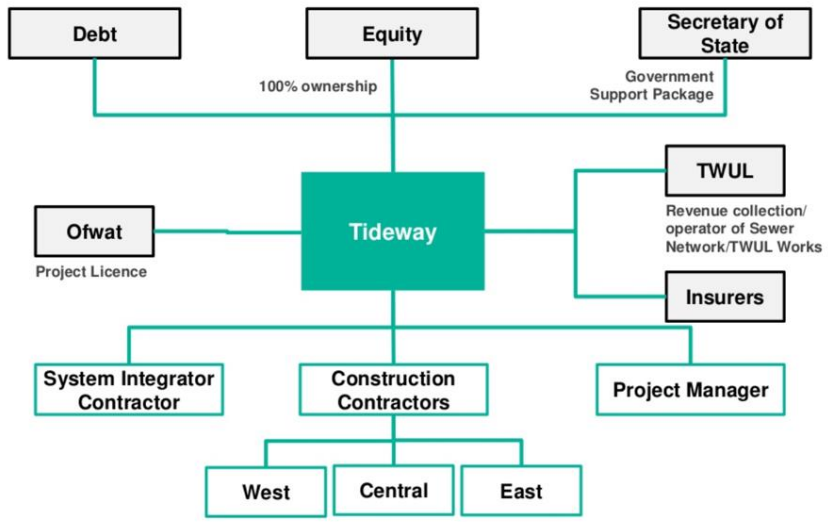
The structure of TTT is well understood in the industry. It provides a useful precedent in it demonstrates the flexibility of the regulatory structure to support the development of different commercial models. However the TTT model had one source of funding - TW customers, and therefore did not need to address the issue of multiple funding sources.

The preferred commercial and legal model for developing the TTT was as a regulated Infrastructure Provider (IP) under the Flood and Water Management Act 2010. The IP is a separate, regulated infrastructure provider with revenues determined by Ofwat under terms of its licence.

- Thames Water was the incumbent water company developing the solution that became the TTT. It also put in place all of the building blocks for the IP:
    - Undertaking initial design work and going through planning consents
    - Tendering construction contracts
    - Establishing corporate architecture for the IP (e.g. systems and IT etc.)
    - Putting in place a management team with delivery expertise
- The IP was formed through a competitive process, with the responsibility for the build, financing, management, operation, and maintenance of the tunnel. Thames Water is currently operating and maintaining the tunnel under an agreement with the IP.
    - The IP tendered on the basis of a Bid WACC to be applied as the allowed cost of capital up until Construction Completion – WACC of 2.49%
- The regulatory framework governing the IP is complemented by risk mitigants, including a Government Support Package, that will ensure that the IP has characteristics similar to a regulated UK water company. This ensured the profile of the IP attracted sufficient private financing (equity and debt) from the capital markets.

The structure of the IP is depicted in the figure below, with the responsibilities of the respective parties involved in TTT summarised below.

Figure A.1. TTT IP



Source: Tideway (2016) Delivering Thames Tideway. Available at slideshare.net
Note: TWUL – Thames Water Utilities Limited

- Secretary of State
    - Responsible for specification and designation of the IP and its robustness and financeability through the Government Support Package
- Thames Water Utilities Limited
    - Responsible for development stage - DCO, enabling works, tendering under SIPR
    - Ensures compliance with operating techniques and will provide some maintenance upon completion
    - Relationship governed by Interface, O&M agreements
- Infrastructure Provider
    - Responsible for designing, constructing, owning, financing, operating and maintenance of the assets
    - Regulatory and contractual obligation to deliver the Project
- Ofwat
    - Granted Project Licence to and regulates the IP in accordance with the project licence, including determining allowed revenue during construction and price regulating the IP thereafter
- Environment Agency
    - Assesses impact on water quality/resources under Water Framework Directive
    - Issues environmental permits

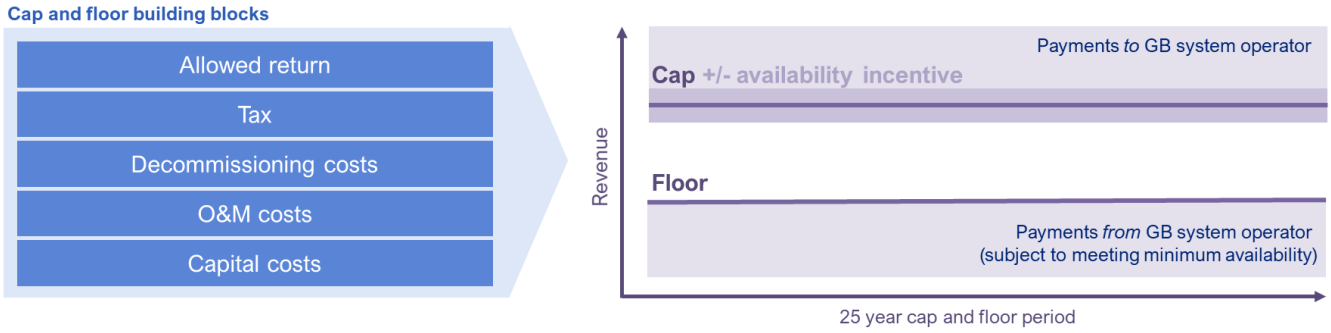
A.2. INTERCONNECTOR CAP AND FLOOR REGIME

Ofgem introduced the cap and floor regime for interconnectors in 2014 as a way of unlocking investment in new electricity interconnectors. The key objective of the regime was to reduce (but not remove) the revenue risk in interconnector projects. Under the regime, developers can identify, propose, and build interconnectors which are then subject to maximum (cap) and minimum (floor) revenue limits once the asset is in operation for a 25-year duration.

As shown in the figure below, where revenues exceed the cap, the developer must pay the excess to the GB system operator, and vice versa. Ofgem develops a view of the efficient level of capital and operating costs, which feeds into the cap and floor calibration on each project.

The floor is calculated at a level that enables the developer to meet annual operating expenditure and debt service costs. This effectively translates to consumers underwriting the risk that developers are unable to generate sufficient revenues to pay for their investment. In order to access the floor revenue, developers must meet minimum availability levels.

Figure A.2. Interconnector cap and floor



Source: Ofgem

Ofgem undertakes a 3-stage cost assessment process to determine the appropriate cap and floor level for each asset:

- Initial Project Assessment (IPA): Ofgem considers the needs case for a group of projects. Those that pass IPA are granted a cap and floor in principle only.
- Final Project Assessment (FPA): Prior to construction, Ofgem undertakes a cost assessment process to determine provisional cap and floor levels.
- Post Construction Review (PCR): When the project is at or near completion, the final cap and floor levels are determined.

Throughout the process, there are various conditions applied to ensure robust due diligence and deliverability, as the construction risks ultimately sit with the developer (subject to changes beyond their control).

The floor enables debt costs to be met, and the equity return must absorb the merchant risk between the cap and floor revenue levels. There are various requirements (e.g. insurance), protections (e.g. Income Adjusting Event) and conditions (e.g. adjustments for financeability reasons) that work to mitigate certain risks to equity within the regime. Further, the additional revenue streams are available to interconnectors (e.g. from participating in the GB capacity market or providing services to system operators).

Careful incentive design and risk allocation, underpinned by a stable regulatory framework, has worked to mitigate construction and merchant risk, and encouraged significant investment into interconnectors.

A.3. THIRD PARTY INCOME IN WASTE

PFI projects are similar in structure to DPC projects in that they are long term contracts with a revenue stream that is activated on completion of asset commissioning. Usually, this revenue will come from a public authority. Such contracts have been used by local authorities in the commissioning of waste management assets.

Defra published guidance on the treatment of income from a source other than the Local Authority named in the PFI contract. This included items such as the sale of recyclables and compost or treatment of non-contract waste.

Key considerations included:

- **Authority's affordability v Contractor's long-term financial stability:** Defra's guidance recognised that more third-party income would improve the affordability of the contract from the perspective of Local Authorities. However, over-optimistic assumptions around third-party income may have a significant impact on the long-term financial stability of the Contractor, affecting their ability to provide the services required.
- **Changes in the market relating to the waste sector:** The guidance recommended that contracts be flexible to allow both parties to benefit from changes in the market relating to the waste sector. For example, at the time, there was no established long-term market for dry recyclables or compost, so this

would have been reflected in the bid price. The guidance recommended that contract designs include a sharing mechanism so that both parties benefit from those markets developing.

A.4. OFTO COORDINATED NETWORKS

Historically the development of the UK offshore wind has involved the generator constructing both the generation and transmission assets, with the latter connecting the windfarm to the onshore grid. Following construction, the transmission assets are competitively tendered. This is called the Offshore Transmission Owner (OFTO) regime, which grants the winner ownership of the asset and a licence to receive a revenue stream for operating the asset for a defined period.

This approach results in point-to-point transmission. At the time the regime was developed, the sector was nascent and so this approach appeared appropriate and de-risked delivery. However, in the context of a 40GW by 2030 objective, it is no longer the most efficient approach. BEIS is therefore leading the Offshore Transmission Network Review (OTNR) to identify approaches to improve coordination whilst encouraging investment and maintaining competitive tension.

The review is broad in scope, and separated into three, complementary temporal workstreams. It includes consideration of how delivery and funding can be best designed to manage the existing and future interests of various parties (e.g. generator, OFTO, onshore TO, interconnectors, etc.) and fairly allocate both costs and risks.

Early opportunities

In the near term, developers are opting in to collaborate on pathfinder projects. One of the key issues under consideration is the management of anticipatory investment (AI) (i.e. additional capacity built by a developer that has the potential to act as shared infrastructure in the future).

Relative to the current approach, where any AI risk sits with a single developer, Ofgem is proposing this risk be shared with consumers.

Figure A.3. Early Opportunities AI approach

Source: Ofgem

Pathway to 2030

In the **medium term**, Ofgem is seeking the most appropriate delivery models to support holistic design, as well as changes to codes, standards, and processes.

A.4.1. Enduring regime

In the **long term**, the aim is a new approach to ensure improved strategic planning.

The ONTR remains at a relatively early stage. However, some lessons that emerge are as follows:

- The chosen delivery model will define risk and return requirements
- Shared infrastructure without revenue certainty presents considerable challenges which private investors may be unwilling to take without significant protections
- Current legislation, regulation, industry codes, etc. are interconnected and can act as a barrier to efficient delivery of public services
- There is a need for objective and advanced engagement and planning across all stakeholders

A.5. SITES RESERVOIR PROJECT, CALIFORNIA

The Sites Reservoir Project is an example of a multi-sector solution. We find that Government funding is used for public benefits, with water and irrigation agencies funding direct benefits through user charges. The project is being financed through a mixture of federal, state, and private resources.

The Sites Reservoir is a proposed off stream reservoir to be built in northern California. Construction of the reservoir is due to begin in 2023 and completed in 2030. It is envisaged that the reservoir will deliver the following benefits:

- California water supply: California has suffered 5 drought periods this century, spanning over 19 years. The reservoir will be crucial for improving the security and quality of customer water supply and improving irrigation for the agricultural sector.
- Ecosystems: The reservoir hopes to improve water quality and ecosystem conditions in the Sacramento River and Delta. The improved water reliability should help with fish protection and habitat management.
- Secondary objectives: Recreation, *potential hydropower generation*, and flood damage reduction.

The primary beneficiaries of the project are California water customers and agricultural irrigation users.

Ownership and responsibilities

The Sites Reservoir and accompanying infrastructure, will be owned by the Sites Project Authority, which consists of 12 water agencies and irrigation districts. These districts are state owned corporations with their own tax raising powers.

Funding

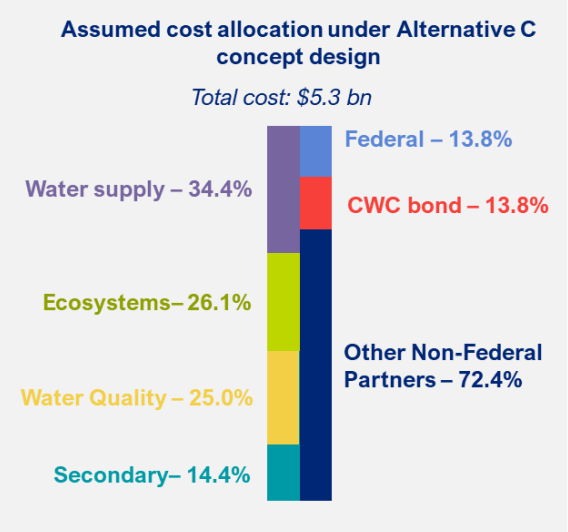
Four concept designs for the Sites Reservoir project were developed in the feasibility study, with **cost estimates ranging from $4.8-$5.3 billion** (2015 prices). The study allocated costs to parties based on the beneficiaries, assuming:

- Federal grants cover 75% of the cost related to biodiversity improvements, 100% of water quality improvements, 100% of flood control benefits, and 50% of recreational benefits.
- Public water supply and irrigation benefits are ultimately funded through user charges, via the water and irrigation agencies.
- Power supply benefits are funded by the beneficiaries, or by local water agencies.

Financing

- Development costs have been financed through state funds and contributions from project members. Bank lending may also be used, underwritten by project members.
- Construction will be financed using a mixture federal loans and bonds.
- Credit risk is mutualised across project participants.

Figure A.4. Sites reservoir cost allocation



Source: North-of-the-Delta Offstream Storage Investigation Draft Feasibility Report, Chapter 8

A.6. VILLEREST RESERVOIR, FRANCE

Well-defined operational guidelines are important for an MSR, as it provides all actors with clarity as to the risks involved during times of drought or flood.

The Villerest reservoir is in central France, along the Loire River, commissioned in 1985. It joins with the Allier River, whose flows are managed by the Naussac reservoir. Both the Villerest and Naussac reservoirs are owned and operated by the Etablissement Public Loire (EPL). Its key benefits are:

- **Water flow management:** By regulating and maintaining water flow, the dam helps to sustain water levels throughout the year, reducing the risk of drought and flooding. The dam is placed upstream, and thus has a wide impact on flood risk across the Loire, by far the longest river in France.
- **Water supply**: Provision of water for consumers and agricultural users.
- **Power generation:** A hydroelectric plant was commissioned to utilise the dam to generate power. In addition, the water is used for cooling of thermal power plants in the area.

Financing and funding

Finance for dam construction was provided by the French government and a Water Agency, with small contributions made by stakeholders. EDF financed the power plant construction.

Since January 2007, users taking water from the Loire have had to pay for the operation, maintenance, and support of the dam in times of low flow management through a fee-for-service model. The fees are intended to cover 100% and 80% of the Naussac and Villerest dam expenditures, respectively, as well as 20% management of exceptional flow expenditure.

Villerest power plant costs and revenues are accrued by EDF, who hold a licence for the plant until 2060.

The reservoir priorities and operation principles in all foreseeable periods are fully defined in the Water Regulation or through River Basin Management Plans.

- **Normal Operation -** The dam maintains a minimum outflow of water (of 12 m^3/s) to maintain the levels of the Loire and has a maximum outflow limit (of 1000m^3/s). In normal operation, the reservoir is flooded in May and in September-November
- **Low Water Operation -** In the case of severe drought, the Reservoir Management Committee may decide to reduce flows below the 12m^3/s lower bound. The objectives of the flow of the Loire are set by regulation, and the dam operates under that principle.
- **Flood Risk Operation -** There are clear instructions provided by EPL forecasters as to how to operate the dam in the presence of future flood risk. Depending on the level of the dam, this results in outflowing water to maintain the reservoir level or increasing outflow to sustainably reduce the reservoir level.
- **Flood Period Operation -** The Villerest dam's principle in times of flood is to manage downstream flood risk by having smaller outflows than inflows. A flood period is defined by when inflows exceed 1000m^3/s. The dam uses modelling to decide the timing and quantity of outflows to minimise risk of damage to different beneficiaries, by minimising the peak flow of the flood.

A.7. AVIATION: HYBRID TILL STRUCTURES

Airports generate aeronautical revenues and costs, from the provision of runways to airline operators, and non-aeronautical revenues and costs, from the provision of car parking and retail space, for example.

In order to incentivise non-aeronautical revenue generation / cost minimisation for airports, non-aeronautical revenues and costs can be partially excluded from economic regulation decisions on Airport Charges (i.e. they do

not affect the charges airports can levy towards airline operators). Under a **hybrid till approach**, non-aeronautical revenues and costs are partially offset against Airport Charges. This means that airlines (and ultimately customers) share non-aeronautical risks with the airport.

Cost allocation principles

Under a hybrid till approach, regulators must allocate costs and revenues between aeronautical and non-aeronautical activities. A cost allocation system should adhere to the following principles:

- Relevance: Costs should be allocated directly to activities
- Objectivity
- Accruals basis: Costs should be related to the relevant period
- Consistency

Example: Dublin Airport – Single till with a till exit

Dublin Airport operates under a single till approach, in which all revenues and costs are considered when setting Airport Charges, except if stakeholders can agree that a particular non-aeronautical stream should be excluded.

In the context of reservoirs, the misallocation of costs is pertinent due to the number of different actors involved, each with their own potential areas of costs and revenues, and thus their own vested interest re. the cost allocation process.

Appendix B SUMMARY OF LEGAL CHALLENGES

This Appendix sets out some of the legal issues that may arise or require consideration when companies undertake multi-sector reservoir projects (**MSRs**).

As set out above, there is no "one size fits all" model for MSRs. As such, this Appendix does not represent due diligence on any specific model. Nor does this list of issues mean any of these issues are insurmountable or that they will always be relevant. Indeed, we are of the view that any number of MSR solutions could be deliverable in the right circumstances.

The purpose of this Appendix is to serve as a checklist for those developing MSRs. It may not be exhaustive as different models may present different challenges depending on risk allocation, participants, and counterparties. However, we have tried to set out some of the key considerations – in particular considering the likely involvement of or intersection with the regulated water sector.

B.1. ISSUE 1 – THE POWER TO SUPPLY

A critical issue for the owner of any MSR may be the power to take water from the reservoir to supply customers (whether domestic, commercial, or self-supply) – although customer supply is not necessarily a required use of an MSR. There are effectively three core means of supply of water in England and Wales:

Table B.1 – Means of Water Supply

Means of Water Supply		
Direct from Undertakers	*Water Supply Licensee*	*Private Supply*
Supply using public networks operated and maintained by undertakers.	Supply using public networks operated and maintained by undertakers.	Supplies made by means other than through an appointed water undertaker's supply system.
Household premises and certain non-household premises where the relevant undertaker has not exited the retail market[29].	Non-household premises.[30]	Most private supplies are to individual houses and farms. Some hospitals and industrial premises have private supplies for their own sites. Manufacturers, power stations and farmers also directly abstract large volumes of water for various purposes. There are also some private water supply networks, including parts of the canal network
Supply regulated by Ofwat via licence and Water Industry Act 1991.	Supply regulated by Ofwat via licence and Water Industry Act 1991.	This is not regulated by Ofwat but by local authorities and is subject to other rules and regulations including the Private Water Supplies (England) Regulations 2016. Rules regarding drinking water also still apply and so private supply remains highly regulated.

[29] Note: The position is more nuanced in Wales. In Wales non-household customers who use more than 50ML of water per year can switch to a water supply licensee. However, all other non-household customers are not able to choose and continue to receive their retail services from their existing water undertaker.

[30] As above.

B.1.1. Undertakers

Generally supply of water in England and Wales is carried out by water undertakers and water supply licensees (retailers). Water companies operating the public water networks hold appointments as water undertakers for the purposes of the Water Industry Act 1991. They also supply water and wastewater services (i.e. retail functions) direct to household customers (and in some cases to non-household customers) who are connected to their networks.

B.1.2. Water Supply Licensees

In addition, since 1 April 2017, holders of new water supply and/or sewerage licences (**WSSL**) can provide supplies of water and sewerage services to certain eligible non-household premises[31] (namely certain business customers). Some licensees may be limited to providing water supplies or sewerage services to their own sites and those of persons associated with them (known as self-supply). In terms of water supply there is a water supply licence which is capable of having dual authorisations as follows:[32]

- an (English) retail authorisation: this allows the licensee to supply water to non-household premises using the public water networks operated by water undertakers whose areas are wholly or mainly in England.
- an (English) wholesale authorisation: this currently allows the licensee to introduce water into the public water networks of water undertakers whose areas are wholly or mainly in England in order to supply the licensee's own customers if their non-household premises consume at least 5 megalitres of water a year.

Water supply licensing also enables self-supply.

B.1.3. Private Suppliers

A private water supply is any water supply which supplies one or more properties that is not provided by a water company – i.e. a private supply is one where the major water networks are not used at all. Local authorities regulate private supplies in accordance with relevant regulations and the Water Industry Act 1991.

B.1.4. Conclusions

It is not necessary to be a water undertaker to supply water to customers. However, where any reliance is placed upon the wider water networks then a licence will be required. Although we note the exemptions for this set out in the Water Supply (Exceptions from Supply System Prohibitions) Regulations 2005, which may be of assistance to those developing MSRs.[33] In particular, these regulations allow for certain circumstances where the network of one water undertaker can be used to supply customers by other water undertakers or for certain private supplies. It also allows for the introduction of private supplies to an undertaker's system in certain circumstances.[34]

B.2. ISSUE 2 – POWERS TO LAY PIPES

Certain powers that are critical to running a water business and carrying out works are held by water undertakers. This includes:

- the power to lay pipes in streets (s.158 Water Industry Act 1991); and

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[31] See note above. Water Supply Licensees can supply water to any non-household premises in England. The situation in Wales is different as above.

[32] Authorisations differ in Wales

[33] Section 66I of the Water Industry Act 1991 prohibits the use of a water undertaker's supply system for the purpose of supplying water to any premises of a customer. This prohibition does not apply if the supply is made by the water undertaker, by a licensed water supplier in pursuance of its licence or in such further circumstances as the Secretary of State or National Assembly for Wales ("the Assembly") may specify in regulations.

[34] Water Supply (Exceptions from Supply System Prohibitions) Regulations 2005.

- the power to lay pipes in other land and keep them there (s.159 Water Industry Act 1991).

These powers are critical in operating and maintaining a water network. Infrastructure providers specified pursuant to the Water Industry (Specified Infrastructure Projects) (English Undertakers) Regulations 2013 ("**SIP Regulations**") also have certain of these powers pursuant to Regulation 12 of the SIP Regulations.

Where an MSR is not undertaken by an undertaker or a licensed infrastructure provider then alternative arrangements may need to be made for laying of pipes linked to delivery of the reservoir. This may be achieved in certain circumstances by contractors of the water undertaker/infrastructure provider exercising powers on their behalf or (in the case of DPC) water undertakers may use their powers on behalf of the Competitively Appointed Provider in certain circumstances. It may also be achieved by way of private treaty or agreements with Highway Authorities.

We would also note that the existence of statutory powers can provide a basis for private treaty negotiations with relevant Highway Authorities and third-party landowners.

The non-involvement of a water undertaker or infrastructure provider in developing any MSR is not a bar to development of an MSR. However, in all cases a considered options analysis will need be carried out on a case-by-case basis as to how best to acquire rights to lay pipes. This is also the case where a water undertaker or an Infrastructure provider is involved as the powers highlighted above relate only to the regulated function of the undertaker/ infrastructure provider.

B.3. ISSUE 3 – ABSTRACTION LICENCES/ ENVIRONMENTAL PERMITS

B.3.1. The nature of abstraction licences

The abstraction licence regime covers the abstraction of water from both surface and ground water. It is a criminal offence to abstract water from any source of supply (surface water and groundwater) without a licence subject only to certain exemptions.

An abstraction licence gives the holder of the licence a right to take a quantity of water from a relevant source of supply. We are also aware of certain circumstances where licensees allow abstraction under their licenses by third parties.

An abstraction licence will typically specify:

- Where the water can be taken from (the source).
- The quantities that can be taken.
- What the water can be used for.
- How the water can be abstracted (that is, specific works or machinery).
- When the licence starts and when it expires.

Restrictions as to how the water can be used may obviously impact licence holders developing a reservoir – as may abstraction limits.

B.3.2. Revocation

A licence-holder can apply to the EA to have its abstraction licence revoked or varied.

However, the EA also has powers to:

- Revoke or vary an abstraction licence, where the EA thinks this is necessary. Where the licence-holder objects reference must be made to the Secretary of State.
- Temporarily reduce or stop abstraction in certain circumstances, where the EA thinks this is necessary because of an exceptional shortage of rain or other emergency.

Obviously, suspensions or revocations of abstraction licences may have material impacts on water undertakers and any entity delivering a reservoir project. While there is some comfort in the fact that, where possible, the EA will seek to agree any variation or revocation with the licence-holder this remains a material risk. It should be noted that there are provisions for compensation where a licence is revoked but compensation may not be complete[35].

It should be noted that the Environment Act 2021 includes wider powers to revoke abstraction licences without compensation – this removal of compensation rights relates specifically to instances where there is environmental damage[36] – and also a further right for the EA to vary or revoke a water abstraction licence based on underuse over an assessment period of 12 years.

B.3.3. Water rights trading

The EA does allow licence-holders to give another part or all of their abstraction right permanently or temporarily.

The trading of water rights will usually require the parties involved to apply to the EA for a new licence and to change or cancel (revoke) any existing licence.

This process can become somewhat protracted and may impact on delivery of certain structures for a multi-sectoral reservoir approach.

B.3.4. Change in abstraction regime

It is anticipated that the government intends to merge the abstraction licence regime with that of the Environmental Permitting regime in 2022. This may have further impacts on how the regime operates.

B.4. ISSUE 4 – RESERVOIRS ACT 1975 AND OTHER REQUIREMENTS

The design, construction, operation, and maintenance of a reservoir is a heavily regulated activity. While there is no prohibition on entities that are not undertakers undertaking reservoir construction, there are a range of complex and high-risk activities in the development and construction phase. These activities lend themselves not to fix priced turnkey EPC arrangements (commonly implemented by SPVs as part of PFI projects) but to target cost type construction arrangements such as NEC Engineering and Construction Contract Option C – with a split on costs incurred over and above a target cost (by way of example this was the approach agreed by Portsmouth Water and Southern Water for the on-going Havant Thicket Reservoir).

Further there are significant development costs in planning a reservoir before any contractor is even appointed.

The Reservoirs Act 1975 as well as other legislation contain a number of relevant regulatory requirements that need to be taken in to account in delivering a reservoir. Examples of regulated activities include:

- Obtaining planning permission and complying with relevant consents inherent in obtaining planning permission – such as s.106 Agreement requirements.
- Third party landowner consents (if needed).
- Informing the Environment Agency of works.
- Registration of the reservoir with the Environment Agency - You do not have to register a reservoir with a capacity of under 25,000 cubic metres of water above ground level.
- Health and safety and building regulation compliance.

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[35] The Water Act 2014 included a measure to remove water undertakers' right to statutory compensation for costs resulting from changes to their abstraction licences. This change helps address unsustainable abstraction more effectively at the same time as delivering better value for customers. Water companies now include the costs of ensuring sustainable abstraction and possible licence changes in their normal business planning processes with funding agreed through Ofwat's price review process.

[36] Section 88 Environment Act 2021.

- Appointment of a panel engineer to supervise construction.
- Obtaining either an abstraction or impounding licence (depending on the nature of the reservoir – see further on abstraction licences below).
- Maintaining flood plans.

All of this is to say there are significant regulatory hurdles in the development and construction phases of a reservoir. This can result in additional and unforeseen cost which might make it challenging for a non-recourse entity to deliver a project within a fixed and constrained budget. We would also add that the operation of MSRs may come with activities which (if carried out incorrectly) may result in significant liabilities. None of this necessarily precludes any means of delivering an MSR however where liabilities for negative outcomes are potentially significant recourse to cash reserving or a significant balance sheet may be required. In this regard we note that cost settlements for regulated undertakers and infrastructure providers contain flexibility both in terms of portfolio effect (they often deliver more than one project allowing for cost overruns on any one project to be mitigated) and protection for overspends. Similarly, involvement of the public sector to support certain instances of overspend or certain negative cost outturns may be an option to explore (in this regard we refer to the government support package for the Thames Tideway Tunnel which provided contingent support in a number of regards for high impact and low probability events – while such support may not be readily available in all circumstances – in developing an MSR it is worth considering whether any state support may be available).

We would also note that there may be particular challenges with SPVs undertaking the very early stage of projects (i.e. when projects do not have planning/consents or are at a low level of development). While there is no prohibition on such stages being undertaken by an SPV or non-governmental or non-regulated entity – the challenge of raising financing will need to be considered. Where delivery by way of an SPV is proposed, the stage at which the SPV takes on the project will need to be considered. By way of example in most PFI transactions planning permission is not normally a risk within the SPV itself. Similarly, TTT and current pathfinder DPC projects have seen the regulated utility undertaking initial planning and development (however we note Ofwat has not ruled out the prospect of earlier stage DPC projects[37]).

B.5. ISSUE 5 – BULK SUPPLIES

The Water Industry Act 1991 makes specific provision for bulk supplies. For the purposes of this report we refer to bulk supplies as covering those trades for water described in s.40 of the Water Industry Act 1991. Namely trades for water between water companies or between a water company and a new appointment or variation appointee pursuant to s. 8 of the Water Industry Act 1991.

While companies are generally considered to be free to determine the terms of bulk supplies between themselves - bulk supply arrangements have very specific regulatory arrangements. We do not set these out here, but we note that MSRs may be developed in part to service bulk supplies (or indeed MSRs may be supplied by bulk supplies[38]). Where bulk supplies are part of the structure of an MSR the current regime under the Water Industry Act 1991 will need to be considered. We do not consider this to be a fetter to MSRs (rather the trading incentive actually provides clear incentives for trades) but note the regime may need to be considered.

[37] Ofwat – Delivering Water 2020: Our Methodology for the 2019 Price Review (Ofwat)

[38] By way of example see https://www.southernwater.co.uk/our-story/water-for-life-hampshire/technical-documents - which, while not an MSR involves comparable considerations.

B.6. ISSUE 6 – FINANCING RESTRICTIONS

Several water undertakers are subject to whole business securitisations or other highly restrictive covenant packages as a result of the corporate lending. This may restrict the ability of water undertakers to carry out projects in ways other than within the regulated business (e.g. by way of setting up an SPV).

Examples of common place warranties/covenants/restrictions that may be problematic include:

- Restrictions on the creation of holding and subsidiary companies.
- A requirement to maintain a regulated asset ratio (this is effectively a ratio of indebtedness to RCV) – where largescale projects were to be undertaken other than on or as part of the RCV this may be problematic.
- Restrictions on the scale of any non-regulated business.
- Restrictions on disposals of any regulated assets (which may fetter land sales).
- Restrictions on transactions with affiliates – which may create issues where any contracts are put in place with an SPV.
- Limits on the creation of new guarantees and indemnities – in particular in respect of other group companies.
- Limits on material modifications of regulated licenses.

None of the above is a legitimate or acceptable reason for water undertakers not to participate in MSRs. Ofwat has been clear with companies that the risks inherent in the chosen capital structure are for the company. To the extent that any restrictions within a financing structure conflict with regulatory requirements this is the relevant water undertaker and its investors to manage. We are aware that a number of complex water projects have been delivered within financing restrictions. Further in all cases waivers can be sought from investors which may enable a specific delivery model. However, where a water undertaker takes part in an MSR compliance with financing documents should be considered early. Any waiver from investors lenders usually has significant cost and time implications.

B.7. ISSUE 7 – RING-FENCING AND ARMS LENGTH ARANGEMENTS

Water undertakers have a number of requirements to ring-fence their regulated business and are also subject to a number of restrictions in respect of transactions with related companies. Both of these sets of requirements may have implications where a water undertaker is involved in an MSR or for other contractual arrangements between a water undertaker and any multi-sector owned reservoir provider. Again, we do not consider anything here to be prohibitive to undertaker involvement in MSRs but any structure where undertakers play a role should consider this.

Undertakers are subject to certain ring-fencing measures under their licences. These measures are intended to ensure: (i) that undertakers have the means to conduct their regulated business; and (ii) that all dealings with related companies are on an arm's length basis. We also note these measures are generally credit positive for investors (as they provide comfort about the nature of the business that will receive investment) and certain of these measures may be replicated in financing and other documents for relevant MSRs notwithstanding the involvement of undertakers.

The main elements comprising the regulatory ring-fence are:[39]

[39] Although conditions vary in part between undertakers these provisions are generally found in undertaker's licence Condition P.

- **Rules regarding transactions between an undertaker and its associated companies** - Any transaction between an undertaker and its associated companies must be conducted at arm's length, such that there is no cross-subsidy of the associated company by the undertaker.
- **Rules on the transfer of certain assets to associated companies** – Undertakers are generally not permitted to transfer certain rights or assets (namely those needed to run the regulated business) to an associated company. Regulatory consent can be sought for this.
- **Restrictions on other transactions** – Generally undertakers are prohibited from giving guarantees in relation to any liability of an associated company, making loans to an associated company; or entering into agreements incorporating a cross default obligations. There are limited exceptions relating to existing cross-default obligations – and regulatory consent may be obtained in certain circumstances.
- **Restrictions on dividend payments** – Undertakers have certain restrictions on dividend payments and can only pay dividends in line with a dividend policy.
- **Sufficient resources** - Undertakers must act in a manner "best calculated" to ensure that they have sufficient financial resources and facilities, management resources and systems of planning and internal control to carry out its regulated activities. Compliance with this requirement must not be dependent upon discharge by any other person of any obligation under, or arising from, any agreement or arrangement under which that other person has agreed to provide any services to the undertaker in its capacity as a regulated company.
- **Sole business** - Undertakers are required to operate the regulated business as though it was substantially the undertaker's sole business and a separate public limited company.
- **Maintenance of an investment grade credit rating** - Undertakers must (or any associated company which issues corporate debt on its behalf must) maintain an investment grade issuer credit rating.
- **Ring-fencing certificate** – Undertakers must submit a Ring-Fencing Certificate to Ofwat. This confirms that, in the opinion of the Board, the relevant undertaker will have available to it sufficient: (i) financial resources and facilities; (ii) management resources and systems of planning and internal control; and (iii) rights and resources other than financial resources (for the purposes of any special administration).
- **Cash lock-up** - The cash lock-up provision creates a prohibition on transfer, leasing, licensing, or lending of any sum, asset, right or benefit to any associated company when an undertaker: (i) no longer holds an investment grade issuer credit rating; (ii) holds more than one issuer credit rating and one or more such ratings is not investment grade; or (iii) holds an issuer credit rating at the minimum investment grade level and that rating has been put under review for possible downgrade or is assigned a negative outlook.
- **Ultimate controller undertakings** – Ultimate controllers of undertakers are also required to make undertakings as to compliance with some of the above requirements.

B.8. ISSUE 8 – DIRECT PROCUREMENT FOR CUSTOMERS

Direct procurement for customers is a new model for infrastructure delivery in the regulated water sector. Direct procurement for customers (DPC) involves a water or wastewater company competitively tendering for services in relation to the delivery of certain large infrastructure projects, resulting in the selection of a third-party competitively appointed provider (CAP). DPC will result in water companies competitively procuring more aspects of an infrastructure project, including financing for the project. DPC embraces a wide variety of delivery structures and may or may not necessitate the outsourcing from the water undertaker of project development, design, construction and operations.

Undertakers are currently required to identify projects that may be suitable for DPC using the following criteria:[40]

- Size: whole project life Totex c. £100m+;
- Discreteness: the project is suitably technically discrete; and
- Value for money: delivery via DPC is likely to offer better value for money for customers.

Ofwat has modified the licences of Anglian Water, Welsh Water, United Utilities, Southern Water and Affinity Water to facilitate DPC[41] including pass throughs of revenues although the exact manner in which such projects will be delivered remains to be tested as none have yet reached financial close.

B.9. ISSUE 9 – WATER INDUSTRY (SPECIFIED INFRASTRUCTURE PROJECTS) (ENGLISH UNDERTAKERS) REGULATIONS 2013

The Water Industry Act 1991[42] and the SIP Regulations allow the Secretary of State or Ofwat to specify a particular project for delivery by an infrastructure provider if that project satisfies the criteria set out in SIP Regulations as to size and complexity and value for money.

The threshold for specifying a project is high. The SIP Regulations state that in order to specify the Secretary of State must be of the view that[43]:

- the infrastructure project is of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers; and
- specifying the infrastructure project is likely to result in better value for money than would be the case if the infrastructure project were not specified.

This is a high bar. By way of note the Thames Tideway Tunnel Project had a capital value of over and above £4bn. This was a material factor in determining whether Thames Water should carry out the project itself on its own RCV or appoint an infrastructure provider[44].

The SIP Regulations are currently being used to deliver the Thames Tideway Tunnel Project. This project is to be designed, constructed, operated, financed, and maintained by a separate infrastructure provider which is a standalone regulated utility and entirely separated from Thames Water

Relevant projects must be specified under the SIP Regulations. Once this occurs the relevant undertaker may only carry out prescribed and listed preparatory works. The relevant undertaker will be required to tender the specified project.

Licence conditions may be imposed on infrastructure providers and are enforceable by Ofwat and the Secretary of State under section 18 of the WIA 1991. In addition, specified powers and duties of Ofwat with respect to undertakers apply (with modification) to licensed infrastructure providers. It is also possible to provide for certain powers and duties of undertakers under the WIA 1991 to apply (with modification) to licensed infrastructure providers.

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[40] Ofwat: Delivering Water 2020: Our final methodology for the 2019 price review (Ofwat)

[41] See Condition U of various licenses.

[42] See Sections 36A-36F Water Industry Act 1991.

[43] See Regulation 4 SIP Regulations

[44] See the reasons notice at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/317558/TTTP-reason-notice-ldmsig.pdf

In the case of the Thames Tideway Tunnel project, alongside specification the incumbent undertaker's licence was modified such that it had the ability and obligation to collect additional revenues from customers (as part of its normal billing cycle) which it would then pass to the regulated infrastructure provider in quantities determined by its own allowed revenues under its licence. However direct charging by an infrastructure provider is also notionally possible for future projects.

B.10. ISSUE 10 – DISPOSALS OF LAND

Water undertakers are subject to a prohibition on disposing of any of their "Protected Land" (as defined in their licences) except with the specific consent of, or in accordance with a general authorisation given by, the Secretary of State. Protected land is generally all that land required to run the regulated business. A consent or authorisation may be given on such conditions as the Secretary of State considers appropriate. A disposal includes the creation of any interest (including leases, licences, mortgages, easements, and wayleaves) in, or any right over, land, and includes the creation of a charge. This may create a number of challenges for a multi-sectoral reservoir solution including in respect of the creation of security and granting of any rights to third parties. Again, this is not to say these cannot be addressed and such issues are regularly dealt with in the normal course of a regulated water business.

B.11. ISSUE 11 – DUTY TO SUPPLY CUSTOMERS

An issue for water undertakers participating in an MSR (and particularly those who share capacity in MSRs with third parties) is the scope and requirement of their principal duty. In respect of water supply this is the obligation under s.37 of the Water Industry Act 1991 as follows:

> *It shall be the duty of every water undertaker to develop and maintain an efficient and economical system of water supply within its area and to ensure that all such arrangements have been made— (a) for providing supplies of water to premises in that area and for making such supplies available to persons who demand them; and (b) for maintaining, improving and extending the water undertaker's water mains and other pipes, as are necessary for securing that the undertaker is and continues to be able to meet its obligations under this Part.*

Breach of the principal duty is enforceable by Ofwat.

In a recent RAPID consultation, the extent of this obligation has been clarified. Ofwat interprets the duty under s.37 of the Water Industry Act 1991 as it[45] :

> *"does not prevent or limit a company's ability to enter into contractual obligations with regard to the supply of water including entering into contractual arrangements providing for a fair shares approach in circumstances of drought and operational stress. As long as it does the necessary planning through its water resource management and drought planning to be able to meet both its section 37 duty and its contractual obligations then it is free to enter into those obligations. An exporting company may itself also be an importing company. In considering how it meets its section 37 duty and its contractual obligations to supply water, it should be able to take into account any transfers that it will receive."*

This interpretation should help facilitate undertaker involvement in MSRs.

B.12. ISSUE 12 – INSOLVENCY AND ADMINISTRATION

Water undertakers are highly likely to be placed into insolvency in the traditional sense. Rather, in certain circumstances (for example, where an undertaker is in breach of its principal duties under its licence or of the

[45] The regulatory and commercial framework for strategic water resources solutions – a consultation (RAPID) 2021.

provisions of a final or confirmed provisional enforcement order or is unable to pay its debts or a creditor has petitioned for the winding-up of the undertaker), this could lead to the appointment of a Special Administrator. Special administration differs from normal administration and the goal is not the liquidation and sale of assets but the preservation and transfer of the undertaker as a going concern.

This regime is imposed for the obvious reason that the assets of regulated water undertakers are critical infrastructure in England and Wales and cannot simply be sold off.

Where a reservoir was constructed outside of a licensed undertaker or licensed infrastructure provider consideration would need to be given to what would happen to the asset in the event of the insolvency of its owner (namely the asset could be subject to various insolvency procedures). Where an MSR is owned by an SPV but is critical to the water network arrangements such as trusts and other security arrangements may need to be explored to protect the MSR as a critical asset.

B.13. ISSUE 13 – OBTAINING PLANNING CONSENT

Planning will be required for any MSR. As set out above, it may be preferable to use the development consent route rather than reverting to local authorities.

The construction or alteration of a dam or reservoir is a nationally significant infrastructure project and so the development consent regime applies provided certain conditions are met (see s.14(1) Planning Act 2008).

The conditions (see s.27 Planning Act 2008) are:

- the dam or reservoir (when constructed) will be in England,
- the construction will be carried out by one or more limited companies appointed as water undertakers under the Water Industry Act 1991:
    - by the Secretary of State, or
    - with the consent of or in accordance with a general authorisation given by the Secretary of State, by the Water Services Regulation Authority,
- it is expected that:
    - the volume of water to be held back by the dam or stored in the reservoir will exceed 30 million cubic metres, or
    - the deployable output of the dam or reservoir will exceed 80 million litres per day.
- If these conditions are met, the DCO regime will apply, and the project must proceed under it.

As such an MSR may be facilitated in using a DCO. However, the above is conditional on the construction by a water undertaker. For completeness we note that where a water undertaker is not involved an MSR may still seek a development consent where the Secretary of State makes a direction pursuant to Section 35 Planning Act 2008.

The extent to which the whole of any multi-sector reservoir can proceed under a single DCO application will depend on the extent to which the multi-sector components can be treated as 'associated development' to a water resources project. It is for the relevant Secretary of State to decide on a case-by-case basis, whether non-water supply aspects of an MSR should be treated as associated development, guided by the following four principles:[46]

[46] See https://www.gov.uk/government/publications/planning-act-2008-associated-development-applications-for-major-infrastructure-projects

The definition of associated development […] requires a direct relationship between associated development and the principal development. Associated development should therefore either support the construction or operation of the principal development, or help address its impacts.

Associated development should not be an aim in itself but should be subordinate to the principal development.

Development should not be treated as associated development if it is only necessary as a source of additional revenue for the applicant, in order to cross-subsidise the cost of the principal development. This does not mean that the applicant cannot cross-subsidise, but if part of a proposal is only necessary as a means of cross-subsidising the principal development then that part should not be treated as associated development.

Associated development should be proportionate to the nature and scale of the principal development. However, this core principle should not be read as excluding associated infrastructure development (such as a network connection) that is on a larger scale than is necessary to serve the principal development if that associated infrastructure provides capacity that is likely to be required for another proposed major infrastructure project. When deciding whether it is appropriate for infrastructure which is on a larger scale than is necessary to serve a project to be treated as associated development, each application will have to be assessed on its own merits. For example, the Secretary of State will have regard to all relevant matters including whether a future application is proposed to be made by the same or related developer as the current application, the degree of physical proximity of the proposed application to the current application, and the time period in which a future application is proposed to be submitted.

B.14. ISSUE 14 – INVOLVEMENT OF THE PUBLIC SECTOR

We have noted in a number of places in this report that MSRs may receive support from public authorities, whether by way of grants, funding, contingent support or otherwise. Public support may come from a number of sources including central and local government and bodies like the Environment Agency. Whether or not governmental support will be available will depend on the nature of the project and we do not attempt to cover all possible avenues of public sector support here. However, where public sector support is utilised, the following issues may arise:

- **Vires –** Namely does the public sector entity have the power to take the relevant decision and has it taken the relevant decision lawfully.
- **Procurement** – Where public sector bodies issue contracts for works, goods and services they are subject to procurement rules (including the Public Contracts Regulations 2015). We note water undertakers are subject to comparable rules under the Utilities Contracts Regulations 2016.
- **Freedom of Information and Environmental Information** – Public sector bodies are subject to certain rules regarding disclosure of information. Again this applies in part to water undertakers too.
- **Subsidy Control** – Any public sector subsidies will be subject to the subsidy control regime. This is a relatively new regime following Brexit and will be governed by what is currently the Subsidy Control Bill.
- **Political Risk** – A level of political risk may arise in respect of certain projects. This may arise in respect of specific legislation i.e. issues regarding the Bribery Act 2010/conflicts of interest (namely there are rules about how to engage with public officials) but may also arise in other circumstances.

Again, none of this is a fetter to the development of MSRs (nor public sector involvement in MSRs) but these are issues which may need to be considered and addressed where public sector support for a project is received.

Appendix C DELIVERY MODELS

In the following appendix, we provide more detailed descriptions of the delivery and contractual models available for the delivery of MSR systems. These can be split into models that are delivered entirely within the regulated water sector, models that are delivered entirely outside the regulated water sector, and those that are partly inside the sector.

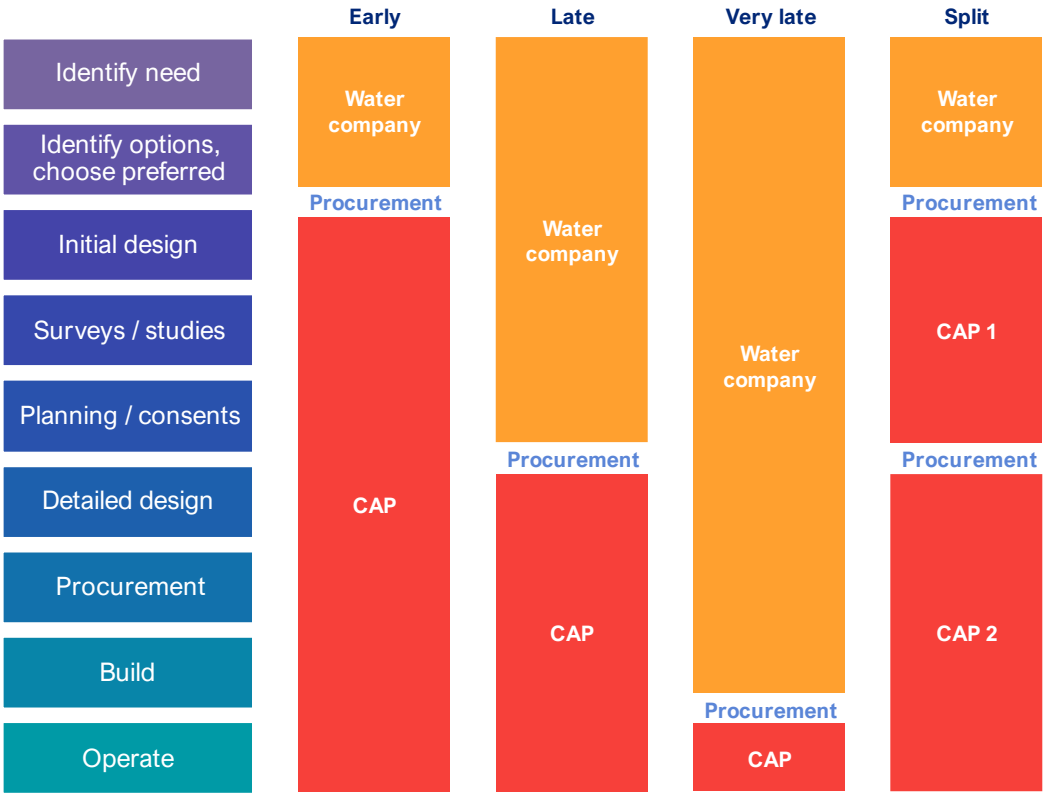
C.1. MODELS WITHIN THE REGULATED WATER SECTOR

The **water company in-house delivery model** is one whereby the water company delivers the project as part of its business-as-usual functions, taking responsibility for the full project lifecycle from concept design to operation and maintenance, to decommissioning or renewal. The project is financed by the water company against its regulatory capital value, with cost efficiency managed through Ofwat's standard economic regulatory toolkit. Until relatively recently, this has been the standard model for the delivery of new water infrastructure.

The **water company direct procurement for customers (DPC) model** is one whereby the water company competitively tenders for all or part of the design, delivery, operation and maintenance and, financing of a new water infrastructure project. The DPC process results in the selection of a third-party company (the "competitively appointed provider" or CAP), typically structured as a special purpose vehicle, to undertake certain aspects of the project.

Under DPC, there are several different tender models available depending on which elements of a project's lifecycle are given to the CAP, as shown in the figure below.

Figure- C.1: Illustration of range of tender models available under DPC



Source: Adapted from Ofwat (2020) Appendix 2: Direct Procurement for Customers. Briefing Note on the Procurement Process for 2020-2025. Available at ofwat.gov.uk

The suitability of a project for DPC is based on three criteria: size, discreteness, and value for money.

- **Size:** New infrastructure or enhancements to existing infrastructure that are expected to cost more than £100m in whole life totex
- **Discreteness:** Project is relatively discrete, with limited interactions with the network
- **Value for money:** Delivery via DPC is likely to offer better value for money for customers

Delivery of an MSR or MSR system is likely to meet the above criteria for DPC. However, the late tender model may be most appropriate given that the planning and consenting stage of the process is likely to be the riskiest.

The **specified infrastructure projects regulations (SIPR) model** is one whereby the incumbent water company is required to run a competitive procurement exercise to appoint a third-party company to finance, build and operate the reservoir. The third-party company is separately licensed and economically regulated by Ofwat, with its own regulatory capital value. The third-party company receives customer revenues to fund the project, which is included in the wholesale charges recovered by the incumbent water company.

The SIPR model is currently being used to deliver the Thames Tideway Tunnel Project. This project is to be designed, constructed, operated, financed, and maintained by a separate infrastructure provider which is a standalone regulated utility and entirely separated from Thames Water. The costs of the project are recovered through charges on Thames Water customer bills.

C.2. Models outside the regulated water sector

A **public sector delivery model** is one where the project sponsorship, development and delivery is led by a public authority, such as a local authority or the Environment Agency. The project would be publicly financed and typically be funded through taxpayer funding, but may also be partly funded by user charges. In an MSR context, public sector delivery may be suitable for elements of the MSR system that provide public benefits, such as flood alleviation or environmental benefits, but is unlikely to be considered suitable for the delivery of a public water supply reservoir, which exists within a privatised water sector.

A **pure merchant delivery model** is one where the project is sponsored and delivered entirely by a third-party that is not a water company. The merchant operator would receive revenues through water trading and other non-water revenue raising activities, taking on full revenue risk. In an MSR context, pure merchant delivery is unlikely to be practicable given the scale of risk it exposes the merchant operator to, which would likely make the project unfinanceable or not commercially viable.

C.3. Models partly within the regulated water sector

A **split delivery model** is one where the MSR system is split into separate components, each delivered by different organisations under different commercial arrangements. For example, the public water supply component may be delivered using the water company in-house delivery, water company DPC or SIPR models, whereas the flood alleviation component may be delivered using the public sector delivery model. This model provides the flexibility to allow different elements of the MSR system to be delivered at different timescales and by under different contractual arrangements.

In theory, this could mitigate the risk of cross-subsidy between the various use cases and limit the complexity of delivering an MSR system as a single project. In practice, however, there are likely to remain interface risks between the various elements of the MSR system, which are integral to achieving the benefits of a multi-sector solution. For example, where a single reservoir is used for multiple purposes, the project is unlikely to be separable in any meaningful way. Additionally, where an MSR system includes multiple reservoirs for different purposes, it is likely that the multi-sector benefits are reliant on there being interfaces between the reservoirs, e.g. the flood reservoir providing water quality benefits for the public sector reservoir.

A **joint venture delivery model**, whereby a joint venture established by a water company and other multi-sector participants raises additional financing to develop, own and operate the reservoir. There are several different legal

models that could be used within the joint venturing arrangement, including setting up a company where each participant has an equity stake, establishing a company limited by guarantee, or establishing a community interest company. One of the main advantages of a joint venture model is that it allows for greater flexibility in the governance of an MSR system compared with a model that sits entirely within the regulated water sector. It also allows for other participants to have an equity stake in the project as a means of providing commitment.

A **joint venture contracting model using DPC**, whereby a water company and other multi-sector participants input equity into a joint venture, which then competitively procures an SPV to design, finance, build and operate the reservoir, with the water company and other multi-sector participants acting as off-takers.

A key difference with the delivery model is that it allows the joint venture to be relatively thinly capitalised and for the financing of the project to be raised by another entity (i.e. the SPV).

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