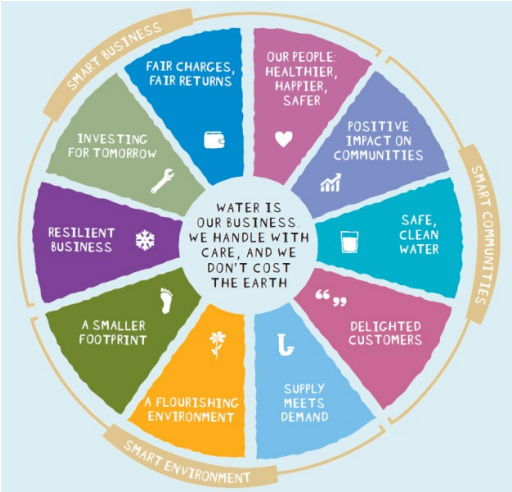
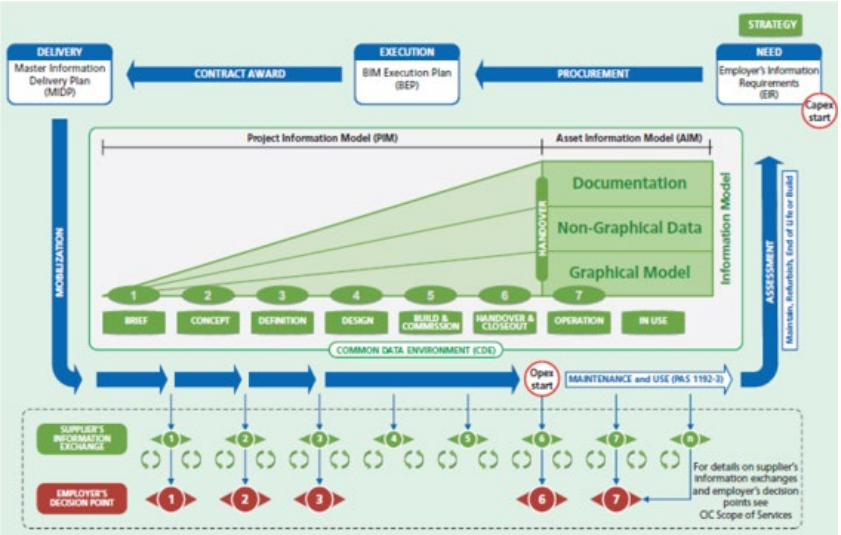
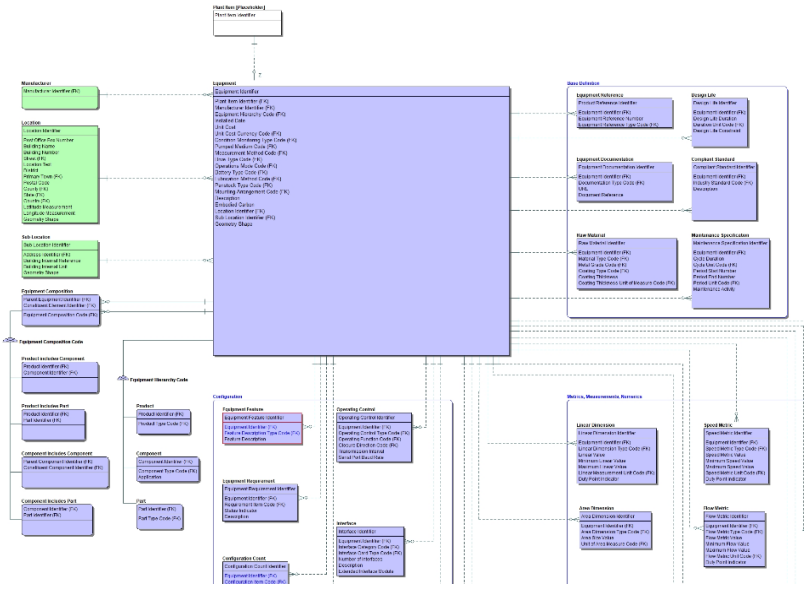
BIM4Water case study template	
Section 1: Project Details	
Project name	Strategic Pipeline Alliance (SPA) Pipeline and Digital Twin – SPA Initiation Case Study (SPA1)
Client	Anglian Water Services Ltd (AWS)

Project Scope and Outcomes	The Anglian region is one of the driest regions in the country receiving on average only two thirds of the national average rainfall. In addition to water stress the region's population has grown by 20% in the last twenty years and is expected to grow further. There is also a need to protect the environment from over-abstraction and hence the 2025 vision is to deliver a large-scale, holistically linked water transfer resilience system. It will be operated, performance managed and maintained using advanced digital technology. SPA will deliver elements of the AWS Water Resource Management Plan (WRMP) to make the East of England Resilient to the risks of drought and reduce customers on single supply system to 14.1% by 2025. The SPA project consists of up to 420km of pipeline, pumping stations, storage points and a Digital Twin. SPA has been set up as a highly integrated shareholder Alliance where reward is based on outperformance and the delivery of the customer outcomes. SPA will deliver a physical asset consisting of the pipeline, various pumping stations and storage tanks. SPA will also leverage value from digital to both create the physical asset as well as a Digital Twin for Anglian Water that will assist with asset management by collating data to analyse and use for simulations and decision making. The programme will deliver the physical and digital outputs using Production thinking and will use Project 13 methodologies. Project 13 is an industry led initiative with a model based on enterprise, not on transactional arrangements, to boost certainty and productivity in delivery and improve whole life outcomes in operation. SPA will act as the 'Integrator' in the Project 13 initiative. All monopoly water-only and water and wastewater companies in England and Wales are required to deliver to the levels of service (Outcomes) that their customers expect of them. There are rewards for outperforming these measures which are monitored by the water Regulator Ofwat. The Anglian Water Outcome Delivery Incentives (ODIs) are listed in Figure 1, and we can link the ODIs to the SPA deliverables.  ***Figure 1 - Anglian Water Outcomes Model***

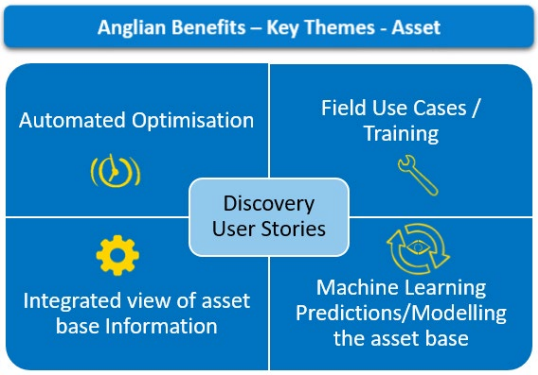
	This is the first of a number of case studies that will track the progress of the SPA programme, taking 'snapshots' at appropriate milestones. This Case Study is the 'SPA Initiation'.	
What are the project timescales?	Brief and Team Engagement	March 2020
	Design	July 2020 – Forecast March 2022
	Construction	Forecast April 2021 - December 2025
	Commissioning and handover	Forecast December 2022 – March 2025
What is the total project budget (including fees)?	£325m (£285m post efficiencies) – NEC ECC Option C	
Type of work (new build, refurbishment, Repair & Maintenance)	**Physical assets** - New pipelines, pumping stations, storage points, control, communication and sensors. **Digital assets** – Data collation, integration, analytics and decision making (as part of a Digital Twin).	
Asset type	Water supply	
Section 2: Stakeholders		
Who's involved in the project team? *(where known)* Indicate (F) if they were appointed via a framework.	Delivery partner(s)	Strategic Pipeline Alliance - Anglian Water, Costain, Jacobs, Mott McDonald Bentley, Farrans
	Key supply chain partners	Atkins
	Other key parties	TBA
Lead contact details	Name and designation	Guy Gregory, SPA Digital and Data Officer
	Organisation	Anglian Water
	E-mail	ggregory@anglianwater.co.uk
	Telephone - Landline	07736 175696
	Case study written	August 2020

Section 3: BIM details	
Background - how long has the Client been using BIM and what is the overall progress to date? Can you provide an overview of the Technology arrangements to support BIM?	There is a general understanding of the benefits of compliance with PAS 1192 (ISO 19650) in Anglian Water, but the requirement to deliver to BIM Level 2 has never been formally mandated for a capital project. Anglian Water's capital @one Alliance have been using BIM principles as part of the development of 3D models during AMP6, and there is a general movement towards BIM Level 2 compliance. A couple of case studies demonstrating the value gained by adopting BIM principles have previously been written (Cambridge WRC Extensions, Semer WTW Treatment and Resilience Commissioning – see the BIM4Water website for more details). Whilst SPA will not specifically focus on achieving any BIM level 2 maturity, it is recognised that the principles will drive outperformance. Initial focus was to ensure that the foundations are in place to enable us to maximise benefits from data and information, and a general acceptance that by undertaking the current direction of travel we would indeed tick most, if not all, of the BIM level 2 requirements. At an early stage of mobilisation, it was recognised that there would be value in developing an enterprise architecture, data model and cost model. A team was created comprising of enterprise, data, and GIS architects. This team formulated the Enterprise Architecture, developing on the as-is model currently used in another of the Anglian Alliances. To ensure alignment across the business a data frameworks group was established. This brought together key stakeholders acting as a central body to steer and manage the development of BIM documents and adoption of data standards. Key members of the data frameworks group have also engaged with external bodies, to both adhere here to, and help drive industry best practise. Within Anglian Water we have representatives which sit on the BIM4Water Steering Group as well as the Task Groups. This includes WICHS (Water Industry Classification & Hierarchy Standardisation) group, that is looking at developing a common asset classification system, and the Standard Libraries group, which has developed a common procedure for the exchange of product data through the supply chain. Anglian Water is also represented in the Owner Operator, 4D Design Group, as well as the Water Data Task Force. Production thinking and Project 13 thinking helped shape the enterprise architecture. Focus was put on developing a product agnostic architecture that primarily focussed on the Alliance user requirements. This enabled the production of a lean model that was reviewed by stakeholders and users. The Enterprise Architecture was broken down into four pillars; GIS, CAD/BIM (design); AW packages; Other. This is shown in Appendix 1.

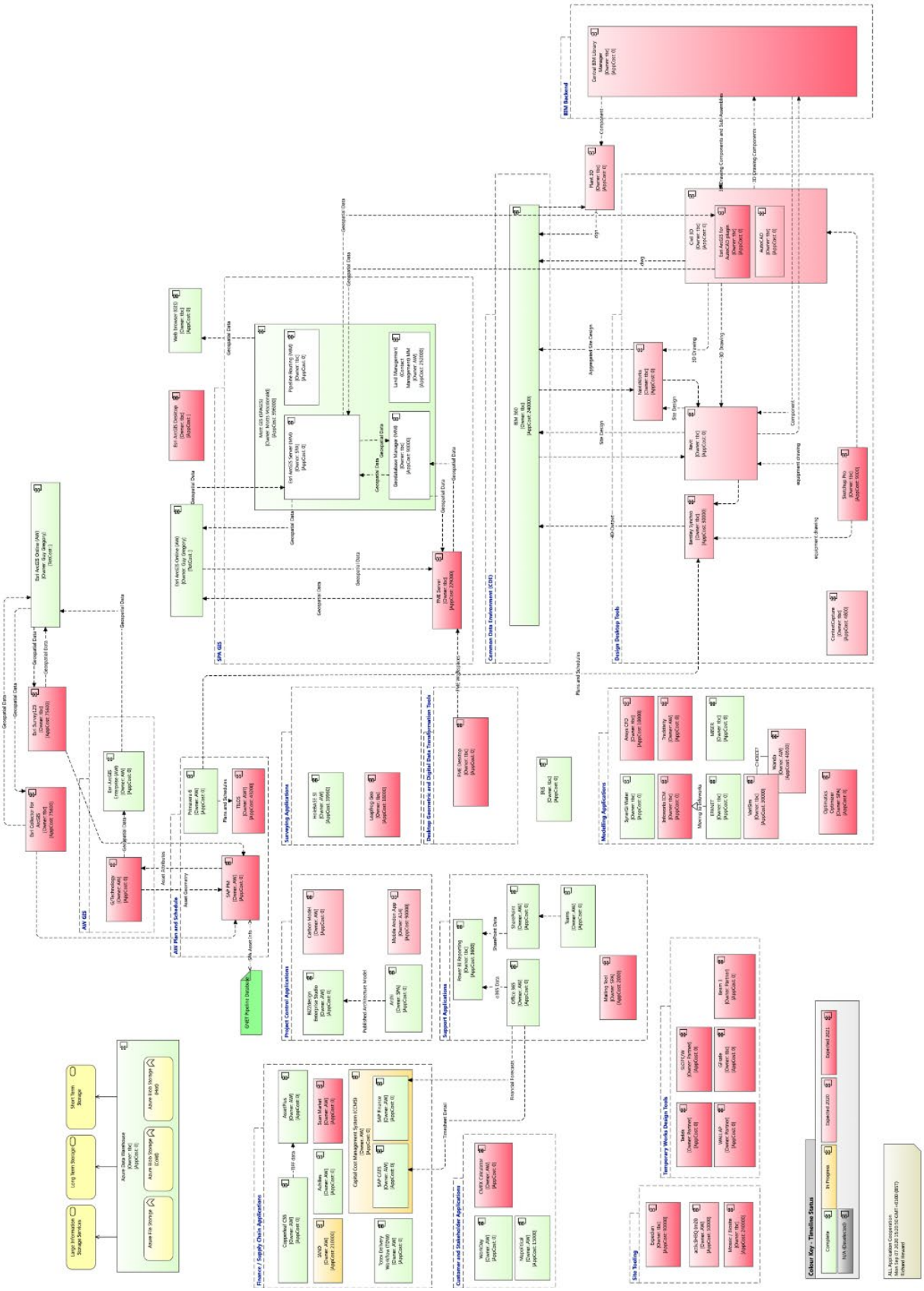
What is the BIM scope for this project and is it planned to use key documents, e.g. EIR/BEP plan/AIR etc.	At an early stage in the project mobilisation phase there was a conscious decision to use BIM principles. There was absolute acceptance from the client and the mobilisation team (this was later reinforced by the SPA partners) that value would be released by focussing on developing: • Collaborative working practices • Better outcomes and end user value • Detailer information requirements • Data exchange and validation • Security minded digital working. It was recognised that there were no formal BIM related documents held by the client, Anglian Water, therefore a collaborative piece of work was undertaken to develop Anglian Water's Exchange Information Requirements (EIR) prior to signing the Alliance Contract. Development of the BIM strategy identified the need for the following BIM tools in line with recommendations in PAS1192-2: • BIM Execution plan – in response to the EIR • Common Data Environment (CDE) – to allow exchange of information within the project team and the wider supply chain eco-system (GIS, BIM360, Azure, SharePoint). • Master Information Delivery Plan (MIDP) – to manage delivery of information during a project • Supply chain EIR • Asset Information Model • Naming convention.  ***Figure 2 – PAS1192-2 – Asset Information Model (now superceded with ISO19650-2)***

What is the BIM scope for this project and is it planned to use key documents, e.g. EIR/BEP plan/AIR etc.	To realise the Strategy, SPA have identified a schedule of new Product Data Templates (PDTs) which will be developed to enable data exchange on the programme of work. Currently within the water industry there are no PDTs for each product type within the SPA scope of work. Once developed SPA will feed back into BIM4Water to support its existing portfolio of PDTs and benefit the wider industry. Using PDTs as the common exchange procedure within SPA, there is an opportunity to develop a clear approach to show how the PDT data can be absorbed into the project information model (PIM). The SPA data architecture team reviewed the existing available industry PDTs and have initiated development of a common model (ontology), as shown in Figure 3. This has potential to enable further effective management, storage and validation of product data with further development.  ***Figure 3 – Data Framework Model***
At what stage was the decision taken to use BIM on this project and has BIM been used throughout the project lifecycle?	The decision was taken to use the principles of BIM during the project mobilisation phase. It was understood by all Alliance partners that adopting BIM principles would drive efficiencies through the project lifecycle as well as the asset lifecycle.

How was the project team "brought on board" to use BIM?	At a very early stage of project mobilisation it was identified that subject matter experts would be required to facilitate the foundation work, developing BIM principles and strategy. We identified how BIM principles would drive efficiencies and what the developmental requirements were. The Strategy clearly linked through to the AW Outcomes to demonstrate 'Why' we would undertake these activities. Roles were identified and recruitment undertaken on a 'best for task' basis. This all happened during the first 4 months of the contract being signed. The following permanent roles were identified: • Digital Twin and Asset Data Lead • Asset Information Manager • Information Manager • BIM/CAD Manager • GIS Manager. This work was undertaken alongside the development of the Enterprise Architecture model to ensure continuity. Specialists were brought in to implement tools such as BIM360. Alongside BIM specialists we also have an Enterprise Architect and GIS Architect.
How did BIM impact on the design stage of the project? What were the benefits and to whom?	This project is just entering the design stage of the project, but we are already seeing that by aligning the work breakdown structure and the asset breakdown structure, we were able to significantly reduce the number of proposed 'tools' within the Enterprise Architecture. It has also allowed us to align closely to the final deliverable requirements (using the EIR) which has significantly reduced the number of process steps that we envisage for information passing from the supply chain, through the project information model and into the asset information model.
How did BIM impact on the construction stage of the project? What were the benefits and to whom?	This project is just entering the design phase, but we expect numerous benefits from the use of smart design tools and information management.

How did BIM impact on the operational stage of the project? What were the benefits and to whom?	This project is just entering the design phase, but we expect that the delivery of the Digital Twin will greatly enhance the way that the infrastructure is operated. It is expected that the digital twin will enable sensors to collate data that will be analysed to create insight which will drive smart decisions, which will be acted upon autonomously. The user stories have identified specific needs/requirements that the Digital Twin is looking to realise (Figure 4).  ***Figure 4 – AW Benefits from User Stories***
What were the estimated costs of utilising BIM on this project?	The cost of generating the framework to undertake BIM was in the region of £66k. As the project progresses the cost of utilising BIM tools will be measured against the benefits generated.
What were the estimated savings from the use of BIM?	It is estimated that setting up this framework will generate at least £586k in capital savings over the 5-year project period based purely on processes alone, and not including tools. It should be noted that there are many non-financial benefits that have also been identified including benefits in safety, to the wellbeing of our staff, to the environment and in the customer perception of the Alliance and Anglian Water. There will also be Opex savings as a result of the way that we collate, capture, manage and re-use data within the asset information model. These cost savings are yet to be quantified.
Any other information	This is the first of a number of SPA Case Studies. It is intended to revisit this project at the end of the design phase, at the end of the commissioning phase, and one year into the operation of the asset. The Case Study will be updated to reflect on further developments related to BIM and to determine whether planned benefits have been realised. The case studies will look at both the physical and the digital asset.

Section 4: Overall Assessment	
Was the use of BIM appropriate?	So far during the initial phase (it is now August 2020) we feel that we have made an appropriate use of BIM.
Are there clear benefits (both quantitative and qualitative) by applying BIM to this project?	We have clearly set out 'user stories' which have been assessed for both quantitative and qualitative benefits. Anglian Water collates the non-financial benefits (including measures against the Six Capitals as shown in Figure 5) as these are important in how it achieves the ODI's. ***Figure 5 – Six Capitals***
What are the key challenges in using BIM on this project and how were they overcome?	During the initial period SPA has had to work closely with Anglian Water to ensure that we have the following in place: 1. Clear information repositories 2. Data stewards 3. Approved data structures At present some of these are not yet in place within the Asset structure, and so at present the ability to move information from the project environment to the asset environment would be inefficient.
What could be learnt from using BIM on this project and applied elsewhere?	It is the intention that a blueprint will be generated that Anglian Water can extend to its other Alliances.
Has all appropriate changes or new asset data been transfer to Asset Management been completed?	No asset data has been transferred to Asset Management at this stage.

Client testimony (where possible)	At Anglian Water our strategic business programmes offer an essential opportunity to improve our most important master data and information. They are a clear focus upon our business-critical outcomes and value creation, with motivated people both from internal teams and key partners, empowered to drive changes in our business whilst utilising advanced digital, data and analytics capabilities. The trailblazer of our Strategic Pipeline Alliance (SPA) is a prime example of this model. Through SPA people with open mindsets have realised a step-change in understanding in our water asset and operating data; how it needs to change, and how we can target both capex delivery and future operating efficiencies that previously didn't exist. The whole collaborative team have worked together to drive a new information-focused design process and importantly have shared with water sector peers to evaluate our data and information models as a blueprint for all to learn from, with a vision to move toward a common information management framework and standards across the whole industry. The SPA outcomes have also driven the aspiration to realise Digital Twin capabilities which requires Anglian Water to attain far deeper maturity and understanding of operational technology and sensors, data, analytics, automation and artificial intelligence. That understanding is now being pushed across our wider enterprise and raising the bar for all strategic intent. Thank you to everyone involved from SPA and Anglian Water, I'm excited to see what is created next! Matt Edwards – Head of Enterprise Data, Chief Data Officer
What is the potential for rolling out any of the above benefits/lesson learnt etc across the water industry wide?	We have a fantastic opportunity to use the templates and blueprint that Anglian Water and the Strategic Pipeline are developing to share across the water industry.
Section 5: Case Study Administration Section	
Author and date completed	Guy Gregory (Anglian Water), Richard Stirland (Anglian Water) - August 2020
Has a case study template been completed by this project before?	No
Version Control	Version 2.2, 19/2/19

Appendix 1 – SPA Enterprise Architecture