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Anglian Water

Direct Procurement for Customers: IAP Response

10 April 2019

PRVATE AND CONFIDENTIAL

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Executive summary

Executive summary (1/3)

- This report addresses the specific actions set out by Ofwat in its Initial Assessment of PR19 Plans (IAP) detailed actions on Direct Procurement for Customers (DPC).
- Specifically the report includes:
  - **Technical and cost projection** information on the Elsham, North Fenland to Ely and Pyewipe transfer and treatment schemes.
  - **An economic value for money analysis (VFM)** using Ofwat's assumptions set out in Appendix A of the detailed actions on DPC for the Elsham, North Fenland to Ely and integrated Pyewipe schemes.
- The previous analysis and technical assessments of the Elsham and Pyewipe schemes suggest they are less suitable for DPC. The VFM analysis was conducted for the North Fenland to Ely Treatment and Transfer Scheme in the original PR19 submission, which showed in-house delivery to be more beneficial than DPC under the previous Mid Case scenario.
- When assessing the overall suitability of the schemes for DPC, the results of all three tests set out in Ofwat's Guidance should be considered, as the size, discreteness and the value for money potential of a scheme are all important indicators of whether customers would benefit from a CAP delivering the scheme under the DPC model compared with the 'in-house' delivery.
- The table below summarises the key findings against each test for the three schemes analysed in the IAP response.

Eligibility assessment	Elsham	North Fenland	Pyewipe (Integrated)
Size test	**Pass** Whole life costs: £337m [1,2]	**Marginal Pass** Whole life costs: £100m [1,2]	**Pass** Whole life costs: £130m [1,2]
Discreteness test	**Less suitable** Critical supply-demand asset, highly integrated with high risk of operational failure and uncertainty around scope	**More suitable** Limited number of interfaces, with no upgrades expected, however critical for required for day to day operation	**Less suitable** Combination of two elements requiring different capabilities and characterised by different risk profiles
VFM analysis	**Marginal Pass**	**Fail**	**Fail**
Overall DPC suitability	**Less suitable**	**Less suitable**	**Less suitable**

- The results of the Value for Money assessment are presented in more detail in the following slides.

[1] In 2017/18 real prices
[2] The asset useful economic life calculated as the weighted average of infrastructure and non-infrastructure elements based on 25-year Capex spend.

Executive summary (2/3)

- A VFM has been conducted on the schemes as required. The results of the VFM and the analysis of key schemes' attributes are included in the table further below and present the mid case VFM analysis for each of the schemes.
- The VFM analysis contained herein has been completed in line with the stated Ofwat assumptions, however the following observations should be considered in the interpretation of the results.
  - The **baseline costs projections** used as inputs in the VFM model are pre-efficiency. The targeted efficiencies AWS may realise against the scheme costs under its in-house delivery model are captured in the counter factual. The efficiencies assumed under the DPC model are applied the baseline cost projection pre-efficiency.
  - **Depreciating the asset over the full economic life** in line with the price control regime would leave a significant terminal value at the end of the contract and is unusual compared with project finance precedents, which generally see assets fully paid for over the contract period.
  - The **impact of an accelerated depreciation profile** under the DPC depends on the level of project IRR when compared to the Social Discount Rate (SDR). Where the project IRR is higher than the SDR, customers benefit from bringing forward revenues in the form of accelerated depreciation profile under the DPC model.
  - A **contract period of 50 years would be very long and inconsistent with project finance precedents,** especially in relation to smaller projects. In addition, in some cases, shorter asset lives and lifecycle Capex profiles would make a 50-year contract less viable.
  - **Benefits arising from financing under DPC** are driven by (i) the assumed gearing (set at 85% under the Mid-Case), (ii) the profile and level of renewal Capex that can result in high costs for lifecycle reserve account, (iii) the level of underlying rates determined by the timing of the scheme and current market condition. The benefits of gearing arise due to the cost of debt and the cost of equity capital being held constant at higher levels of gearing; we would normally expect these to increase with gearing.
  - The **VFM analysis** assumes 1% of Capex for procurement costs in line with Ofwat's guidance. These are, however, significantly understated where schemes have small Capex requirement. PFI experience indicates that procurement costs for a project with £50m Capex requirement are more likely to range 2%-5% of Capex, which would make the DPC model worse for customers.
  - It may be **inconsistent to aggregate the impacts of different assumptions in the high case** when considering the Value for Money for a given scheme as there are likely to be interactions between these assumptions that would need to be more carefully analysed and depend on the specific characteristics of the schemes being evaluated.

Executive summary (3/3)

- The table below provides an overview of the key asset characteristics for the schemes considered for DPC as required by Ofwat in its IAP response and summarises the results of the value for money assessment.

Scheme attributes		Elsham	North Fenland	Pyewipe (Integrated)
Asset type		Treatment + Transfer	Treatment + Transfer	Treatment + Transfer
Timing	Construction start	22/23	21/22	22/23
	Targeted use date	25/26	25/26	25/26
Size	Wholelife totex [1,2]	£335.5m	£100.2m	£130m
	Initial Capex [1]	£130.5m	£40.5m	£41.5m
Value for Money analysis		**Elsham**	**North Fenland**	**Pyewipe (Integrated)**
Mid Case results [3]	NPV DPC	£117.6m	£38.2m	£55.6m
	NPV In-house	£177.3m	£36.5m	£52.6m
	NPV Difference	**- £0.3m**	**+£1.7m**	**+£3.0m**
	Terminal Value	£97.9m 58% of Capex	£28.5m 60% of Capex	£33.4m 58% of Capex

- The results show that all three schemes are unlikely to provide benefits to customers under the DPC delivery route.
- The Elsham Treatment and Transfer Scheme, which has a relatively high initial capital spent, may provide marginally greater value for money for customers under the DPC delivery model in the Mid Case, but the results are highly sensitive to the assumptions.
- The smaller schemes are more expensive under the DPC model and an in-house delivery could save customers between 4.5% and 5.3% of the total costs in NPV terms.

[1] In 2017/18 real prices
[2] The asset useful economic life calculated as the weighted average of infrastructure and non-infrastructure elements based on 25-year Capex spend.
[3] Results are shown as the total costs to customers discounted to the start of construction

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Section 1: Introduction

Introduction

Background

- Anglian Water's PR19 Business Plan submission to Ofwat in September 2018 considered the potential for Direct Procurement for Customers for schemes (DPC) within its AMP7 investment programme in line with guidance set out by Ofwat.
- In response to its PR19 Business Plan submission, Ofwat's Initial Assessment of Plans (IAP) included a number of actions that it requested from the company associated with DPC.
- Anglian Water has engaged KPMG to support it in responding to Ofwat's actions on DPC and the results of this work are presented in this report.

Key assumptions

- Project needs have been established by Anglian Water for the schemes under examination as part of the wider PR19 business plan submission and WRMP.
- Costs and technical details for each of the schemes provided by Anglian Water are based on information from the company's investment planning and cost modelling teams.

Scope

- KPMG has not sought to validate the cost projections or technical characteristics of the schemes being examined and has relied on Anglian Water Management to provide this information, which is presented and used as part of this report.
- Value for Money (VFM) analysis presented in this report is carried out in line with Ofwat's assumptions stated in Appendix A of its DPC actions as part of the IAP. KPMG has not sought to validate or confirm whether these assumptions are based on market observations. However, in some cases we have commented on these assumptions where relevant or where the VFM may be sensitive to these assumptions.

The report contains a response to the actions identified by Ofwat in its IAP response to Anglian Water's PR19 Business Plan submission and each section focuses on a specific scheme as referred to in Ofwat's IAP response.

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Section 2: Elsham Treatment and Transfer Scheme

Section 2.1: Elsham Transfer and Treatment Scheme Technical overview: Scheme attributes

Scheme overview and description

The Elsham transfer scheme is required to increase the capacity of water supplies to allow surplus from East Lincolnshire WRZ to be transferred south. These combine with flows from the new treatment works and are transferred from the Elsham WRZ to North Lincoln and further south to improve resilience associated with reductions to abstraction levels, and increased growth and climate change impacts in other WRZs. The new WTW at Elsham will take raw water from the Intake on River Ancholme and treat it for onward distribution to South Lincolnshire WRZ. The total output capacity from the transfer scheme is a 65MLD. transfer.

In line with the feedback received as part of the WRMP process, alternative options are being reviewed which will inform the decision about the need for the Elsham transfer and treatment scheme.

Key scheme attributes

Wholelife totex (£m)*	£335.5m (Capex: £242.3m Opex: £93.2m)
Targeted in use date	25/26
Construction period	3 years
Development period	2 years
Asset life	100 years for infrastructure and 40 years for non-infrastructure (weighted average life of 69 years based on Capex spent)

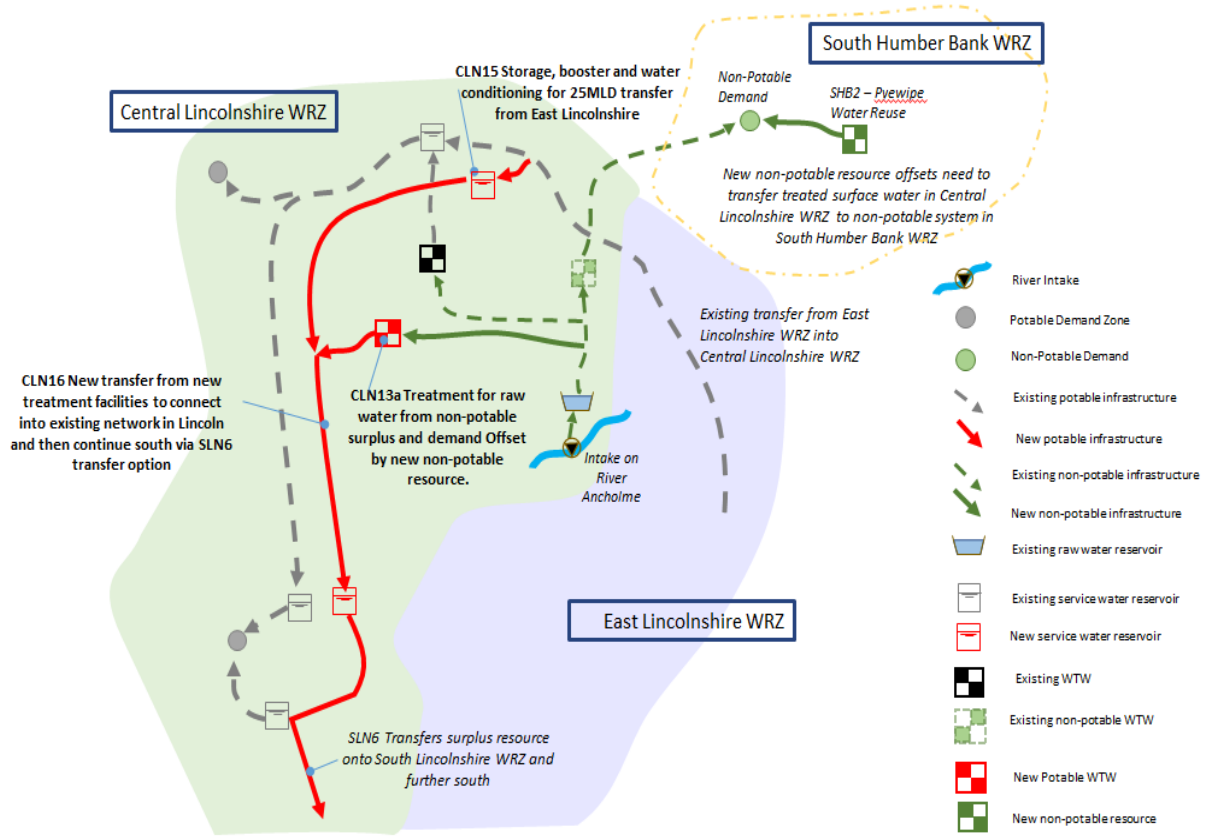
Scheme components

Asset	Dimensions
CLN15 East Lincolnshire WRZ to Central Lincolnshire WRZ	• 50 ML Potable Storage Reservoir • 90 KW Water Booster • Water Conditioning (e.g. Ammonia, Phosphate & Chlorine Dosing) • Other Associated Assets (e.g. Telemetry, Buildings)
CLN13a South Humber Bank WRZ to Central Lincolnshire WRZ Transfer (31 Ml/d) - Treatment only	• 31 MLD Treatment (e.g. Clarification, Ozonation, Plant, GAC Adoption) Membrane • 4.5ML Potable Storage Balance Tank • 102 KW Interstage Pumping • Water Conditioning (e.g. Ammonia, Phosphate & Chlorine Dosing) • Other Associated Assets (e.g. Telemetry, Buildings)
CLN16 South Humber Bank WRZ plus East Lincolnshire WRZ to Central Lincolnshire WRZ - transfer only	• 25ML Potable Storage Reservoir • 1176 KW Water Booster • 55.96km Transfer Main

* over weighted average life of the asset

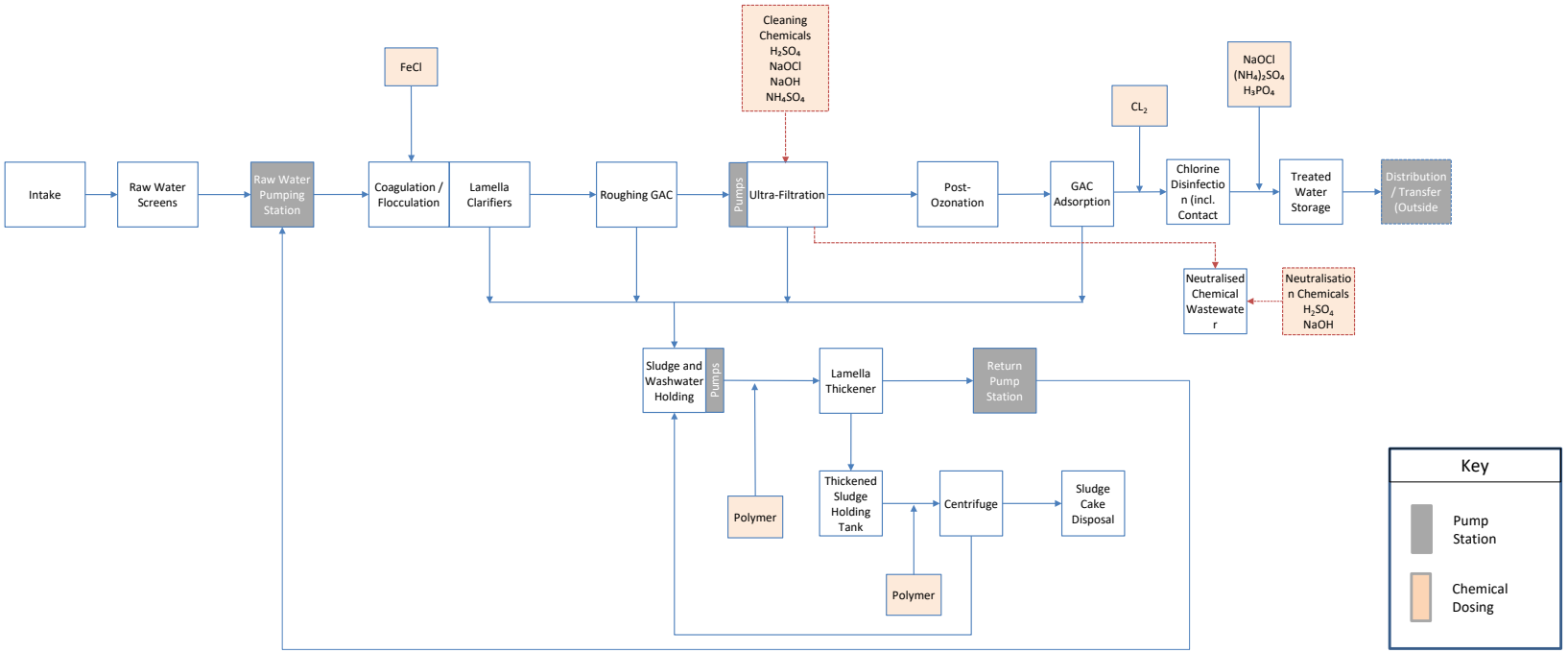
Section 2.1: Elsham Transfer and Treatment Scheme Technical overview: Schematic map

Detailed Schematic diagram of the Elsham Scheme



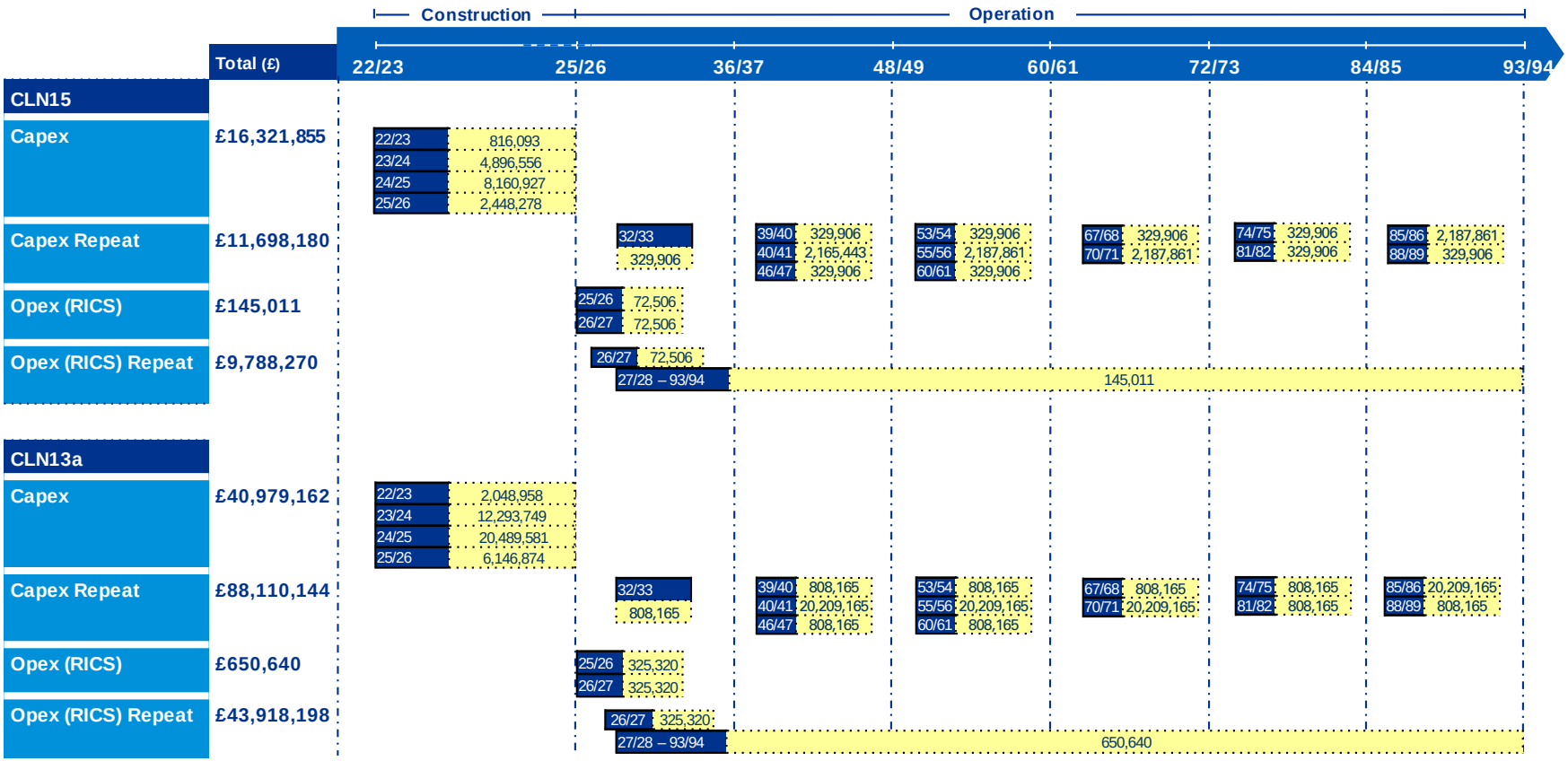
Section 2.1: Elsham Transfer and Treatment Scheme Technical overview: Process diagram

Detailed Process diagram of treatment element of the Elsham scheme (CLN13a)



Section 2.2: Elsham Transfer and Treatment Scheme Cost projections (1/3)

The below tables set out periodic Capex and Opex costs on an annual basis for both Non-Infrastructure and Infrastructure components over the asset economic useful life. Costs are shown in 2017/18 prices.

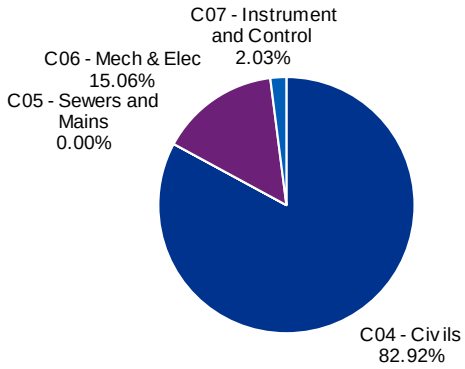


Section 2.2: Elsham Transfer and Treatment Scheme Cost projections (2/3)

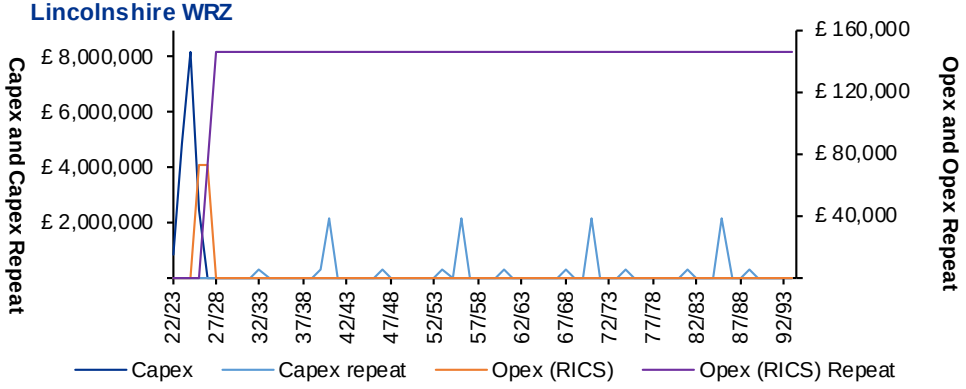
The below tables set out periodic Capex and Opex costs on an annual basis for both Non-Infrastructure and Infrastructure components over the asset economic useful life. Costs are shown in 2017/18 prices.

	Total (£)	Construction / Operation: 22/23	25/26	36/37	48/49	60/61	72/73	84/85	93/94
CLN16									
Capex	£73,162,043	22/23 3,658,102 23/24 21,948,613 24/25 36,581,022 25/26 10,974,306							
Capex Repeat	£11,994,219		32/33 169,602	39/40 169,602 40/41 2,616,951 46/47 169,602	53/54 169,602 55/56 2,616,951 60/61 169,602	67/68 169,602 70/71 2,616,951	74/75 169,602 81/82 169,602	85/86 2,616,951 88/89 169,602	
Opex (RICS)	£566,827		25/26 141,707 26/27 425,120						
Opex (RICS) Repeat	£38,119,110		26/27 141,707 27/28 – 93/94 566,827						

CAPEX by Component - CLN15 East Lincolnshire WRZ to Central Lincolnshire WRZ



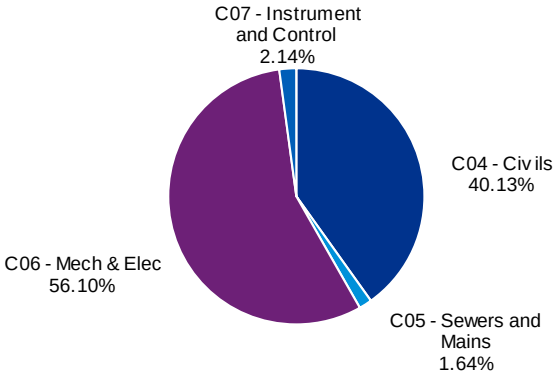
Capex and Opex - CLN15 East Lincolnshire WRZ to Central Lincolnshire WRZ



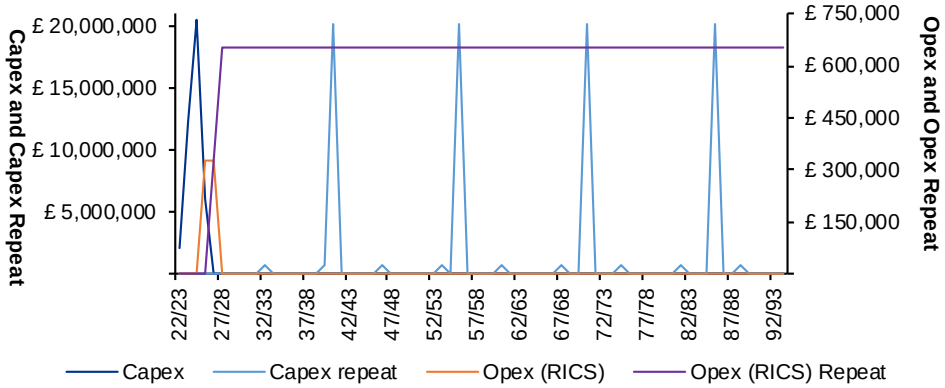
Section 2.2: Elsham Transfer and Treatment Scheme Cost projections (3/3)

The cost structures of the scheme, for both Non-Infra and Infra elements, are set out below. Costs are shown in 2017/18 prices.

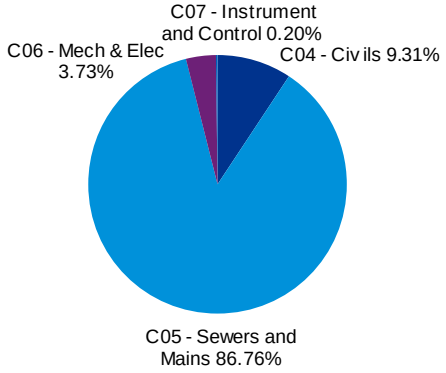
CAPEX by Component - CLN13a South Humber Bank WRZ to Central Lincolnshire WRZ Transfer (31 Ml/d) - Treatment only



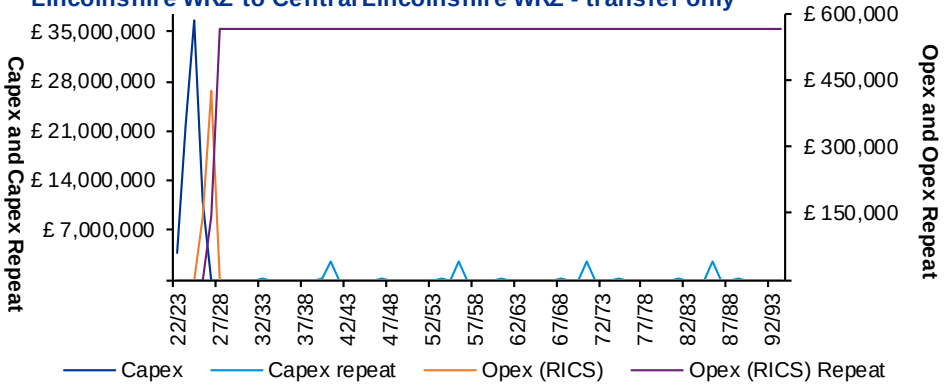
Capex and Opex - CLN13a South Humber Bank WRZ to Central Lincolnshire WRZ Transfer (31 Ml/d) - Treatment only



CAPEX by Component – CLN16 South Humber Bank WRZ plus East Lincolnshire WRZ to Central Lincolnshire WRZ - transfer only



Capex and Opex – CLN16 South Humber Bank WRZ plus East Lincolnshire WRZ to Central Lincolnshire WRZ - transfer only



Section 2.3: Elsham Transfer and Treatment Scheme Value for Money (VFM) Analysis: Mid-Case Assumptions

Value for Money assumptions used in modelling (Note: Assumptions based on those stated in DPC, IAP response from Ofwat)

Key assumptions		DPC	In-house	Comments
Profile	**Discount rate and period**	3.5% real decreasing over time from the start of spend		• The decreasing discount rate is based on HM Treasury Green Book. The level of discount rate drives how delaying revenues impact on the NPV of cost to customers. Where the social discount rate is lower than the project IRR (WACC), the delay in revenue recovery increases the NPV of customer bills under the DPC model (in-house delivery). • The period over which costs to customers are discounted and aggregated starts when expenditure incur, i.e. first year of construction and goes until the end of the asset's economic useful life in order to allow comparability between in-house and DPC delivery routes.
	Indexation	CPIH		• Indexation is in line with Ofwat Final Methodology of indexing new assets by CPIH.
Asset	**Asset depreciation method**	Straight line over 69 years		• Both under DPC and PR19 we are assuming straight line depreciation over the asset useful economic life. • Our approach to asset depreciation is consistent between DPC and in-house delivery. Under the Mid Case and we match the residual value under DPC at the contract life to the undepreciated asset value under the PR19. • Asset life was determined as the average across infrastructure and non-infrastructure components based on the Capex spent over the 25 year contract period.

Financing	**Cost of debt**	Construction: 3.84%
		Operation: 3.36%
		RCV bond: 3.27%
			PR19 WACC of 5.37% (nominal, pre-tax)	• The cost of debt assumptions are based on Ofwat's standard assumptions by applying the mid-point in the range set out for margin costs for each facility:
				  • Construction: LIBOR 6m 4Y, 3yr forward, swap + 230bsp
				  • Operation: Gilt 14Y, 7yr forward, swap + 130bsp
				  • RCV bullet repayment: Gilt 25Y, 7yr forward swap + 130bsp
				• The tenor of the underlying base rates for the facilities used under the operation period varies with the assumed contract length. Under each sensitivity the tenor of the RCV bullet repayment matches the length of the contract, while the tenor of operation facility changes to 12 years under a 20-year contract, and 20 years under a 40-year contract.
				• The underlying base rate for each facility was established as the average of daily rates over a period of 20 business days from 27 February 2019 to 26 March 2019, downloaded from Thomson Reuters Eikon.

Section 2.3: Elsham Transfer and Treatment Scheme Value for Money (VFM) Analysis: Mid-Case Assumptions (cont.)

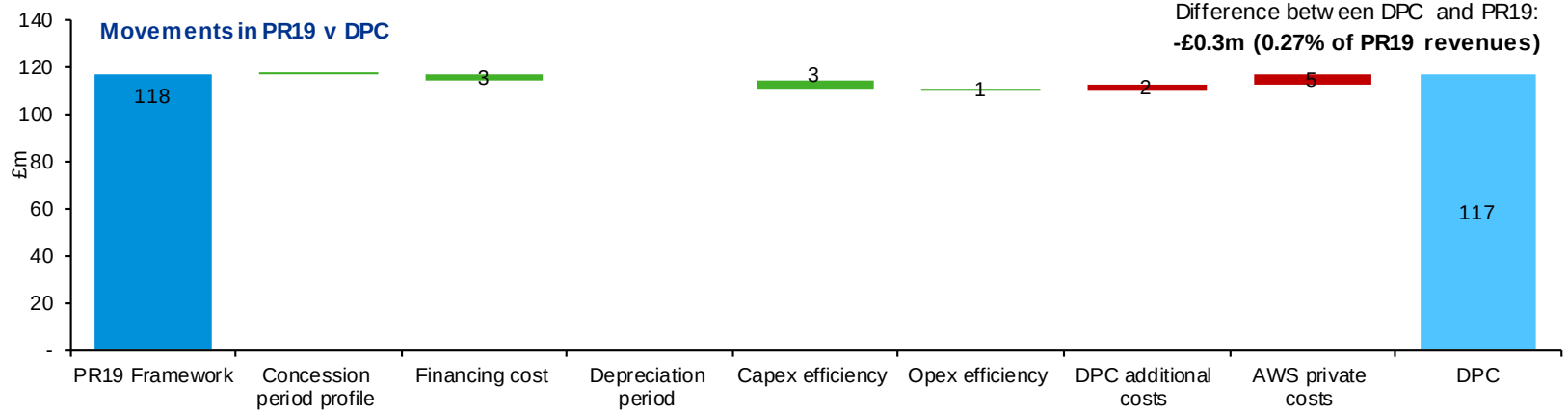
Value for Money assumptions used in modelling (Note: Assumptions based on those stated in DPC, IAP response from Ofwat)

Key assumptions		DPC	In-house	Comments
Financing (cont.)	Cost of equity	8% real	PR19 WACC of 5.37% (nominal, pre-tax)	• Cost of equity is set in line with Ofwat's standard assumptions. Assuming a 2% inflation 8% real EIRR equals a 10% nominal EIRR. • The WACC estimate is based on Ofwat's early view on the cost of capital for PR19 in Appendix 12 of the PR19 Final Methodology as published in December 2017. • The WACC is 5.37% (nominal) assuming, that it is a new asset, and so CPI (H) indexation will apply to revenues.
	Gearing	85%		• In line with Ofwat's IAP guidance gearing is treated as an input in the model and set at 85% under the Mid Case.
	Debt cover ratio	DSCR of 1.25		• The model assumes that debt providers require a minimum Debt Service Coverage Ratio ('DSCR') under project loan underwriting process and gearing can be increased as long as the minimum DSCR is breached.
Costs	Operating costs	£34.6m Plus a 10% efficiency	£34.6m Plus a 7.18% efficiency	• Base expenditure profile and in-house efficiency for operating costs are based on investment planning expenditure forecasts for WRMP and PR19 provided by Anglian Water in real terms (2017/18 prices). • Total operating costs refer to the contract life of 25 years under the Mid Case. • Both efficiencies are applied on the base expenditure profile.
	Capital costs	£159.4m Plus a 10% efficiency	£159.4m Plus a 7.18% efficiency	• Base expenditure profile and in-house efficiency for capital costs are based on investment planning expenditure forecasts for WRMP and PR19 provided by Anglian Water. • Total capital costs comprise of initial Capex and renewal Capex over the contract life of 25 years and are expressed in real terms (2017/18 prices). • Both efficiencies are applied on the base expenditure profile.
	Procurement costs	1% of Capex	Na	• As per Ofwat's IAP guidance.
	Bidder costs	2% of Capex	Na	• As per Ofwat's IAP guidance.
	DPC contract mgmt.	£150k per year	Na	• As per Ofwat's IAP guidance.

Section 2.3: Elsham Transfer and Treatment Scheme Value for Money (VFM) Analysis: Mid-Case Results

The results of the VFM modelling comparing DPC to in house delivery are set out below.

Value driver analysis



Total costs to customers discounted to the start of construction (22/23)

VFM results

(£m)	Mid Case
NPV in-house	£117.6
NPV DPC	£117.3
NPV Difference	- £0.3m
Terminal value (real)	£97.9m 58% of Capex

Findings:

- Under the Mid-Case assumptions DPC delivery model seems to be only marginally more beneficial to customers than in-house delivery with the key value drivers being:
  - Capex and opex efficiencies assumed to be 10% on the base line costs under the Mid-Case
  - Financing costs
- Benefits arising from financing under DPC are limited, mainly because (i) gearing is set at 85% and not optimised, (ii) profile and level of renewal Capex result in high costs for lifecycle reserve account, (iii) relatively high underlying rates driven by timing of the scheme and current market condition.
- While the model assumes a lifecycle reserve account to fund renewal Capex in line with project finance best practice, alternative, innovative solutions could be explored to reduce the financing costs under DPC.
- The results are very sensitive to the efficiency assumptions and if the assumed Capex efficiency benefits are not realised then the benefits offered by DPC would be offset by the additional procurement costs.

Section 2.3: Elsham Transfer and treatment scheme Value for Money (VFM) Analysis: Sensitivities

We tested the impact of key inputs and assumptions on the results of the VFM under the Mid-Case scenario across a number of sensitivities as set out in Ofwat's IAP focusing on and summarised the results in the table below.

Results under the Mid Case	- £0.3m	NPV of costs to customers under DPC minus NPV of costs to customers under the in-house delivery

Variables	Assumptions under different cases*			DPC compared with in-house NPV	
	Low	Mid	High	Low	High
Contact life (years)	20	25	40**	+£6.8m	+£16.1m
Depreciation rate (%)	25% faster	As per in-house	*Not specified*	- £0.5m	*Not specified*
Equity IRR, real (%)	10%	8%	7%	+£8.7m	- £5.0m
Gearing (%)	80%	85%	90%	+£6.5m	- £7.7m***
Capex efficiency (%)	5%	10%	15%	+£3.1m	- £6.3m
Opex efficiency (%)	5%	10%	15%	+£0.2m	- £1.2m
Procurement costs (% of Capex)	2%	1%	0.5%	+£1.5m	- £1.3m
Bidder costs (% of Capex)	3%	2%	1%	+£0.7m	- £1.4m
Contract mgmt. costs (annual)	£300k	£150k	*Not specified*	+£2.6m	*Not specified*

* Scenarios as specified in Ofwat assumptions within IAP 'Direct Procurement for Customers detailed actions'
** In line with the asset life of non-infra elements of the scheme. Under a 50-year contract a significant Capex would be needed to replace the non-infra elements of the scheme leading to increased financing challenges from a 3rd party delivery perspective, as well as to increased contractual complexity under a DPC model.
*** High case gearing results in negative cash balance in certain years so additional costs of liquidity facilities would have to be added in this case. Higher gearing would also be expected to increases the costs of debt and equity.

VFM of DPC improves vs Mid-Case

VFM of DPC deteriorates vs Mid-Case

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Section 3: North Fenland to Ely Transfer and Treatment Scheme

Section 3.1: North Fenland to Ely Transfer and Treatment Scheme Technical overview

Scheme overview and description

The scheme is a transfer of treated water from the North Fenland water resources zone to Ely water resources zone to improve resilience associated with reductions to sustainable abstraction levels, increased growth and climate change impacts.

The infrastructure asset comprises a new pipe, total length 34Km, with 20Ml/d capacity, including 7 crossings requiring directional drilling.

Non-infrastructure assets include treatment for water conditioning, storage capacity and booster pumps. Metaldehyde treatment has been removed from the scheme following the announced ban.

This is a critical link in the grid for ELY9 North Fenland WRZ to Ely WRZ. The water conditioning plant located here is crucial for ensuring the water quality from the north (mainly surface water) is compatible with the East (mainly groundwater).

Given wholelife totex of the scheme just reaches £100m, the asset is borderline in terms of suitability for DPC from a size perspective.

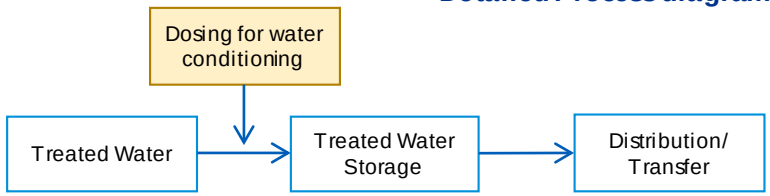
Key scheme attributes	
Wholelife totex (£m)*	£100.2m (Capex: £62.1m Opex: £38.2m)
Targeted in use date	25/26
Construction period	4 years
Development period	2 years
Asset life	100 years for infrastructure and 40 years for non-infrastructure (weighted average life of 71 years based on Capex spent)

* over the weighted average life of the asset

Scheme components

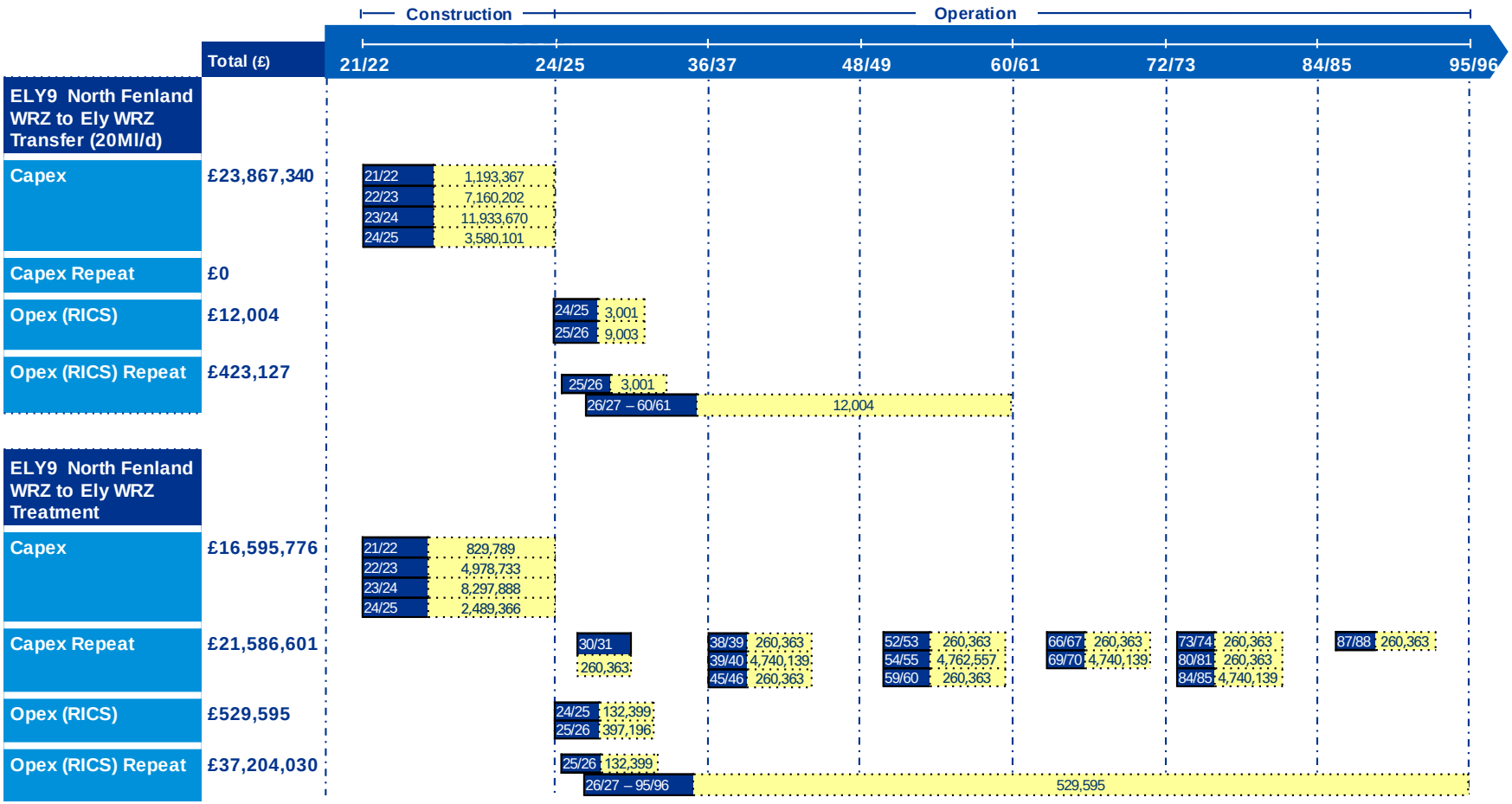
Asset	Dimensions
ELY9 North Fenland WRZ to Ely WRZ Transfer (20Ml/d)	• 20 Ml/d transfer • 34km ductile iron pipe (600mm nominal bore) • Includes approximately 500m of complex directional drilling
ELY9 North Fenland WRZ to Ely WRZ Treatment	• 40Ml potable storage reservoir • 974kw water booster • Other associated assets Additional dosing to retain longevity of treated water: • 20 Ml/d Chlorine, Ammonium Sulphate and Phospate • Other associated assets

Detailed Process diagram



Section 3.2: North Fenland to Ely Transfer and Treatment Scheme Cost projections (1/2)

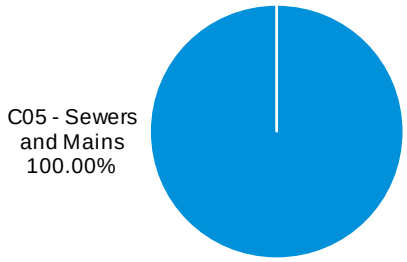
The below tables set out periodic Capex and Opex costs on an annual basis for both Non-Infrastructure and Infrastructure components over the asset economic useful life. Costs are shown in 2017/18 prices.



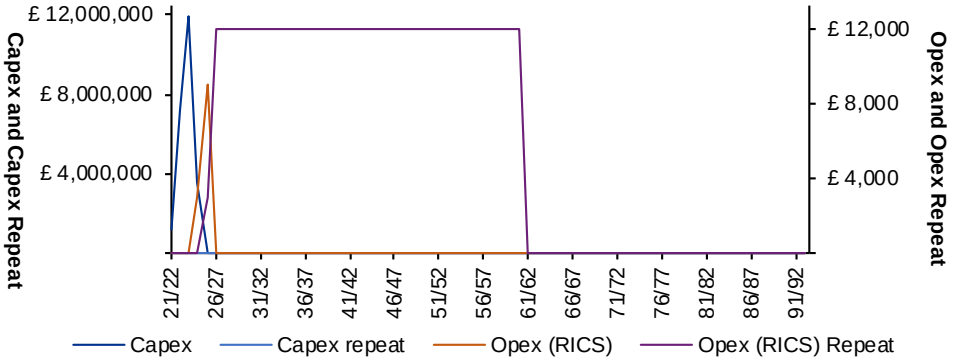
Section 3.2: North Fenland to Ely Transfer and Treatment Scheme Cost projections (2/2)

The cost structures of the scheme, for both Non-Infrastructure and Infrastructure components, are set out below. Costs are shown in 2017/18 prices.

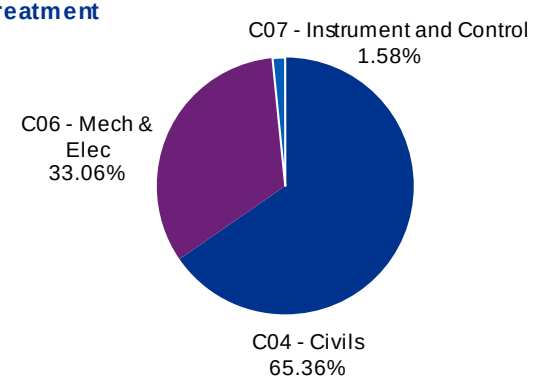
CAPEX by Component - ELY9 North Fenland WRZ to Ely WRZ Transfer (20Ml/d)



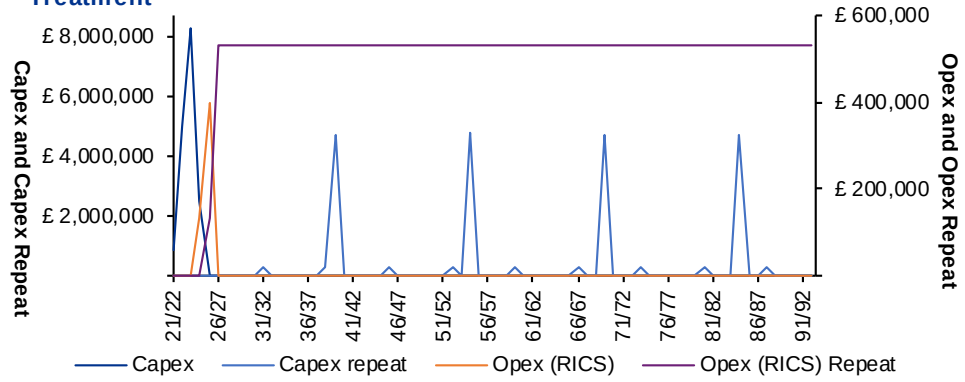
Capex and Opex - ELY9 North Fenland WRZ to Ely WRZ Transfer (20Ml/d)



CAPEX by Component - ELY9 North Fenland WRZ to Ely WRZ Treatment



Capex and Opex - ELY9 North Fenland WRZ to Ely WRZ Treatment



Section 3.3: North Fenland to Ely Transfer and Treatment Scheme Value for Money (VFM) Analysis: Mid-Case Assumptions

Value for Money assumptions used in modelling (Note: Assumptions based on those stated in DPC, IAP response from Ofwat)

Key assumptions		DPC	In-house	Comments
Profile	**Discount rate and period**	3.5% real decreasing over time from the start of spend		• The decreasing discount rate is based on HM Treasury Green Book. The level of discount rate drives how delaying revenues impact on the NPV of cost to customers. Where the social discount rate is lower than the project IRR (WACC), the delay in revenue recovery increases the NPV of customer bills under the DPC model (in-house delivery). • The period over which costs to customers are discounted and aggregated starts when expenditure incur, i.e. first year of construction and goes until the end of the asset's economic useful life in order to allow comparability between in-house and DPC delivery routes.
	Indexation	CPIH		• Indexation is in line with Ofwat Final Methodology of indexing new assets by CPIH.
Asset	**Asset depreciation method**	Straight line over 71 years		• Both under DPC and PR19 we are assuming straight line depreciation over the asset useful economic life. • Our approach to asset depreciation is consistent between DPC and in-house delivery. Under the Mid Case and we match the residual value under DPC at the contract life to the undepreciated asset value under the PR19. • Asset life was determined as the average across infrastructure and non-infrastructure components based on the Capex spent over the 25 year contract period.

Financing	**Cost of debt**	Construction: 3.77%
		Operation: 3.34%
		RCV bond: 3.27%
			PR19 WACC of 5.37% (nominal, pre-tax)	• The cost of debt assumptions are based on Ofwat's standard assumptions by applying the mid-point in the range set out for margin costs for each facility:
				  • Construction: Libor 6m 4Y, 2yr forward, swap + 230bsp
				  • Operation: Gilt 14Y, 6yr forward, swap + 130bsp
				  • RCV bullet repayment: Gilt 25Y, 6yr forward swap + 130bsp
				• The tenor of the underlying base rates for the facilities used under the operation period varies with the assumed contract length. Under each sensitivity the tenor of the RCV bullet repayment matches the length of the contract, while the tenor of operation facility changes to 12 years under a 20-year contract, and 20 years under a 40 -ear contract.
				• The underlying base rate for each facility was established as the average of daily rates over a period of 20 business days from 27 February 2019 to 26 March 2019, downloaded from Thomson Reuters Eikon.

Section 3.3: North Fenland to Ely Transfer and Treatment Scheme Value for Money (VFM) Analysis: Mid-Case Assumptions (cont.)

Value for Money assumptions used in modelling (Note: Assumptions based on those stated in DPC, IAP response from Ofwat)

Key assumptions		DPC	In-house	Comments
Financing (cont.)	Cost of equity	8% real	PR19 WACC of 5.37% (nominal, pre-tax)	• Cost of equity is set in line with Ofwat's standard assumptions. Assuming a 2% inflation 8% real EIRR equals a 10% nominal EIRR. • The WACC estimate is based on Ofwat's early view on the cost of capital for PR19 in Appendix 12 of the PR19 Final Methodology as published in December 2017. The WACC is 5.37% (nominal) assuming, that it is a new asset, and so CPI (H) indexation will apply to revenues.
	Gearing	85%		• In line with Ofwat's IAP guidance gearing is treated as an input in the model and set at 85% under the Mid Case.
	Debt cover ratio	DSCR of 1.25		• The model assumes that debt providers require a minimum Debt Service Coverage Ratio ('DSCR') under project loan underwriting process and gearing can be increased as long as the minimum DSCR is breached.
Costs	Operating costs	£13.7m Plus a 10% efficiency	£13.7m Plus a 6.99% efficiency	• Base expenditure profile and in-house efficiency for operating costs are based on investment planning expenditure forecasts for WRMP and PR19 provided by Anglian Water in real terms (2017/18 prices). • Total operating costs refer to the contract life of 25 years under the Mid Case. • Both efficiencies are applied on the base expenditure profile.
	Capital costs	£46m Plus a 10% efficiency	£46m Plus a 6.99% efficiency	• Base expenditure profile and in-house efficiency for capital costs are based on investment planning expenditure forecasts for WRMP and PR19 provided by Anglian Water. • Total capital costs comprise of initial Capex and renewal Capex over the contract life of 25 years and are expressed in real terms (2017/18 prices). • Both efficiencies are applied on the base expenditure profile.
	Procurement costs	1% of Capex	Na	• As per Ofwat's IAP guidance.
	Bidder costs	2% of Capex	Na	• As per Ofwat's IAP guidance.
	DPC contract mgmt.	£150k per year	Na	• As per Ofwat's IAP guidance.

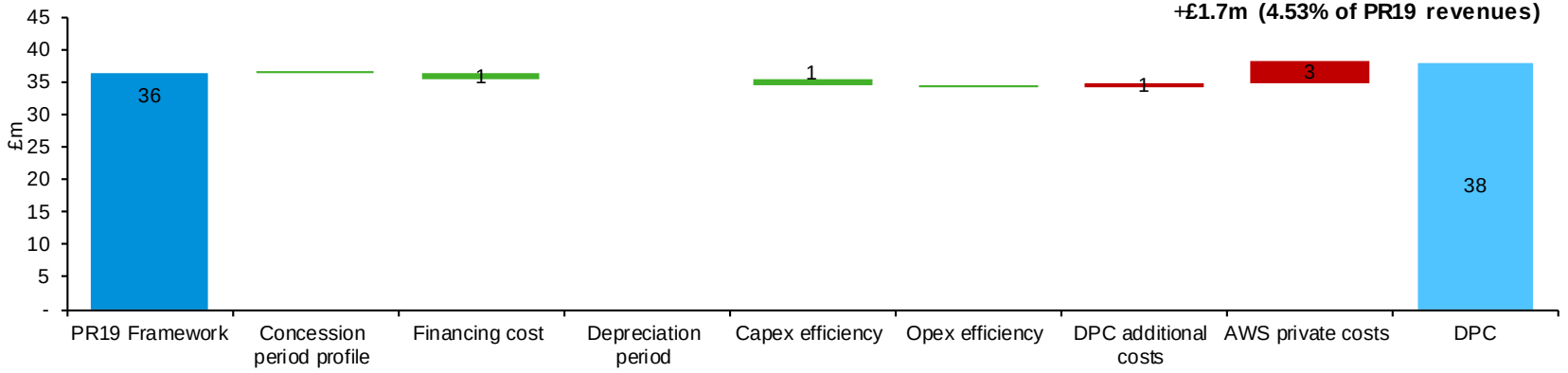
Section 3.3: North Fenland to Ely Transfer and Treatment Scheme Value for Money (VFM) Analysis: Mid-Case Results

The results of the VFM modelling comparing DPC to in house delivery are set out below.

Value driver analysis

Movements in PR19 v DPC

Difference between DPC and PR19:
+£1.7m (4.53% of PR19 revenues)



Total costs to customers discounted to the start of construction (21/22)

VFM results

(£m)	Mid case
NPV in-house	£36.5m
NPV DPC	£38.2m
NPV Difference	**£1.7m**
Terminal value (real)	£28.5m 60% of Capex

Findings:

- Under the Mid-Case assumptions DPC delivery model seems to be more costly for customers than in-house delivery under the PR19 framework with the key value loss driver being additional costs associated with DPC procurement route (AWS's procurement and contract management costs and CAP's bidder costs).
- Benefits arising from financing under DPC are limited, mainly because (i) gearing is set at 85% and not optimised, (ii) profile and level of renewal Capex result in high costs for lifecycle reserve account, (iii) relatively high underlying rates driven by timing of the scheme and current market condition.
- The VFM analysis assumes 1% of Capex for procurement costs in line with Ofwat's guidance. These are, however, significantly understated given the small Capex requirement of the project. PFI experience indicates that procurement costs for North Fenland are more likely to range between 2% and 5% of Capex, making the DPC model even worse to customers.
- Since the residual value at the end of the contract under the DPC is assumed to match the undepreciated asset value under the PR19 framework, depreciation has no impact on the choice between the two models.

Section 3.3: North Fenland to Ely Transfer and Treatment scheme Value for Money (VFM) Analysis: Sensitivities

We tested the impact of key inputs and assumptions on the results of the VFM under the Mid-Case scenario across a number of sensitivities as set out in Ofwat's IAP focusing on and summarised the results in the table below.

Results under the Mid-Case	+£1.729m	NPV of costs to customers under DPC minus NPV of costs to customers under the in-house delivery

Variables	Assumptions under different cases*			DPC compared with in-house NPV	
	Low	Mid	High	Low	High
Contact life (years)	20	25	40**	+£1.7m	+£2.5m
Depreciation rate (%)	25% faster	As per in-house	*Not specified*	+£1.7m	*Not specified*
Equity IRR, real (%)	10%	8%	7%	+£4.6m	+£0.3m
Gearing (%)	80%	85%	90%	+£3.9m	-£0.5m***
Capex efficiency (%)	5%	10%	15%	+£2.7m	+£0.02m
Opex efficiency (%)	5%	10%	15%	+£1.9m	+£1.4m
Procurement costs (% of Capex)	2%	1%	0.5%	+£2.2m	+£1.5m
Bidder costs (% of Capex)	3%	2%	1%	+£2.0m	+£1.4m
Contract mgmt. costs (annual)	£300k	£150k	*Not specified*	+£4.6m	*Not specified*

* Scenarios as specified in Ofwat assumptions within IAP 'Direct Procurement for Customers detailed actions'

** In line with the asset life of non-infra elements of the scheme. Under a 50-year contract a significant Capex would be needed to replace the non-infra elements of the scheme leading to increased financing challenges from a 3rd party delivery perspective, as well as to increased contractual complexity under a DPC model.

*** Higher gearing would also be expected to increase the costs of debt and equity.

VFM of DPC improves vs Mid-Case

VFM of DPC improves vs Mid-Case but remains more expensive

VFM of DPC deteriorates vs Mid-Case

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Section 4: Pyewipe Water Reuse for Non-potable Use

Section 4.1: Pyewipe Water Reuse for Non-Potable Use Technical overview

Scheme overview and description

The Pyewipe water reuse option is required to supply non-potable customers. This does not require the need to abstract and treat river water for non-potable demand to maximise existing resource in our East Lincolnshire WRZ. The scheme involves diverting effluent from our Pyewipe Water Recycling Centre (WRC), treating it at a new Water Reuse Treatment Work (WRTW) and distributing it to non-household industrial customers. The additional capacity made available by diverting the effluent is equivalent to 6 ML/d.

There are two main components of the scheme:

- SHB2a – Pyewipe Water Reuse for Non-Potable (Treatment)
- SHB2b – Transfer from Pyewipe to Non-Potable Network (Transfer)

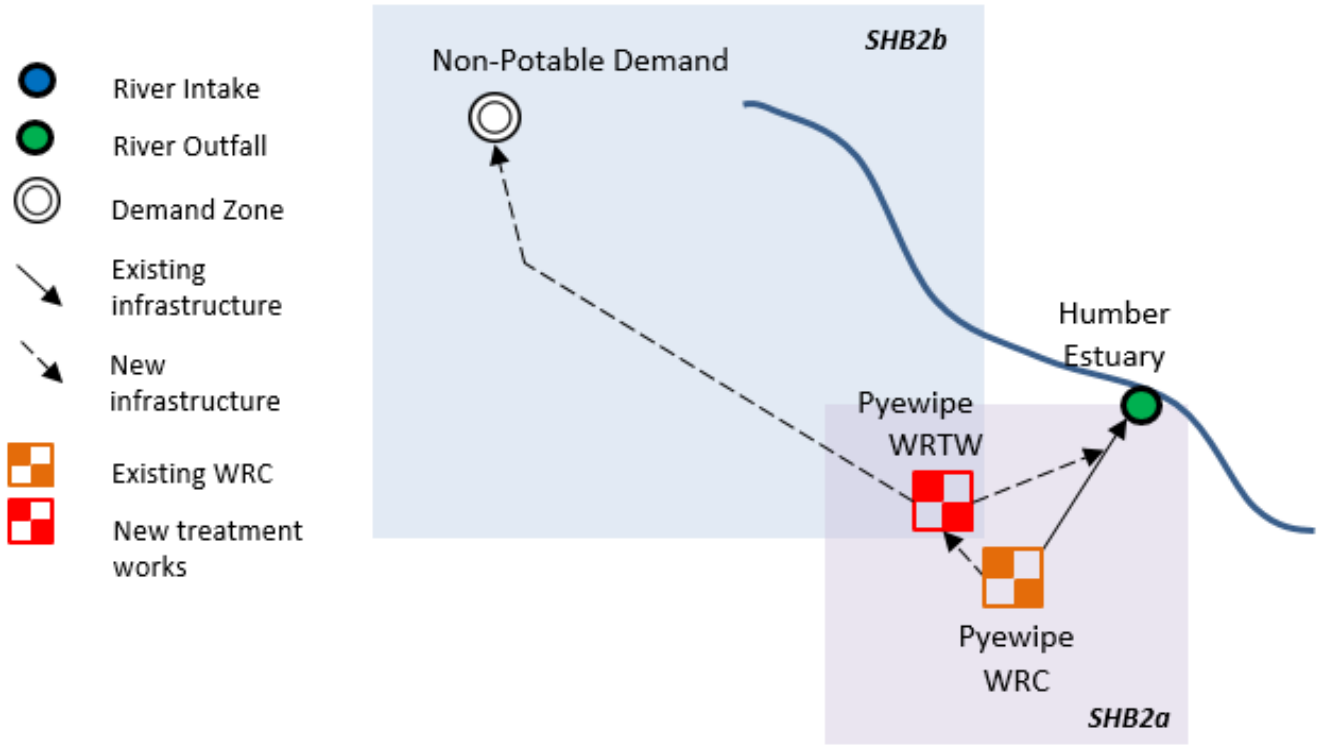
Key scheme attributes	
Wholelife totex (£m)	£90.3m (Capex: £51.4m Opex: £38.9m)
Targeted in use date	25/26
Construction period	3 years
Development period	2 years
Asset life	40 years

Scheme components

Asset	Dimensions
SHB2a Pyewipe Water Reuse for non-potable use (treatment)	• Nitrifying and Denitrifying BAFF • Fine Screening • Ultra Filtration Membrane • Reverse Osmosis • UV Disinfection • Treated Water Storage • Washwater & Sludge Treatment (e.g. washwater balance tank and washwater clarifier) • Chemical Dosing • Interstage Pumping Stations • Ancillary Equipment (e.g. onsite pipework, buildings, fencing)
SHB2b Pyewipe Water Reuse for non-potable use (transfer)	• Water Boosting (incl. standby generation) • Ancillary (e.g. fencing, roads) 18.5 Km total pipeline: • 16.0km length in field (900mm) • 1.8km length in field (1200mm) • 0.7km directional drill (incl. roads, rivers, railways and built-up areas)

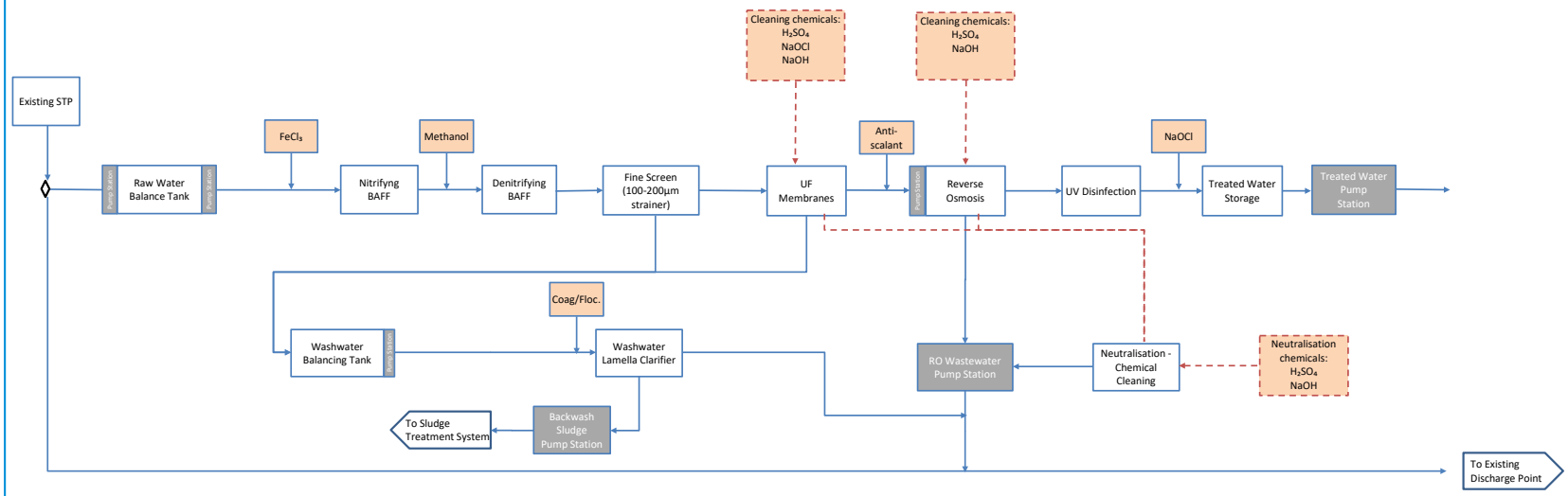
Section 4.1: Pyewipe Water Reuse for Non-Potable Use Technical overview: Schematic map

Detailed Schematic diagram of Pyewipe Water reuse for non-potable use Scheme



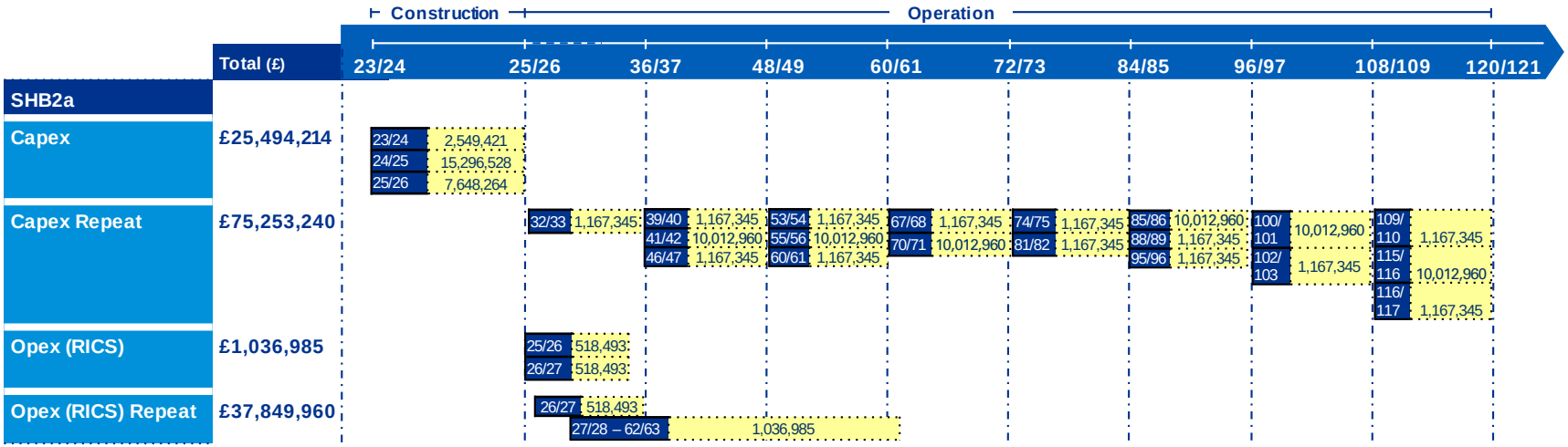
Section 4.1: Pyewipe Water Reuse for Non-Potable Use Technical overview: Process diagram

Detailed Process diagram of Pyewipe Water reuse for non-potable use Scheme (SHB2a)

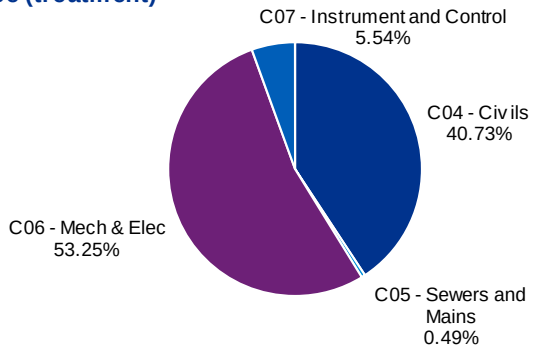


Section 4.1: Pyewipe Water Reuse for Non-Potable Use Cost projections

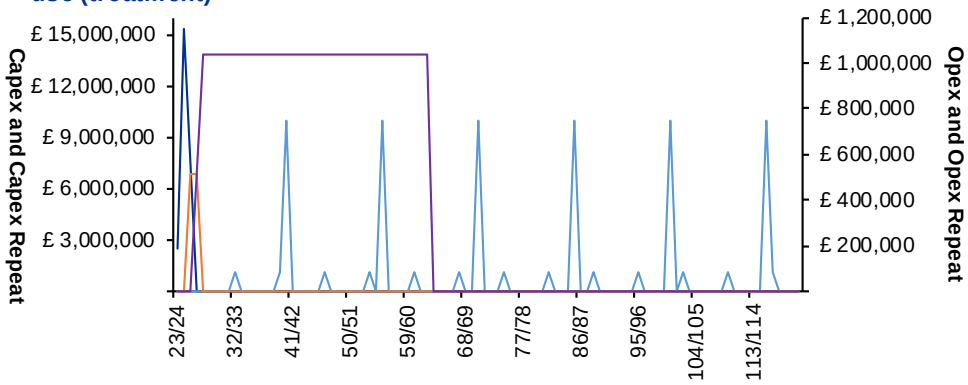
The cost structures of the scheme SHB2a are set out below. Costs are shown in 2017/18 prices.



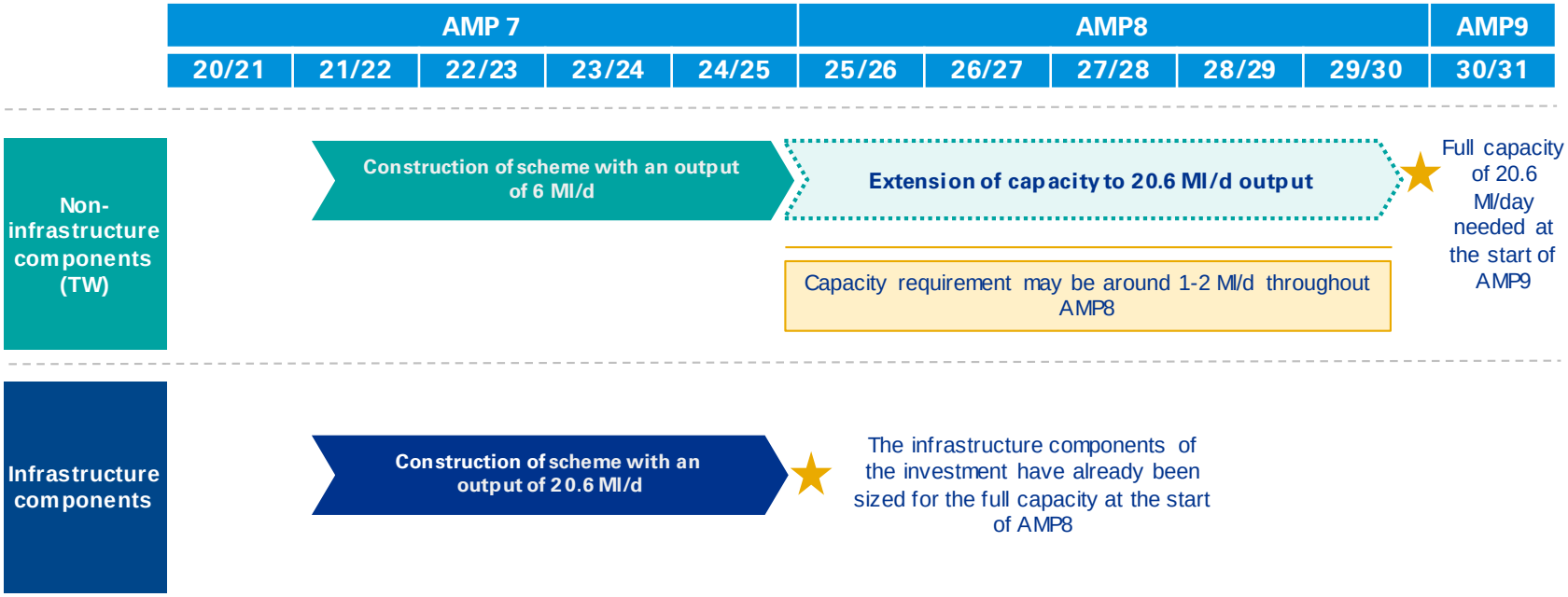
CAPEX by Component - SHB2a Pyewipe Water Reuse for non-potable use (treatment)



Capex and Opex - SHB2a Pyewipe Water Reuse for non-potable use (treatment)



Section 4.1: Pyewipe Water Reuse for Non-Potable Use Timeline to increase scheme outputs



- The phasing of the Pyewipe scheme is driven by one of the key principles in AWS' planning process, that existing resources are utilised before new resources are developed.
- Given full capacity at Pyewipe is not required until a much later period, at the start of AMP9, the non-infrastructure elements of the scheme will be constructed with an initially lower output requirement of 6 Ml/d and extended over AMP8.
- Based on the uncertainty around the output required during AMP8, there is still ambiguity with the Pyewipe solution as options are being evaluated to ensure that the solution represents the best value for customers and the entire scheme may be deferred until AMP8 as a result. We have made a commitment to continue to review alternative options to the Pyewipe scheme.

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Section 5: Transfer from Pyewipe to Non Potable Network Scheme

Section 5.1: Transfer from Pyewipe to Non Potable Network Scheme Technical overview

Scheme overview and description

The Pyewipe water reuse option is required to supply non-potable customers. This does not require the need to abstract and treat river water for non-potable demand to maximise existing resource in our East Lincolnshire WRZ. The scheme involves diverting effluent from our Pyewipe Water Recycling Centre (WRC), treating it at a new Water Reuse Treatment Work (WRTW) and distributing it to non-household industrial customers. The additional capacity made available by diverting the effluent is equivalent to 6 ML/d. There are two main components of the scheme:

- SHB2a – Pyewipe Water Reuse for Non-Potable (Treatment)
- SHB2b – Transfer from Pyewipe to Non-Potable Network (Transfer)

The scheme is sized for the full capacity at the start of AMP8.

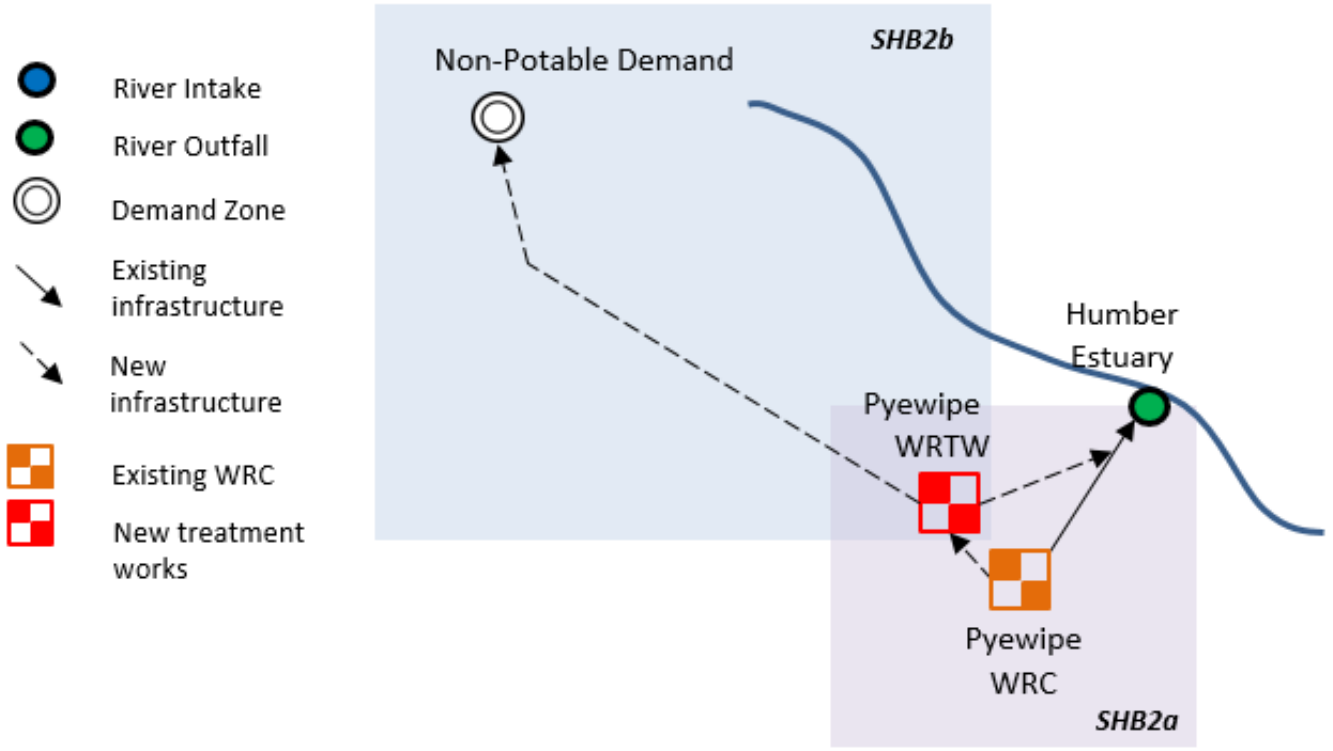
Key scheme attributes	
Wholelife totex (£m)	£39.7m (Capex: £29.8m Opex: £9.9m)
Targeted in use date	25/26
Construction period	3 years
Development period	2 years
Asset life	100 years

Scheme components

Asset	Dimensions
Water main	Specification and main subcomponents: • Rural component: depth of 900mm with a length in field of 12,421m • Urban component: depth of 1,200mm with a length in field of 1,814m • Both components have an internal diameter of 500mm • Crossings: 1 railways, 4 roads, 12 rivers, 1 built-up areas • Capacity: 20.6 Ml/d
Water boosting	Specification and main subcomponents: • Standby generation of 272 KW • Water Distribution Booster Civil and MEICA of 272 kW • Power: 2,083,897 kWh/year

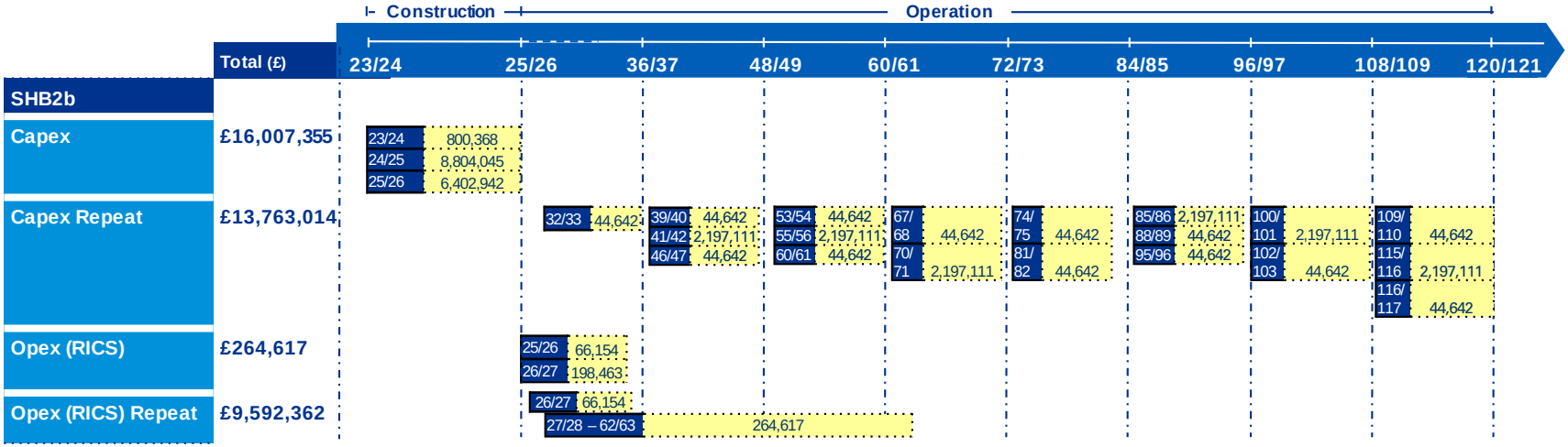
Section 5.1: Transfer form Pyewipe to Non Potable Network Scheme Technical overview: schematic map

Detailed Schematic diagram of Transfer from Pyewipe to non potable network Scheme (SHB2b)

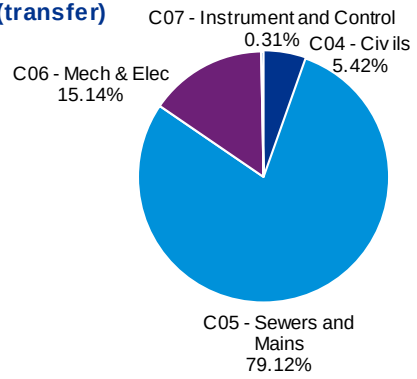


Section 5.2: Transfer from Pyewipe to Non Potable Network Scheme Cost projections

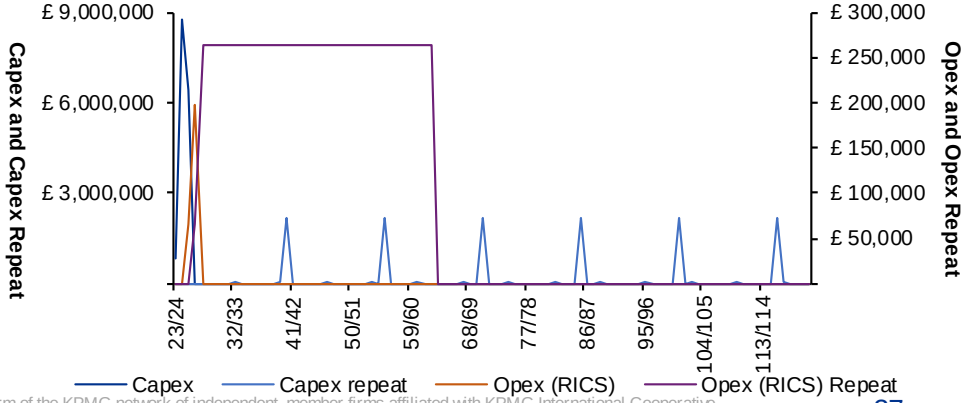
The cost structures of the scheme SHB2b are set out below. Costs are shown in 2017/18 prices.



CAPEX by Component - SHB2b Pyewipe Water Reuse for non-potable use (transfer)



Capex and Opex - SHB2b Pyewipe Water Reuse for non-potable use (transfer)



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Section 6: Pyewipe

Section 6.1: Pyewipe Treatment and Transfer Scheme Reasons for not combining the two Pyewipe schemes

The Pyewipe Treatment and Transfer Schemes are inherently different in nature and cost profile raising concerns around the deliverability of the aggregated scheme under a DPC model.

Risk profile	• As a general rule, infrastructure elements are characterised by inherently different risk profile than non-infrastructure elements. • While the transfer scheme is considered to be a relatively simple asset from construction and operational perspectives, treatment works involve complex operational processes. • As a result, the average expected return for a transfer scheme ranges between 1% - 2%, versus 6% - 10% for treatment works.
Capabilities of the supply chain	• The delivery of the treatment work and transfer scheme requires different set of capabilities from the supply chain. • Combining that with the different risk profiles of these two elements, bringing them together into one aggregated DPC project is likely to reduce the scheme's attractiveness in the market. • Limited interest from market participants can act as a major constraint on competition achieved through tendering. A reduction in competitive tension will adversely affect the potential benefits of the DPC route. • The supply chain may, however, consolidate their capabilities and enter the tender in consortia allowing participants to share the risk and manage the aggregated project in an efficient way.
Uncertainty	• The increase in costs for professional indemnity cover by 150% from 2018/19 introduces significant contractor risk and raises concerns around insurability of the project. • While the Pyewipe Treatment and Transfer Schemes represent the preferred option in the WRMP, in light of the responses received as part of the consultation, there is some uncertainty around the scheme and alternative options are being considered.

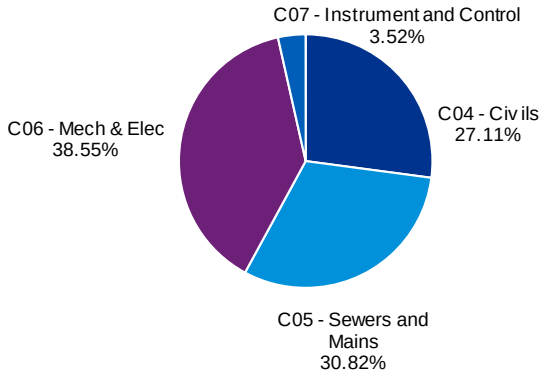
Section 6.2: Pyewipe Treatment and Transfer Scheme Cost projections

The cost structures of the scheme are set out below. Costs are shown in 2017/18 prices.

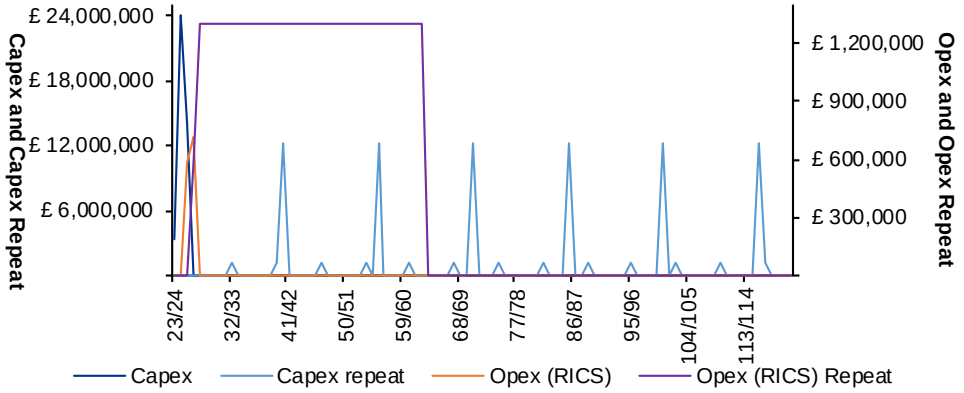
	Total (£) *	Construction / Operation	23/24	25/26	36/37	48/49	60/61	72/73	84/85	96/97	108/109	120/121
Pyewipe aggregated												
Capex	**£41,501,569**		23/24 3,349,789 24/25 24,100,573 25/26 14,051,206									
Capex Repeat	**£89,016,254**			32/33 1,211,987	39/40 1,211,987 41/42 12,210,071 46/47 1,211,987	53/54 1,211,987 55/56 12,210,071 60/61 1,211,987	67/68 1,211,987 70/71 12,210,071	74/75 1,211,987 81/82 1,211,987	85/86 12,210,071 88/89 1,211,987 95/96 1,211,987	100/101 12,210,071 102/103 1,211,987	109/110 1,211,987 115/116 12,210,071 116/117 1,211,987	
Opex (RICS)	**£1,301,602**			25/26 584,647 26/27 716,955								
Opex (RICS) Repeat	**£47,442,322**			26/27 584,647 27/28 – 62/63 1,301,602								

* The table takes into account cost projections over 100 years for both Pyewipe schemes

CAPEX by Component - Pyewipe aggregated



Capex and Opex - Pyewipe aggregate



Section 6.3: Pyewipe Treatment and Transfer Scheme Value for Money (VFM) Analysis: Mid-Case Assumptions

Value for Money assumptions used in modelling (Note: Assumptions based on those stated in DPC, IAP response from Ofwat)

Key assumptions		DPC	In-house	Comments
Profile	**Discount rate and period**	3.5% real decreasing over time from the start of spend		• The decreasing discount rate is based on HM Treasury Green Book. The level of discount rate drives how delaying revenues impact on the NPV of cost to customers. Where the social discount rate is lower than the project IRR (WACC), the delay in revenue recovery increases the NPV of customer bills under the DPC model (in-house delivery). • The period over which costs to customers are discounted and aggregated starts when expenditure incur, i.e. first year of construction and goes until the end of the asset's economic useful life in order to allow comparability between in-house and DPC delivery routes.
	Indexation	CPIH		• Indexation is in line with Ofwat Final Methodology of indexing new assets by CPIH.
Asset	**Asset depreciation method**	Straight line over 59 years		• Both under DPC and PR19 we are assuming straight line depreciation over the asset useful economic life. • Our approach to asset depreciation is consistent between DPC and in-house delivery. Under the Mid Case and we match the residual value under DPC at the contract life to the undepreciated asset value under the PR19. • Asset life was determined as the average across infrastructure and non-infrastructure components based on the Capex spent over the 25 year contract period.

Financing	**Cost of debt**	Construction: 3.87%
		Operation: 3.36%
		RCV bond: 3.27%
			PR19 WACC of 5.37% (nominal, pre-tax)	• The cost of debt assumptions are based on Ofwat's standard assumptions by applying the mid-point in the range set out for margin costs for each facility:
				  • Construction: LIBOR 6m 3Y, 4yr forward, swap + 230bsp
				  • Operation: Gilt 14Y, 7yr forward, swap + 130bsp
				  • RCV bullet repayment: Gilt 25Y, 7yr forward swap + 130bsp
				• The tenor of the underlying base rates for the facilities used under the operation period varies with the assumed contract length. Under each sensitivity the tenor of the RCV bullet repayment matches the length of the contract, while the tenor of operation facility changes to 12 years under a 20 year contract, and 20 years under a 40 year contract.
				• The underlying base rate for each facility was established as the average of daily rates over a period of 20 business days from 27 February 2019 to 26 March 2019, downloaded from Thomson Reuters Eikon.

Section 6.3: Pyewipe Treatment and Transfer Scheme Value for Money (VFM) Analysis: Mid-Case Assumptions (cont.)

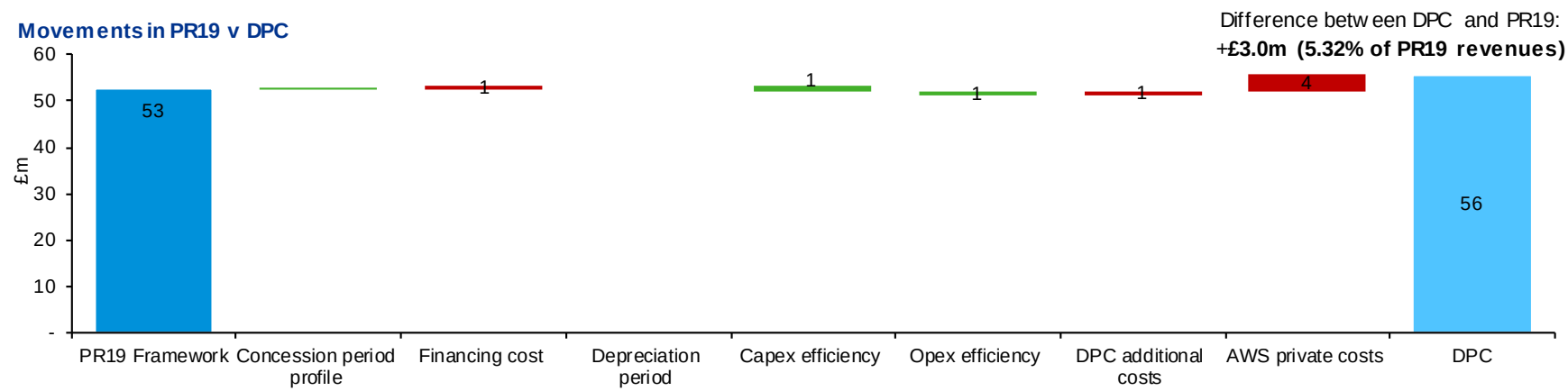
Value for Money assumptions used in modelling (Note: Assumptions based on those stated in DPC, IAP response from Ofwat)

Key assumptions		DPC	In-house	Comments
Financing (cont.)	**Cost of equity**	8% real	PR19 WACC of 5.37% (nominal, pre-tax)	• Cost of equity is set in line with Ofwat's standard assumptions. Assuming a 2% inflation 8% real EIRR equals a 10% nominal EIRR. • The WACC estimate is based on Ofwat's early view on the cost of capital for PR19 in Appendix 12 of the PR19 Final Methodology as published in December 2017. The WACC is 5.37% (nominal) assuming, that it is a new asset, and so CPI (H) indexation will apply to revenues.
	Gearing	85%		• In line with Ofwat's IAP guidance gearing is treated as an input in the model and set at 85% under the Mid Case.
	Debt cover ratio	DSCR of 1.25		• The model assumes that debt providers require a minimum Debt Service Coverage Ratio ('DSCR') under project loan underwriting process and gearing can be increased as long as the minimum DSCR is breached.
Costs	**Operating costs**	£33.1m Plus a 10% efficiency	£33.1m Plus a 6.99% efficiency	• Base expenditure profile and in-house efficiency for operating costs are based on investment planning expenditure forecasts for WRMP and PR19 provided by Anglian Water. • Total operating costs refer to the contract life of 25 years under the Mid Case. • Both efficiencies are applied on the base expenditure profile.
	Capital costs	£57.3m Plus a 10% efficiency	£57.3m Plus a 6.99% efficiency	• Base expenditure profile and in-house efficiency for capital costs are based on investment planning expenditure forecasts for WRMP and PR19 provided by Anglian Water in real terms (2017/18 prices). • Total capital costs comprise of initial Capex and renewal Capex over the contract life of 25 years and are expressed in real terms (2017/18 prices). • Both efficiencies are applied on the base expenditure profile.
	Procurement costs	1% of Capex	Na	• As per Ofwat's IAP guidance.
	Bidder costs	2% of Capex	Na	• As per Ofwat's IAP guidance.
	DPC contract mgmt.	£150k per year	Na	• As per Ofwat's IAP guidance.

Section 6.3: Pyewipe Treatment and Transfer Scheme Value for Money (VFM) Analysis: Mid-Case Results

The results of the VFM modelling comparing DPC to in house delivery are set out below.

Value driver analysis



Total costs to customers discounted to the start of construction (22/23)

VFM results

(£m)	Mid Case
NPV DPC	£55.6m
NPV In-house	£52.6m
NPV Difference	**+£3.0m**
Terminal value (real)	£33.4m 58% of Capex

Key findings:

- Under the Mid-Case assumptions DPC delivery model seems to be slightly more beneficial to customers than in-house delivery under the PR19 framework. The difference between the DPC and PR19 models is £3m in NPV terms representing a 5.3% saving over the PR19 costs.
- Financing under DPC becomes more expensive than the PR19 WACC mainly because (i) gearing is set at 85% and not optimised, and (ii) profile and level of renewal Capex result in high costs for lifecycle reserve account.
- The VFM analysis assumes 1% of Capex for procurement costs in line with Ofwat's guidance. These are, however, significantly understated given the small Capex requirement of the project and based on previous PFI experience they are more likely to range between 2% - 4% of Capex, making the DPC model overall even worse to customers.
- As residual value at the end of the contract under the DPC is assumed to match the undepreciated asset value under the PR19 framework, depreciation has no impact on the choice between the two models.

Section 6.3: Pyewipe Treatment and Transfer Scheme Value for Money (VFM) Analysis: sensitivities

We tested the impact of key inputs and assumptions on the results of the VFM under the Mid-Case scenario across a number of sensitivities as set out in Ofwat's IAP focusing on and summarised the results in the table below.

Results under the Mid-Case	+£2.956m	NPV of costs to customers under DPC minus NPV of costs to customers under the in-house delivery

Variables	Assumptions under different cases*			DPC compared with in-house NPV	
	Low	Mid	High	Low	High
Contact life (years)	20	25	40**	+£5.5m	+£9.3m
Depreciation rate (%)	25% faster	As per in-house	*Not specified*	+£3.0m	*Not specified*
Equity IRR, real (%)	10%	8%	7%	+£6.2m	+£1.3m
Gearing (%)	80%	85%	90%	+£5.5m	+£0.4m***
Capex efficiency (%)	5%	10%	15%	+£4.2m	+£0.9m
Opex efficiency (%)	5%	10%	15%	+£3.5m	+£2.0m
Procurement costs (% of Capex)	2%	1%	0.5%	+£3.6m	+£2.6m
Bidder costs (% of Capex)	3%	2%	1%	+£3.3m	+£2.6m
Contract mgmt. costs (annual)	£300k	£150k	*Not specified*	+£5.8m	*Not specified*

* Scenarios reflect Ofwat's assumptions in IAP 'Direct Procurement for Customers detailed actions'
** In line with the asset life of non-infra elements of the scheme. Under a 50-year contract a significant Capex would be needed to replace the non-infra elements of the scheme leading to increased financing challenges from a 3rd party delivery perspective, as well as to increased contractual complexity under a DPC model.
*** Higher gearing would also be expected to increases the costs of debt and equity.

VFM of DPC improves vs Mid-Case

VFM of DPC improves vs Mid-Case but remains more expensive

VFM of DPC deteriorates vs Mid-Case