PR24

NORTHUMBRIAN WATER living water | ESSEX&SUFFOLK WATER living water

A3-19 FIRST TIME SEWERAGE

NES33

TABLE OF CONTENTS

1. INTRODUCTION

This enhancement business case sets out the investment required to provide first time sewerage to three locations in accordance with section 101A of the Water Industry Act.

Local Residents or the Local Authority can make an application under Section 101A of the Water Industry Act for properties on private drainage to connect to a public sewer. Water companies are required to assess this application in accordance with the guidance set out by the Department of the Environment[1], which sets out the criteria and factors to be used for the assessment of cases to judge whether a public sewer should be provided in accordance with the legislation.

We intend to invest a total of £3.191m on capex and £0.098m on opex over the AMP8 period at three sites.

2. NEED FOR ENHANCEMENT INVESTMENT

2.1. ALIGNMENT WITH STATUTORY LEGISLATION

This business case is produced in accordance with the PR24 final methodology and our legal obligation under section 101A of the Water Industry Act 1991. The timing of investment dictated by our acceptance of an application. Table 1 summarises the requirements that must be met.

[1]Department of the Environment, June 2018, Statutory Guidance on sewerage undertakers' duty to connect properties to the public sewerage system under the Water Industry Act 1991 Section 101A

TABLE 1: GUIDANCE FOR S101A

Legislation	Description	Legal obligation	PR24 data tables enhanced category
Section 101A of Water Industry Act 1991	Duty of a sewerage undertaker to provide a public sewer to be used for the drainage for domestic sewerage purposes of premises in a particular locality in its area if the conditions specified in the subsection below are satisfied. (a) that the premises in question, or any of those premises, are premises on which there are buildings; (b) that the drains or sewers used for the drainage for domestic sewerage purposes of the premises in question do not, either directly or through an intermediate drain or sewer, connect with a public sewer; and (c) that the drainage of any of the premises in question is giving, or is likely to give, rise to such adverse effects to the environment or amenity that it is appropriate, having regard to any guidance issued under this section by the Secretary of State and all other relevant considerations, to provide a public sewer for the drainage for domestic sewerage purposes of the premises in question.	Required	First time sewerage

Source: Water Industry Act 1991

2.2. NEED FOR ENHANCEMENT EXPENDITURE IN AMP8

2.2.1 Process for identifying needs

For each of the three applications we have received, we have assessed them against the guidance set out by Defra and determined that they qualify as an S101A application. We have assessed if an existing domestic sewerage system which is not connected to the public sewer directly or indirectly adversely affects the environment. There must be two or more domestic properties, and they must have been built before 20 June 1995.

TABLE 2: LIST OF NEEDS S101A

Need name	Description	Root cause
s101A Allendale, Northumberland	Bridge End hamlet, nine properties formally applied for connection at the time of application (2006) – currently served by private septic tanks or directly discharges to the watercourse.	The current system comprises of the sewer installed by Allendale Parish Council, untreated discharges to the culvert, septic tanks with soakaways and septic tanks with discharges to the culvert. The Environment Agency received complaints from the public in 2003 about the presence of sewage, litter, and gross solids in the nearby watercourses. In 2006 the owners or occupiers of the nine properties formally applied for first time connection under Section 101A of the Water Industry Act 1991. The initial application was accepted and progressed but a feasibility assessment determined that the application would not be delivered. Since that time, a new homeowner appealed to the Environment Agency in 2022.
s101A Hagg Bank, Wylam, Northumberland	Five properties (collectively known as Railway Cottages) have formally applied for S101a – currently connected to a private failing septic tank that discharges directly to the River Tyne.	The existing private septic tank is in poor condition. These properties sit within a hamlet of 13 further properties which are connected to a public septic tank.

Need name	Description	Root cause
s101A Lartington Teesdale	Lartington village, a total of 64 properties require connection to the public network (six properties have formally applied for S101A).	The Environment Agency has been speaking to the owners of Lartington Hall about the septic tank located in the Hall grounds which a number of village properties utilise. The septic tank does not keep to General Binding rules and is non-permitted (illegal) discharge. Large volumes of surface water entering septic tank and having localised impact upon outfall. Sampling has shown high levels of Ammoniacal nitrogen, BOD and SS.
s101A AMP8 Planning future apps	A contingency sum for future 101A applications. We currently have 4 applications which are under review: • Kirkley Park Newcastle – 6-7 properties and 1 building from a Horticultural College. • Drumrauch Hall, Yarn – 15 properties • Hebron – 2 properties • Grange House and Ayton – 4 properties	To enable future S101A applications To enable initial investigations on future s101A applications received during AMP8.

Note: For Allendale, Hagg Bank and Lartington, formal applications have been received and validated and they meet the criteria for further assessment (buildings are all domestically used, applications all relate to more than two properties and buildings are understood to have been built pre-1995)

Source: Northumbrian Water

2.2.2 Overlaps with other investment programmes

We are not requesting enhancement investment for activities which were funded at previous price reviews. None of the proposed enhancement investment overlaps with activities delivered through base because we are providing first time sewerage to properties which were previously connected to private drainage. This means existing service to new customers.

There is one opportunity to provide a joint solution to address both a WINEP septic tank driver at Hagg Bank and a First Time Sewerage application received for five properties (Railway Cottages). Our optioneering has considered both separate and joint solutions, which is explained in section 3.3.2.

2.2.3 Link to long term strategy

This investment is needed as part of the 'protecting the local environment' investment area under our Long-Term Strategy (LTS) core pathway. We consider this is low/no regret investment because it is needed to meet statutory requirements in the 2025-30.

We have a legal obligation to deliver this investment as part of section 101A of the Water Industry Act. Local Residents or the Local Authority can make an application under Section 101A of the Water Industry Act for properties on private drainage to connect to a public sewer. Water companies are required to assess such application in accordance with the guidance set out by the Department of the Environment[2], which sets out the criteria and factors to be used for the assessment of cases

[2]Department of the Environment, June 2018, Statutory Guidance on sewerage undertakers' duty to connect properties to the public sewerage system under the Water Industry Act 1991 Section 101A

to judge whether a public sewer should be provided in accordance with the legislation. We therefore consider this investment is necessary in 2025-30 to deliver our LTDS.

2.2.4 Factors outside of our control

Local residents or the Local Authority can make an application at any time during the 2025-2030 period. We have included investment to review four applications which will require further investment in AMP8 at Hebron, Grange House and Ayton, Kirkley Park Newcastle and Drumrauch Hall Yarn.

2.3. CUSTOMER SUPPORT FOR THE NEED

These projects are all a consequence of statutory requirements, and so we have not discussed the specific needs with customers. That is because our research shows that customers expect us to meet our statutory obligations, and it is not appropriate to discuss delaying or phasing investment where there are no alternatives to meet the statutory requirement to provide first time sewerage.

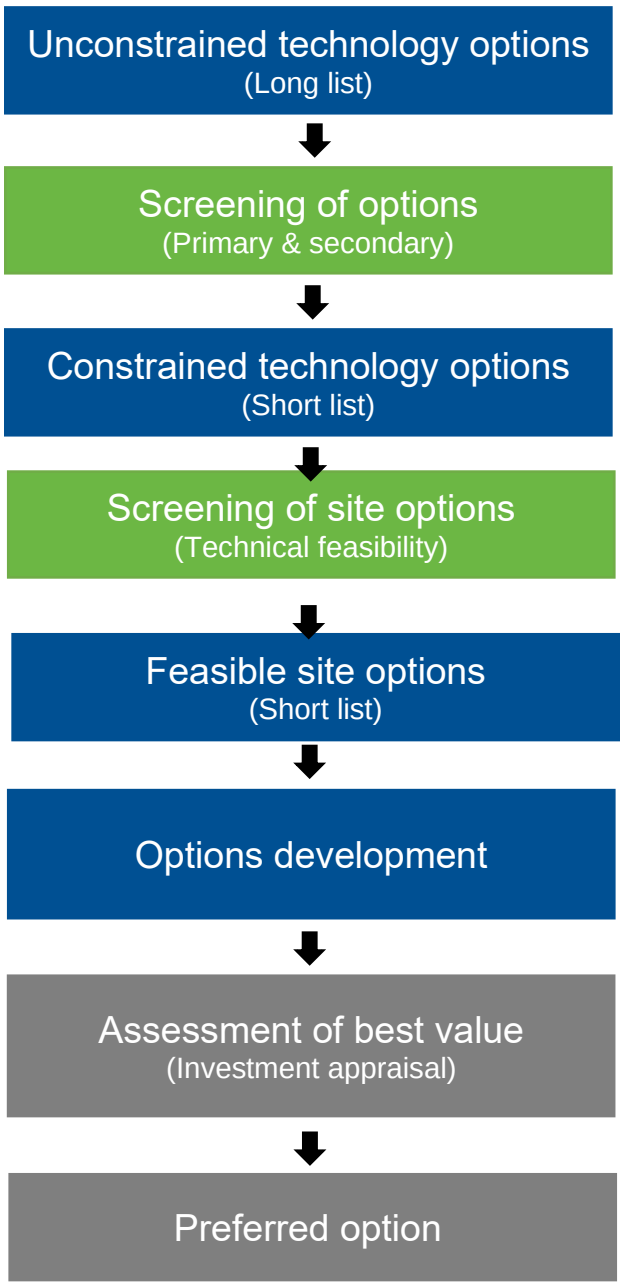
Our research shows that customers support investment in the environment, including wider environmental and social benefits – though they do not necessarily think they should always pay for this through their water and wastewater bills. In particular, our customers rank dealing with sewage effectively and improving the quality of rivers as two of their “medium” priorities (**prioritisation of common PCs**, NES44).

In our **qualitative affordability and acceptability testing** (NES49), customers supported our “preferred” plan which included this investment in first time sewerage. Customers found this plan acceptable because it focused on the right things, is good for future generations, and is environmentally friendly. Customers who did not find this plan acceptable said that this was expensive, and water companies should pay out of their own profits. We did not ask specifically about first time sewerage (as our individual items were limited only to the largest investments), but customers supported maintaining rivers and reducing pollution (NES49). Customers and stakeholders have repeatedly expressed their support for addressing raw sewage and illegal discharges, and this investment will help to eliminate the impact of unacceptable private sewage treatment and disposal in our areas. In our **quantitative research** (NES50), 74% of customers supported our preferred plan, including this investment.

3. BEST OPTION FOR CUSTOMERS

Figure 1 shows our process for identifying the best option for customers which is based on the principles of the HM Treasury, The Green Book: Central Government Guidance on Appraisal and Evaluation[3]. A full description of each of the steps and the output from it is contained in the following sections.

FIGURE 1: PROCESS FOR DEVELOPING AND FILTERING OPTIONS



Unconstrained list of technology options (section 3.1)

We have developed a broad range of potential technology options in accordance DWMP guidance.

Constrained list of technology options (section 3.2.1)

We have screened the unconstrained list of technology option against:
1) expected to meet statutory obligation, and
2) technically feasible in accordance

Where we have multiple options of a similar type, we have then used a proportional approach to screen out technology options which are obviously less natural capital benefits, higher costs, and higher carbon.

Unconstrained list of technology options for site options (section 3.2.2)

We have applied the constrained list of technology options to each of the septic tank sites and then screened this to make sure the technology is technically feasible to implement for first time sewerage (contributes towards the deliverability assessment).

For example, it is not possible to implement a gravity solution where the gradient does not allow it.

Options development (section 3.2)

We have developed scope to level 2. Our assessments are based on desktop assessments.

Assessment of best value (section 3.3)

We have carried out an assessment of benefits and net present value for each of the options from the constrained list at each site in accordance with PR24 guidance. Our approach is consistent with the way we have scored septic tanks in the WINEP septic tanks case.

Preferred option (section 3.2.2)

We have selected the preferred option and where we have not selected the least cost option we have explained why.

Source: Northumbrian Water

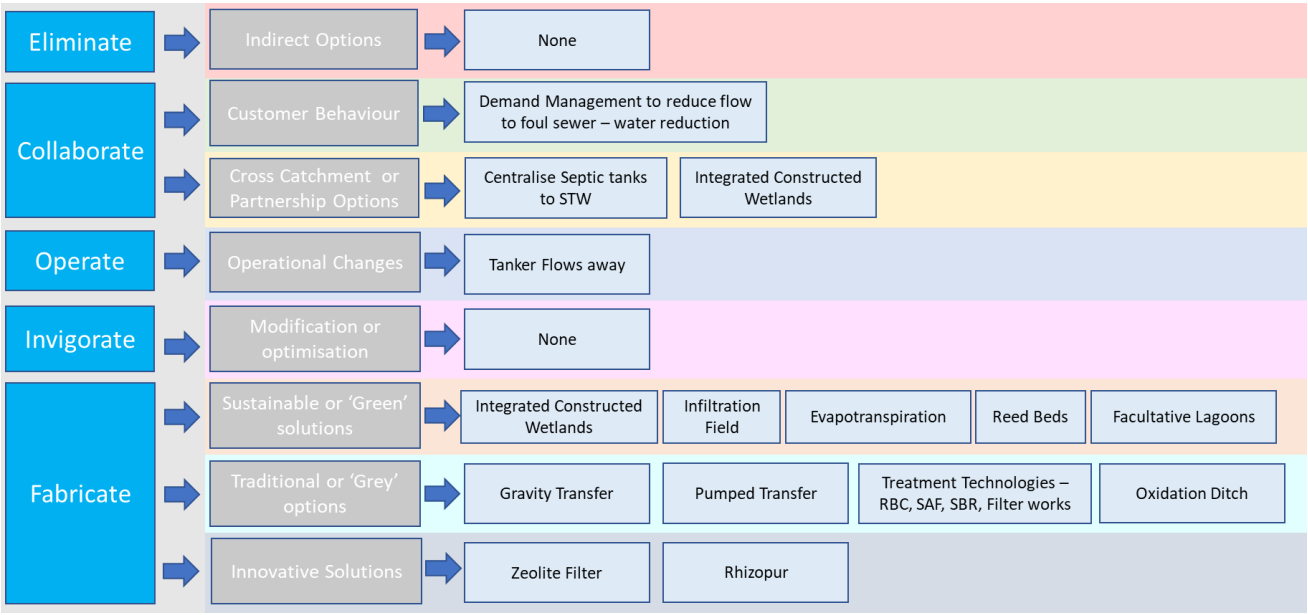
[3] HM Treasury, 2022, The Green Book, Central Government Guidance on Appraisal and Evaluation

3.1. BROAD RANGE OF OPTIONS

3.1.1 Range of options to meet the need

We have developed a broad range of options. As shown in
Figure 2, we have considered sustainable low carbon solutions such as integrated wetlands, infiltration fields, reed beds (vertical and secondary/tertiary treatment), evapotranspiration and facultative lagoons, which are combined with primary settlement from new septic tanks.

FIGURE 2: INTERVENTIONS FRAMEWORK CONSIDERING RANGE OF APPLICABLE INTERVENTIONS



Source: Northumbrian Water

Our broad range of options considers options with differing levels of costs and benefits categorised as follows:

- Eliminate - identification of processes and practices that can be stopped possibly by stakeholder management or other, and by challenging the need for existence. Eliminate options are not applicable to this investment case as we are only including cases where we have accepted an S101A application.
- Collaborate - work with stakeholders to re-assign the issue or co-fund. Costs can be shared with third parties either to deliver the same or an extra level of social and environmental benefit.
- Operate - improved operational management practices to enhance existing capacity – tankering is technically feasible on a short-term basis it is not considered a long-term viable option.
- Invigorate - invest in the existing infrastructure to improve performance. This is not a viable option for first time sewerage.
- Fabricate - new assets to augment or replace existing. These options are likely to have the highest costs. Green options will have lower carbon and potentially higher biodiversity and amenity benefits. Traditional grey options are likely to have highest certainty that service-related benefits will be realised. Innovative options have the potential for greater benefits and lower costs but have the lower certainty that benefits will be realised. We have considered options such as zeolite

filters, rhizopur and sequential bioreactors. All green fabricate options require sewerage collection and primary treatment in addition to the secondary treatment options listed above.

3.2. PRIMARY AND SECONDARY SCREENING OF OPTIONS

3.2.1 Primary and secondary screening of technologies at a programme level

We have carried out screening of the each of the options shown in

Figure 2 to make sure the option is:

- expected to meet the requirements under the statutory obligation to provide first time sewerage; and
- technically feasible (to implement the option)

If the option does not meet these criteria, then the option is discarded. The results and reasons for discarding interventions is shown in Table 3.

TABLE 3: PRIMARY SCREENING OF OPTIONS AGAINST NEED AND TECHNICAL FEASIBILITY

Option	Meets Statutory Obligation?	Technically Feasible?	Reason for discarding Allendale	Hagg Bank	Lartington
Continue business as usual	No	Yes	**Discarded –** does not provide first time sewerage in accordance with S101A of the Water Industry Act.		
Demand management to reduce flow to foul sewer. Water reduction	No	No	**Discarded –** does not provide first time sewerage in accordance with S101A of the Water Industry Act.		
Tanker flows away Tanker flows to another STW.	No	Yes	**Discarded -** does not provide first time sewerage in accordance with S101A of the Water Industry Act.		
Centralise septic tanks to STW Combine two or more septic tank sites into a new larger works to achieve efficiencies of scale.	Yes	No	**Discarded** – there are no other septic tanks within 1km.	**Carried forward** Considered with Hagg Bank WINEP drive.	**Discarded -** there are no other septic tanks within 1km..
Combine septic tank with Integrated wetlands Tertiary wetland to achieve increased biological treatment.	Yes	Yes	**Carried forward**	**Discarded –** no available land locally.	**Carried forward**
Sewerage Collection + primary treatment + Infiltration field Discharge of the septic tank to ground rather than surface water using an infiltration system.	No	Yes	**Discarded -** not compliant with general binding rules (flow > $2m^3$/day).		
Sewerage collection + primary treatment + Evapotranspiration Disposal of wastewater into the atmosphere through evaporation from transpiration from reed beds. Implemented in conjunction with reed beds.	No	No	**Discarded –** unproven technology in this configuration plus requires a significant land requirement (circa $91m^2$ for every one population equivalent).		

Option	Meets Statutory Obligation?	Technically Feasible?	Reason for discarding Allendale	Hagg Bank	Lartington
New Septic Tank + Reed beds – secondary or tertiary This would be in addition to converting the existing septic tank to primary treatment process.	No	No	**Discarded -** not confident it will achieve the standard.		
New Septic Tank + Facultative lagoons Waste stabilisation pond for biological treatment of wastewater This can be used instead of an integrated constructed wetland as land take is similar.	Part	Yes	**Carried forward**	**Discarded** -no available land locally	**Carried forward**
Gravity transfer Transfer flow to another STW using gravity.	Yes	Yes	**Discarded -** Not possible to transfer flows from the site under gravity transfer due to elevation of the site compared to receiving sewer systems.	**Discarded -** Not possible to do full gravity transfer flows due to elevation of the site compared to receiving sewer systems.	**Carried forward** Separation of flows, gravity sewer to Caravan Park and adoption of private SPS.
Pumped transfer Transfer flow to another STW using pumping.	Yes	Yes	**Carried forward** 1) Allotments to Allendale Town 2) Allotments to Thornley Gate 3) Mill to Allendale Town 4) Mill to Thornley Gate	**Carried forward** 1) Railway and Hagg Pond 2) Hagg Pond	**Carried forward** 1) Barnard Castle
Treatment technologies – Packaged STW – RBC or SAF Using rotating biological filter or submerged aerated filter or biological filtration.	Yes	Yes	**Carried forward**	**Carried forward**	**Carried forward**

Option	Meets Statutory Obligation?	Technically Feasible?	Reason for discarding Allendale	Hagg Bank	Lartington
Treatment technologies – Oxidation ditch Provide an oxidation ditch for secondary treatment	Yes	Yes	**Carried forward** from primary screening. **Discarded** from secondary screening. Oxidation ditches in all cases cost more to construct (more concrete) and operate (due to higher energy costs) than other packaged treatment technologies. In terms of natural capital, they have more embedded carbon due to more concrete and more operational carbon due to high energy use aerators. Benefits to water quality and other natural capital measures are the same as other traditional treatment technologies.		
Treatment technologies – sequencing batch reactor A type of activated sludge batching process that aerates a sewage/activated sludge mixture, settles, and then refills sequentially.	Yes	Yes	**Carried forward** from primary screening. **Discarded** from secondary screening. SBRs cost more to construct and have a higher energy requirement (higher carbon and higher opex costs) than other packaged wastewater treatment technologies and would deliver the same benefit to water quality.		
Zeolite filter Previously offered by a supplier, Zeolite was an innovative trial product based on a filter media used more commonly in Water Treatment.	No	No	**Discarded** – this is new and innovative and as yet unproved technology. In addition, it is likely to be of a higher cost to implement than other secondary treatment technology which means it would have been screened out through secondary screening.		
Rhizopur A combination of a trickling filter with infiltration beds planted with reeds.	No	No	**Discarded** – this is new and innovative and as yet unproved technology. In addition, it is likely to be of a higher cost to implement than other secondary treatment technology which means it would have been screened out through secondary screening.		

Source: Northumbrian Water

3.2.2 Options Development process/deliverability assessment

For each of the options we developed a list of scopes from our desktop assessments.

In the optioneering process we have made the following assumptions:

- Where a transfer solution is preferred, it is assumed that the site can be accessed easily, and the transfer solution designed from the existing private drainage.
- Where the site reviewed was determined urban, it is assumed that treatment options are not feasible due to construction, access/covers, kiosk/controls.
- Where a green space exists and a treatment option is determined feasible, it is assumed that a manhole can be constructed over the incoming sewer, a nominal pipework length allowed to and from the treatment process and a nominal pipework length allowed back to a manhole built over the outgoing sewer. It is assumed the outgoing sewer/outfalls are in adequate condition.
- If the site is in a green space, it is also assumed that biological filters, package sewage treatment works (STW) RBC and SAF, transfer by gravity or pumped, constructed wetlands and vertical flow reed beds are feasible options.
- If the site is in an urban space, it is assumed that transfer by gravity or pumped are the only feasible solutions.

3.3. BEST VALUE

3.3.1 Benefit scoring

For each of the technology options carried forward to this stage we carried out a benefits assessment using our value framework which contains performance commitments, wider environmental outcomes[4] and other metrics. Table 4 shows the range of benefits, the quantification and monetisation values we have used for the assessment of first-time sewerage options. These are primarily carbon impact (operational and embedded). We recognise that there may be some wider pollution benefit to local communities, but as these are not currently our assets they would not contribute towards a reduction in our pollutions. The area require for a wetland and vertical reed bed are very small and therefore the biodiversity an amenity benefits are negligible. The differentiators for this business case are carbon and cost.

All values in our value framework reflect PR19 values, but as they have been used consistently across options, they do not affect the choice of option.

[4]Environment Agency, March 2022, WINEP Options Assessment Guidance

TABLE 4: RANGE OF BENEFITS IDENTIFIED FOR FIRST TIME SEWERAGE

Value measures	Description	Unit	Value	WEO	Performance Commitment
Biodiversity net gain (negligible)	Change in biodiversity units (BU)	BU	Not monetised in VM	Yes	Yes
Amenity (negligible)	Amenity	Ha	-	Yes	No
Operational Carbon	t/CO2e /year	tCO2e	£256.2*	Net zero	Yes – GHG
Embedded Carbon	t/CO2e /year	tCO2e	£256.2*	Net zero	No

Note: *£ value per tonne of CO2e in 2025/26, annual increase (varying rate) reaching £378.6/t CO2e in 2024/55

** An annual value of £16,869 per km (£22,493 multiplied by an assumed confidence in level of 0.75) can be included in Copperleaf using a dummy model if externally calculated using the 'Benefits Assessment Tool'.

Source: Northumbrian Water

3.3.2 Cost benefit appraisal to select preferred option

For each of the technically feasible options we have carried out a robust cost benefit appraisal within our portfolio optimisation tool to select the preferred option. This calculates a net present value (NPV) over 30 years in accordance with the PR24 Guidance and a cost to benefit ratio for each option. The ratio is calculated by dividing the present value of the profile of benefits by the present value of the profile of costs over the appraisal period of 30 years.

Costs and benefits have been adjusted to 2022-23 prices using the CPIH Index financial year average. The impact of financing is included in the benefit to cost ratio calculation. Capital expenditure has been converted to a stream of annual costs, where the annual cost is made up of depreciation/RCV run-off costs and allowed returns over the life of the assets. Depreciation (or run-off) costs are calculated using the straight-line depreciation over the appraisal period. To discount the benefits and costs over time, we have used the social time preference rate as set out in 'The Green Book'.

TABLE 5: COST BENEFIT RATIOS AND PREFERRED OPTIONS FOR SEPTIC TANKS

Site Name	Option	Value NPV £M	Least Cost	Chosen Option
Allendale	Pumped Transfer to Allotments to Allendale Town	1.843	N	Alternative option
Allendale	Pumped Transfer to Allotments to Thornley Gate	1.691	N	Alternative option
Allendale	Pumped Transfer the Mill to Allendale Town	1.858	N	Alternative option
Allendale	Pumped Transfer the Mill to Thornley Gate	1.637	N	Alternative option
Allendale	Package RBC	1.628	N	Alternative option
Allendale	Package SAF	1.919	N	Alternative option
Allendale	Septic Tank + Facultative Lagoon	2.504	N	Alternative option
Allendale	Septic Tank + Integrated constructed wetland	2.568	Y	Preferred option
Allendale	Septic Tank + Vertical reed bed	2.415	N	Alternative option
Hagg Bank	Pumped Transfer railway and Hagg Pond	1.619	N	Alternative option
Hagg Bank	Pumped Transfer – north Hagg Pond	1.334	N	Alternative option

Site Name	Option	Value NPV £M	Least Cost	Chosen Option
Hagg Bank	Package RBC	1.884	Y	Preferred option in isolation from Hagg Bank WINEP
Hagg Bank	Package SAF	1.881	N	Alternative option
Lartington	Gravity sewer to caravan park	-0.500	N	Alternative option
Lartington	Package RBC	0.592	N	Alternative option
Lartington	Package SAF	1,317	N	Alternative option
Lartington	Pumped Transfer to Barnard Castle	-0.069	N	Alternative option
Lartington	Septic Tank + Facultative Lagoon	1.510	N	Alternative option
Lartington	Septic Tank + Integrated constructed wetland	1.611	N	Alternative option
Lartington	Septic Tank + Vertical reed bed	1.726	Y	Preferred option
Planning for future S101As	Planning for FTS future			Single option based on £100k per year

Source: Northumbrian Water

For all options we are selecting the least cost option. For Hagg Bank we have selected the joint solution which pumps flows from the private septic tank and our septic tank to a local gravity sewer approximately 200 metres to the west of Hagg Bank. This is the lowest cost option, when considering both options together. We have proportionally allocated the investment between the WINEP septic tanks and S101A driver based on the number of properties.

The benefits and investment for our preferred first-time sewerage are included in Table 6 and Table 7. Profiling of benefits and expenditure will continue to be refined as we continue to work with our strategic delivery partner to carry out further design work and optimisation of the programme for delivery.

TABLE 6: INPUTS FOR TABLE CWW15 – BENEFITS BEST VALUE OPTION

EA/NRW environmental programme	Benefit	Units	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
S101As	Operational carbon	t/CO2e		1.550	6.000	5.050	3.750	2.900
	Embedded carbon	t/CO2e		479.590[5]				

Source: Northumbrian Water

We plan to deliver three projects currently consisting of 20 properties. There are also currently 4 proposed applications for investigation.

[5] Embedded carbon will be reprofiled as part of the delivery process

TABLE 7: INPUTS FOR TABLE CWW3 - ENHANCED EXPENDITURE

EA/NRW environmental programme		2023-2024	2024-2025	2025-26	2026-27	2027-28	2028-29	2029-30	Total
S101As	Capex			2.791	0.100	0.100	0.100	0.100	3.191
	Opex				0.024	0.024	0.024	0.024	0.098
	Totex								3.290

Source: Northumbrian Water

3.4. THIRD PARTY FUNDING

No opportunities for third party funding have been identified for the chosen interventions because the nature-based solutions such as wetlands are very small and have been assessed as having a very minor environmental benefit. Therefore, they are unlikely to attract funding from third parties. We will continue to explore opportunities for third party funding in the delivery of the projects.

3.5. DIRECT PROCUREMENT FOR CUSTOMERS

We assessed our first time sewerage investments against the DPC guidance (see our **assessment report**, NES38). This report concludes there are no opportunities for direct procurement for customers relevant to first time sewerage because the projects are small value and less than <£200m of whole life totex.

3.6. CUSTOMERS VIEWS INFORMING OPTION SELECTION

The least cost option has been selected for all options. These are statutory obligations, so we have not consulted customers on individual solutions.

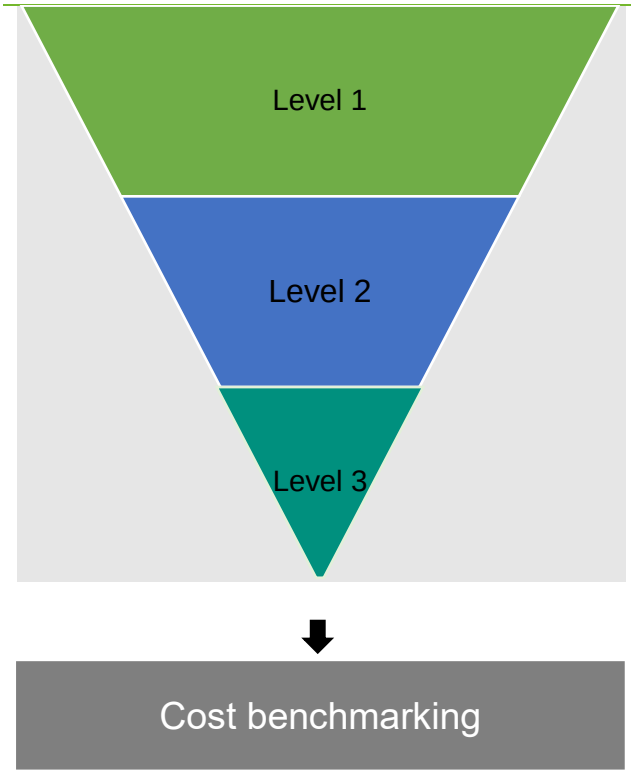
4. COST EFFICIENCY

4.1. APPROACH TO COSTING

4.1.1 Cost methodology

A full description of our costing methodology is contained in Appendix A3 - Costs (NES04). Figure 3 shows how our First Time Sewerage options have been costed to Level 2. As these are relatively small and low complexity projects, this level is appropriate for our business plan as it is sufficient to understand that the interventions can be delivered within the cost at a programme level. A level 3 estimate would require a level of detailed design to be carried out, which would incur significantly more cost and is not appropriate until delivery is confirmed.

FIGURE 3: PROCESS COST ESTIMATION



Level – 1 (confidence: – 50% to +100%)

Costing is carried out using our costing curves. Costing occurs at an overall asset level. For example, package plant or a pumping for a certain population.

Level – 2 (confidence: - 50% to + 50%) – Chosen approach

Costing is carried out using our costing curves. Costing occurs for each of the main items of scope. For example, the length of rising main and the size of the pumps.

Level – 3 (confidence: - 20% to +30%)

Detailed bottom-up cost of all items taking into consideration factors such as ground conditions.

Cost benchmarking

The cost benchmarking has been covered as part of the WINEP septic tanks case as the options are very similar. Further detail is provided in section 4.1.3.

Our costing has been carried out by our costing partners using our cost models, they have then been benchmarked against our costing partner's cost database and independently assured by PwC as they have been loaded into data tables.

4.1.2 Options providing cost efficiencies

We have identified one opportunity for efficiencies – and we have applied this at Hagg Bank, where one intervention will address the WINEP septic tank driver (see NES31) and an S101A driver.

4.1.3 Cost benchmarking NWL

We have not carried out separate benchmarking for first time sewerage projects as there are only three projects and the solutions are similar to those already benchmarked in the WINEP septic tanks case (NES31). For septic tanks we benchmarked direct costs for each of the key asset types and indirect costs against the cost curves for other companies in our costing partner's database. As there is no standard asset hierarchy used for costing across all companies, there are differences in what each company includes and excludes. For septic tanks our costing partner has benchmarked where it is possible to carry out an equitable comparison and this ranges between four and two other companies depending on the asset type, as shown in Table 8. A mean average of these companies has been used as the benchmark with a 25% percentile and 75% percentile provided as a suitable range.

TABLE 8: NUMBER OF COMPARATORS USED FOR BENCHMARK

Scope Item Analysed	Comparators Used for Benchmark	Data Points Per Curve	Total Data Points Per Benchmarked Item
Wet Well Sewage PS	3	181	543
Sewer - Rising Main	3	1,600	4,799
Sewer - Manhole	2	1,600	3,199
Power supply	2	1	2
Primary Tanks Desludging and Scrapers, Circular	4	184	734
Biofilter Tanks - (combined)	2	179	358
Humus Tanks Desludging and Scrapers, Circular	4	50	200
Sewer - Gravity	3	642	1,926
Vertical Flow Reed Beds	3	1	3
Soakaway	3	1	3
Total			**11,767**

Source: Northumbrian Water

We have selected six projects within the Septic Tank business case (9% of preferred options) at varying costs across the identified range of solution costs to compare against the industry position. Reviewing projects at varying ranges of value allows for interrogation of the costs produced at individual ranges of the curves and price data utilised in costing.

We have benchmarked on direct costs which are directly attributable to the project such as plant, labour material and equipment and on indirect costs which are related to design, site setup, professional support and other costs not directly related to the construction aspect of a project. Our indirect costs have been benchmarked as 63.4% of direct costs 10.46% below the industry average as describe in our Appendix A3 – Costs (NES04).

TABLE 9: BENCHMARK OF DIRECT COSTS FROM OUR SEPTIC TANKS BENCHMARKING

Investment Name	Option Type	Northumbrian £k	Benchmark £k	25%ile £k	75%ile £k	Delta* £k	Delta %**
Wyndon Burn St (Wyndon Burn House)	Pumped Transfer	£192,092	£196,825	£203,234	£265,556	-£4,733	-2%
Jarrow Bridge (Bede's World)	Pumped Transfer	£305,703	£302,017	£379,284	£505,948	£3,687	1%
Whickhope (Kielder)	Packaged Biological Filter	£545,465	£818,517	£764,778	£895,369	-£273,052	-33%
Rothbury St Caravan Park	Gravity Transfer	£85,141	£99,359	£88,283	£111,416	-£14,218	-14%
Horncliffe South	Vertical Flow Reed Beds	£129,917	£110,487	£102,432	£122,916	£19,430	18%
Fontburn 2 Reservoir House	Infiltration systems	£18,171	£14,186	£24,429	£30,907	£3,985	28%
Total		£1,276,488	£1,541,390	£1,562,441	£1,932,113	-£264,902	-17%

Note: * Delta = Northumbrian – Benchmark
** Delta % = Delta ÷ Benchmark
Source: Northumbrian Water

When taking into account both direct and indirect costs for the selected projects, Table 10 shows that we are 22% more efficient overall than our comparators. Our vertical flow reed beds, which are part of the solution we are proposing to instal at Lartington are slightly above the benchmark but are within the 25%ile banding that we would expect. We have implemented fewer of these types of solution in the past, so we would expect our cost benchmarking to be slightly higher for these types of assets.

TABLE 10: SUMMARY FOR SEPTIC TANKS INCLUDING INDIRECT COSTS

Investment Name	Option Type	Northumbrian	Benchmark	Delta*	Delta %**
Wyndon Burn St (Wyndon Burn House)	Pumped Transfer	£313,878	£342,199	-£28,322	-8%
Jarrow Bridge (Bedes World)	Pumped Transfer	£499,519	£525,086	-£25,567	-5%
Whickhope (Kielder)	Biological Filter	£891,290	£1,423,073	-£531,783	-37%
Rothbury St Caravan Park	Gravity Transfer	£139,120	£172,745	-£33,625	-19%
Horncliffe South	Vertical Flow Reed Beds	£212,284	£192,093	£20,191	11%

Investment Name	Option Type	Northumbrian	Benchmark	Delta*	Delta %**
Fontburn 2 Reservoir House	Infiltration systems	£29,691	£24,664	£5,027	20%
Total		**£2,085,782**	**£2,679,861**	**-£594,079**	**-22%**

Notes: * Delta = Northumbrian – Benchmark

** Delta % = Delta ÷ Benchmark

See our **septic tanks case** (NES31) for details of these septic tank projects.

Source: Northumbrian Water

4.1.4 Factors affecting cost allowances

There are no specific factors affecting cost allowances compared to other companies.

5. CUSTOMER PROTECTION

5.1. PERFORMANCE COMMITMENT

This enhancement investment does not deliver a specific improvement in pollution or treatment works compliance as this is a new statutory requirement. We expect to provide first time sewerage to 20 properties and investigate a further 28.

5.2. PRICE CONTROL DELIVERABLE

Our approach to determining Price Control Deliverables (PCD) is outlined in Section 12.3 of **A3 – costs** (NES04). In Table 11, we assess our first-time sewerage related enhancements to test if the benefits are linked to PCs, against Ofwat's materiality of 1%, and to understand if there are outcome measures that can be used.

TABLE 11: ASSESSMENT OF BENEFITS AGAINST THE PCD CRITERIA

Enhancement scheme	Benefits linked to PC?	Materiality	Possible outcomes?
Wastewater First Time Sewerage (NES33)	Pass – no link to performance commitments	Fail – <1%%	Number of properties connected to First Times Sewerage. Customers could be protected through an output measure based on delivery of schemes.

Source: Northumbrian Water

Our First Time Sewerage programme is dictated by the number of applications we receive from Local Residents and Local Authorities which are made under section 101A of the Water Industry Act. Our enhancement expenditure for this programme is smaller than the materiality threshold that Ofwat has set out for PCDs and could vary significantly from this forecast if there are more applications under section 101A of the Water Industry Act than we expect. Our forecasts include only current applications, and there are likely to be more during the 2025-30 period (which we are not including as enhancement expenditure).

Since these projects are uncertain and the investment is small, we do not propose a PCD for first time sewerage.