Affinity Water

# AFW139 Assurance of Enhancement costs and 3rd party benchmarking

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**Affinity Water**

AMP7 Assurance Provider framework

27th August 2024

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# PR24 ENHANCEMENT SCHEME COST BENCHMARKING

**AtkinsRéalis – Baseline**

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# 1. Executive Summary

This benchmarking report confirms that the Affinity Water approach of utilising historic cost data, market testing and obtaining specialist third party quotations demonstrates a sound proactive approach to cost planning.

In total £118.6m of proposed PR24 schemes, which was representative of the wider £160.6m value of schemes, underwent targeted cost assessment with £98.08m identified as making up the construction works element. To clarify, the benchmarking was exclusive of allowances for things such as business overhead and risk.

The benchmark analysis of over 82% of the data provided by Affinity Water indicates that the results are within the anticipated value range. The benchmarking of £98.08m showed that approximately 47% (£45.8m) of the Affinity Water rates were within 10% of the median anticipated market rates and the remaining 53% (£52.2m) was within the +/-10% to 30% proximity range to the median (upper quartile or lower quartile).

This value is further broken down as follows:

| PR24 Programme | Range | Value in Range (£/m) |
|---|---|---|
| SR AMP8 | Median +/- 10% | £35.33 |
| | Upper / Lower Quartile +/- 10-30% | £52.22 |
| Water Quality | Median +/- 10% | £10.53 |
| | Upper / Lower Quartile +/- 10-30% | £0.00 |
| | **Total** | **£98.08** |

Table 1 – Overall benchmark variance by programme type

In light of this cost benchmarking work, it has been concluded that the benchmarked construction cost data is within a reasonable alignment with anticipated market rates. When looking at total value benchmarked at a more granular level by overall programme case area, a clearer conclusion can be made:

- SR AMP8, raw cost data sits at £87.0m with our benchmarking sitting at £80.6m, within 7% to 8% variance
- Water Quality, raw costs data sits at £10.5m, with our benchmark sitting at £10.1m, within a 5% variance

# 2. Background and report structure

AtkinsRéalis has been engaged by Affinity Water to provide high level cost benchmarking on a number of identified schemes within the PR24 Business Plan Draft Determination (DD) submission to Ofwat. The focus of the exercise covered by this report is to provide Affinity Water with an assessment of confidence that the costs submitted are robust in-light of the recent response from Ofwat cost efficiency assessment. The PR24 programme schemes considered had a budget of £160.6m.

Affinity Water has assigned named projects within the PR24 plan to a programme category, dependant on the type of works being undertaken. These classifications are:

- Supply Interconnectors
- Raw Water Quality Deterioration

The table below summarises the total estimated budget value of the PR24 by case area:

| Scheme Name | Case Area | PR24 Submission |
|---|---|---|
| ST12 Markyate BPS | SR AMP8 | £2,561,247 |
| Ickenham to Harrow TM and New BPS | SR AMP8 | £23,969,329 |
| Heronsgate to Bovingdon TM + BPS | SR AMP8 | £29,731,675 |
| Kings Walden Resilience | SR AMP8 | £7,238,307 |
| Codicote Resilience | SR AMP8 | £3,301,782 |
| Redbourne Resilience | SR AMP8 | £2,844,098 |
| Kensworth Lynch Resilience | SR AMP8 | £3,758,352 |
| Improve Licence reliability in Area affected by SR AMP8 | SR AMP8 | £14,022,568 |
| WINEP WFD West Hyde ADO | SR AMP8 | £11,628,869 |
| WQ - PFAS - Blackford | SR AMP8 | £10,529,802 |
| Hadham to Silverleys + BPS | SR AMP8 | £14,393,247 |
| Silverleys to Dunmow + BPS | SR AMP8 | £26,559,821 |
| Blackford Group Treatment requirements - Blackford ADO | Water Quality | £10,103,034 |
| | **Total Value** | **£160,642,131** |

Table 2 - PR24 Submitted Summary Plan

# 3. Scope of Work

Affinity Water's planned enhancement expenditure has increased compared to previous AMPs, driven by new legal and regulatory obligations. Given the nature and scale of the programme, Affinity Water has identified specific programmes within the PR24 plan that have acceptable levels of data to enable AtkinsRéalis to conduct independent high-level benchmarking, focusing on the financial value of these schemes as shown in the table below:

| Scheme Name | Case Area | PR24 Submission | Non Factored PR24 Data | Budget Value Benchmarked | % |
|---|---|---|---|---|---|
| ST12 Markyate BPS | SR AMP8 | £2,561,247 | £2,561,247 | £0 | 0% |
| Ickenham to Harrow TM and New BPS | SR AMP8 | £23,969,329 | £23,969,329 | £20,731,552 | 86% |
| Heronsgate to Bovingdon TM + BPS | SR AMP8 | £29,731,675 | £29,731,675 | £25,231,628 | 85% |
| Kings Walden Resilience | SR AMP8 | £7,238,307 | £7,238,307 | £340,304 | 5% |
| Codicote Resilience | SR AMP8 | £3,301,782 | £2,965,000 | £1,965,000 | 66% |
| Redbourne Resilience | SR AMP8 | £2,844,098 | £2,544,000 | £2,544,000 | 100% |
| Kensworth Lynch Resilience | SR AMP8 | £3,758,352 | £3,375,000 | £3,375,000 | 100% |
| Improve Licence reliability in Area affected by SR AMP8 | SR AMP8 | £14,022,568 | £14,022,568 | £11,628,869 | 83% |
| Blackford Group Treatment requirements - Blackford ADO | SR AMP8 | £10,103,034 | £10,103,034 | £10,103,034 | 100% |
| WINEP WFD West Hyde ADO | SR AMP8 | £11,628,869 | £11,628,869 | £11,628,869 | 100% |
| Hadham to Silverleys + BPS | SR AMP8 | £14,393,247 | £0 | £0 | |
| Silverleys to Dunmow + BPS | SR AMP8 | £26,559,821 | £0 | £0 | |
| WQ - PFAS - Blackford | Water Quality | £10,529,802 | £10,529,802 | £10,529,802 | 100% |
| | **Total Value** | **£160,642,131** | **£118,668,832** | **£98,078,059** | **82.6%** |

Table 3 – PR24 Plan identified schemes and benchmarking value

To facilitate the cost benchmark, a Pareto Analysis was undertaken on the provided cost data. This was done to establish key costs/rates for benchmarking against expected industry rates. This analysis can be seen by the value represented in the 'Budget Value Benchmarked' column. Our Pareto / benchmarking process involved three core elements:

1. Reviewing and understanding of Affinity Water's cost models and calculations within the submitted values to Ofwat.

2. Undertaking high-level benchmarking of these projects, by our cost intelligence team and in house cost data, assessing against median and quartile ranges.

3. Confirming and responding to the Ofwat challenges in the Draft Determination, which set out a number of challenges and associated adjustments to Affinity Water's proposed enhancement expenditure.

External assurance of the cost estimation process used by Affinity Water is being undertaken separately and has not been reviewed as part of this benchmarking exercise.

# 4. Benchmarking and Analysis

## 4.1 Summary of Values

In the table below, heading" Budget Value Benchmarked" indicates the total construction cost value considered for benchmarking against each scheme based on the data provided by Affinity Water. The adjoining column shows this as a percentage of the value provided.

Items coloured in 'Green' represent benchmarked costs that either align with or are within +/- 10% of the expected / acceptable benchmark cost. Meanwhile, items coloured in 'Amber' correspond to benchmarked costs that sit within a variance of +/-10% to 30%, upper quartile or lower quartile, from the expected median range of benchmark cost.

Items highlighted in 'Grey', denote schemes where less than 50% of the data was appropriate for benchmarking.

| Scheme Name | Case Area | PR24 Submission | Non Factored PR24 Data | Budget Value Benchmarked | % |
|---|---|---|---|---|---|
| ST12 Markyate BPS | SR AMP8 | £2,561,247 | £2,561,247 | £0 | 0% |
| Ickenham to Harrow TM and New BPS | SR AMP8 | £23,969,329 | £23,969,329 | £20,731,552 | 86% |
| Heronsgate to Bovingdon TM + BPS | SR AMP8 | £29,731,675 | £29,731,675 | £25,231,628 | 85% |
| Kings Walden Resilience | SR AMP8 | £7,238,307 | £7,238,307 | £340,304 | 5% |
| Codicote Resilience | SR AMP8 | £3,301,782 | £2,965,000 | £1,965,000 | 66% |
| Redbourne Resilience | SR AMP8 | £2,844,098 | £2,544,000 | £2,544,000 | 100% |
| Kensworth Lynch Resilience | SR AMP8 | £3,758,352 | £3,375,000 | £3,375,000 | 100% |
| Improve Licence reliability in Area affected by SR AMP8 | SR AMP8 | £14,022,568 | £14,022,568 | £11,628,869 | 83% |
| Blackford Group Treatment requirements - Blackford ADO | SR AMP8 | £10,103,034 | £10,103,034 | £10,103,034 | 100% |
| WINEP WFD West Hyde ADO | SR AMP8 | £11,628,869 | £11,628,869 | £11,628,869 | 100% |
| Hadham to Silverleys + BPS | SR AMP8 | £14,393,247 | £0 | £0 | |
| Silverleys to Dunmow + BPS | SR AMP8 | £26,559,821 | £0 | £0 | |
| WQ - PFAS - Blackford | Water Quality | £10,529,802 | £10,529,802 | £10,529,802 | 100% |
| | **Total Value** | **£160,642,131** | **£118,668,832** | **£98,078,059** | **82.6%** |

Table 4 - PR24 Plan identified schemes outlining benchmarked values.

# 4.2 Benchmark Analysis

## 4.2.1 Direct Construction - CAPEX

The Pareto Analysis identified £98.0m of direct cost data, suitable for benchmarking. This represented 82% of the non-factored construction cost (£118.6m of identified schemes) and 82% of the PR24 Enhancement (factored) budgets of £119m.

The cost estimates in Affinity Water's PR24 Business Plan are made up of many individual items and sub-components. When reviewing the scope and build-up to the project estimates, queries were raised over the inclusions and exclusions of the corresponding cost models, as it was unclear what coverage the unit cost rates were based upon. Following consultation, it was agreed to assume that the models provided were an all-in unit rates, encompassing both direct and indirect costs. It was assumed that direct costs included but were not limited to: construction, lane rental, land purchase, easement, OH+P, delivery teams, design. The models provided were costed as a linear per metre rate for trunk mains, and cost per crossing at £/m. The price base was confirmed as mid-year 2022/23. Risk and corporate overhead uplifts were not considered as part of the direct construction benchmark review.

In summary the benchmark review of the direct construction cost established the following:

- SR AMP8 Schemes – The construction costs component reviewed was £87.5m, representing 74% of the PR24 submission value, £118.6m. The assessment identified that the value within acceptable range was £35.3m, representing 36% with the remaining value £51.8m, representing 63% of the value was in the upper / lower quartile, +/- 10 to 30% range. Examples for specific schemes include:
    - Ickenham to Harrow – The Scheme is between 10% and 15% over the benchmark, this could be attributed to the benchmarks used are in less urban areas with less costly laying compared to the nature of urban works Affinity undertake.
    - Heronsgate to Bovingdon – The Scheme is approximately 32% over the benchmark, similar observation with Ick-to-Har above, due to the length of the scheme, we have assumed work undertaken within type 3/4 road.
    - Codicote Resilience – The Scheme is between 5% and 10% under the benchmark, no clarity on the classification for sub-urban_180 method used, we have assumed works undertaken within type 3/4 road, which could be an overestimation.
    - Kensworth Lynch Resilience – The Scheme is between 20 and 25% under the benchmark, no clarity on the classification for sub-urban_280 method used, we have assumed works undertaken within type 3/4 road, which could be an overestimation.
    - Improve License Reliability – The scheme is less than 5% under the benchmark, and within the acceptable range, and deemed competitive for this type of work.
    - Blackford ADO and West Hyde – raw cost data sat within 5% under the benchmark and within the acceptable range.
- Raw Water Quality – The Construction costs component reviewed was £10.5m, representing 100% of the PR24 submission value. The assessment identified that the baseline was 5% over the benchmark and within the acceptable range.

We were unable to effectively benchmark the Booster projects within the time constraints.

### 4.2.2 Ofwat challenges Draft Determination

Raw Water Quality Deterioration

The table below sets out Ofwat's cost efficiency challenge. This challenge relates to absence of cost benchmarking. As stated earlier the report, of the benchmarking undertaken, £10.5m benchmarked (under case area Water Quality), typically fell within the +/-0 to 10% range, and such no concerns on the validity at this stage of the design.

| Enhancement assessment criteria grouping | Assessment comments | Criteria decision | % adjustment | Reference (e.g. document and page number) |
|---|---|---|---|---|
| Cost efficiency | Minor concerns: We have minor concerns whether the investment is efficient. The company provide no clear evidence how option costs were calculated and no clear cost comparisons to other industry benchmarks or external assurance. | Minor concerns | 10% | AFW14b - Enhancement investment cases.pdf, p21-22<br><br>AFW14b - Enhancement investment cases.pdf, p359-431 |

Table 5 – RWD Ofwat Challenge

Supply Interconnectors

No direct challenge has been made by Ofwat on the costs submitted.

Water Framework Directive

The table below sets out Ofwat's cost efficiency challenge. This challenge relates to efficiency of the recorded benefits in relation to £/m expended. As stated above, of the benchmarking undertaken, £87.5m was reviewed (under case area SR AMP8), and £35.3m typically fell within the +/-0 to 10% range, and £52.2m typically fell within the +/-10 to 30% upper / lower quartile range, and as such there are no concerns identified on the validity of the costings at this stage of the design.

| Enhancement assessment criteria grouping | Assessment comments | Criteria decision | % adjustment | Reference (e.g. document and page number) |
|---|---|---|---|---|
| Cost efficiency | **Some concerns:** We have some concerns whether the investment is efficient. The company does not provide sufficient and convincing evidence that the proposed costs are efficient.<br><br>For the three pipelines included in this programme, we tested the efficiency in the Supply interconnector model using the relevant variables of length (km) and benefit (Ml/d). Based on this benchmarking we concluded that the pipeline schemes were efficient. For the remainder of the cost request (non-interconnector component) we apply our cost efficiency challenge (20%), due insufficient evidence for cost efficiency as described above. This results in an overall 7.56% challenge. | Some concerns | 7.56% | AFW14a - Enhancement investment cases |

Table 6 – WFD Ofwat Challenge

| Company | Pipeline Name | Length (km) | Cost (£m) | Query Reference(s) |
|---|---|---|---|---|
| AFW | Harefield to Harrow interconnector | 10.70 | 28.628 | OFW-OBQ-AFW-090, OFW-OBQ-AFW-105 |
| AFW | Heronsgate to Bovingdon pipeline | 12.80 | 35.511 | OFW-OBQ-AFW-090, OFW-OBQ-AFW-105 |
| AFW | Local Replacement schemes WRZ3 | 13.76 | 23.534 | OFW-OBQ-AFW-090, OFW-OBQ-AFW-105 |

Table 7 – Efficient accepted schemes.

# 5. Conclusion

In light of this cost benchmarking work, it has been concluded that the benchmarked construction cost data is within a reasonable alignment with anticipated market rates. When looking at the overall programme case area:

- SR AMP8, raw cost data sits at £87m with our benchmarking sitting at £80.6m, within 7.8% variance.
- Water Quality, raw costs data sits at £10.5m, with our benchmark sitting at £10.070, within 5% variance.

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AtkinsRéalis Affinity Water PR24
Enhancement Cost Benchmarking Report
v2.1 - Client Issue
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AtkinsRéalis

**Affinity Water**

AMP7 Assurance Provider framework

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# PR24 ENHANCEMENT SCHEME COST ESTIMATION ASSURANCE

AtkinsRéalis – Baseline

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# 1. Background and report structure

AtkinsRéalis has been engaged by Affinity Water to provide technical assurance on aspects of the PR24 Business Plan Draft Determination (DD) response submission to Ofwat. The focus of the exercise covered by this report is to assure the cost estimates submitted in the Company's initial PR24 business plan for the enhancement schemes and programmes listed below.

The scope of work is addressed in Section 2 and our key findings are detailed in Section 3.

# 2. Scope of Work

Ofwat's Draft Determination set out a number of challenges and associated adjustments to Affinity Water's proposed enhancement expenditure. These were focused on three areas: need, best option for customers and cost efficiency.

This assurance exercise is focused solely on the last of these i.e. cost efficiency for the programmes/schemes set out below. The purpose of the exercise is to provide external assurance of the cost estimation process used by the Company for the following schemes/programmes:

- WINEP Water Framework Directive (WFD)
- Iver and Egham WTW's- Cryptosporidium
- Blackford PFAS
- Egham to Harefield Interconnector

External benchmarking of costs is being undertaken separately and has not been reviewed as part of this assurance exercise.

# 3. Key Findings

## 3.1 Summary and general comments

The cost estimates in Affinity Water's PR24 Business Plan are made up of many individual items and sub-components. This assurance exercise has trailed many but not all of the input costs as well as examining the general approach taken to cost estimation for each of the four enhancement programme/schemes being assured, looking at the approach to risk/contingency and the basis of unit costs for example.

Issues were flagged for further consideration through entry into an Issues Log for tracking and closure. We classified our findings into 'Red', 'Amber' and 'Green' categories. The definition for each category as follows:

- 'Red'. These are material reporting risks to the submission relating to either the methodology, the application of the methodology, the accuracy of the technical data and/or cost estimates.
- 'Amber'. These are significant issues either with the methodology, the technical data and/or costs that may represent a risk to the business.
- 'Green' signifies either no issues or relatively minor issues that are designed to provide continuous improvement to the submission.

During the assurance process a total of 20 issues were raised (17 Amber and 3 Green). All issues were categorised as Green by the end of the process except for one which is related to the reported pre- and post-efficiency expenditure as set out below.

**Summary of key findings and issues**

Our overall conclusion is that the approach taken to costing is generally reasonable given the stage of development of the projects. We have highlighted a number of the general issues and recommended a number of potential improvements in the following table.

We consider that the cost estimation process will be further strengthened by the cost benchmarking process being carried out in parallel with this assurance exercise.

| Subject | Assurance summary | |
|---|---|---|
| | Methodology/ data | Findings |
| Application of efficiency/real price effects | Amber | The cost estimates for each enhancement scheme reviewed have been derived without applying efficiency or real price effects (RPE). These have then been used to populate the Company's "Post Efficiency" figures in its submission.<br>This means that, in its PR24 tables, the Company's reported Post Efficiency expenditure is actually Pre-Efficiency. This also affects the reported Pre-Efficiency figures as these are back-calculated from the Post Efficiency numbers.<br>**This has the effect of reducing proposed AMP8 enhancement expenditure (both pre- and post-efficiency)** as the net effect of RPEs and efficiency is to make "post-efficiency" expenditure higher than "pre-efficiency". We found that this error has an impact of just under £5M or <1% of the programme because of the Company's proposed RPEs and efficiency levels[1] |
| Contingency / uncertainty allowance | Green | There appears to be a lack of guidance related to contingency allowances and the amount of contingency to apply is therefore left to cost estimators. That said, the levels of contingency applied appear reasonable to us and in some cases we consider it likely that they will result in cost underestimates. One of the schemes reviewed has already seen scope increases in excess of contingency allowances in the period since the submission.<br>We suggest it would be useful for Affinity Water to consider undertaking a structured assessment of outturn cost v ex-ante cost estimates and provision of structured guidance to estimators to provide greater consistency and confidence in future cost estimation exercises. |
| Overheads / internal costs | Green | The approach to corporate overheads appears to be consistent. The same uplift is applied to all cost estimates.<br>However, there was some variability and uncertainty in the application of internal project delivery costs, with some scheme estimates incorporating them and others not. This may be reasonable as it depends on the source of the costs. However, it would be useful to have a clear position and guidance as individuals were not always clear on whether it should be included and at what level. Given that it has only been applied to a number of schemes this risks being a missing cost i.e. leading to under-estimates. |
| Non infrastructure costings | Green | There is lower confidence in non-infrastructure than in infrastructure cost estimates. Non-infrastructure estimates rely on a mix of approaches including scaling from similar projects at different stages of development, consultant reports and supplier estimates. We consider this to be an industry wide challenge but suggest that it would be useful for Affinity Water to create a structured library of information to increase the confidence in the consistency of cost estimates in future. |

The following sections summarise the assurance of the approach to cost estimates for each of the proposed enhancement programmes/schemes.

[1] This can be seen by the fact that "Pre Efficiency" AMP8 enhancement totex in CW3 is £694.3M compared to "post efficiency" spend of £699.2M in ADD2

## 3.2 WINEP Water Framework Directive (WFD)

We reviewed the approach to costing of these schemes which Ofwat looked at under a category called 'WINEP Water Framework Directive (WFD)':

- River Restoration & Catchment Management schemes (£16.7M, all treated as opex):
  - River Beane
  - River Colne
  - River Dour & Little Stour
  - River Upper Lee
  - River Great Ouse
- Sustainability reductions capital schemes (£125.0M of capex and £0.4M of opex) of which the following capex:
  - £74.8M of "trunk main" schemes:
    - £28.6M for Ickenham to Harrow
    - £25.5M for Heronsgate to Bovingdon
    - £7.6M for Hadham 10 ML Cell and
    - £3.1M for ST12 Markyate BPS)
  - £28.2M of "ADO relocation" schemes
  - £20.5M of local reinforcement schemes
  - £1.5M of site schemes/"no deterioration reductions" schemes i.e. local schemes to improve licence reliability in areas affected by sustainability reductions.

In its Draft Determination Ofwat's concluded that three pipeline schemes[2] were efficient and therefore excluded £87.67M from its 20% cost efficiency challenge.

### 3.2.1 River Restoration & Catchment Management schemes

We understand that following consultation with regulators, Affinity Water phased the delivery of the programme of river restoration and catchment management activities it had initially proposed to deliver in AMP8 over a longer period covering AMP8 & AMP9. The costings which form the basis of its PR24 submission therefore represent a five-year slice of the ten-year costed programme.

We also understand that the scope of the activities to be delivered are not yet defined as they will need to be agreed with stakeholders in the optioneering process. This is especially the case for new rivers in which the Affinity Water has not previously carried out work. There is therefore significant uncertainty in the scope of work which is reflected in the high-level approach taken to cost estimation.

Our view is that the approach to cost estimation appears reasonable given the state of development of these activities. There is significant uncertainty in the exact scope of work to be delivered. Affinity Water has used historical outturn unit costs for the major cost areas which we consider good practice.

### 3.2.2 Sustainability reductions capital schemes

We consider that the cost estimation process is reasonable. The extensive use of the unit cost database for pipelines increases the confidence in these estimates. There is no empirical basis for the 10% risk allowance adopted across the programme. However, as can be seen in the discussion in Section 3.4, it is common for challenges to emerge which increase the units (e.g. pipe length) which need to be delivered by more than this figure.

[2] Harefield to Harrow interconnector, Heronsgate to Bovingdon pipeline and Local Replacement schemes WRZ3 according to 'Inputs_Interconnector Queries' of Ofwat's model 'PR24-DD-W-Water-Framework-Directive'

## 3.3 Raw water deterioration

We reviewed the approach to costing of three schemes grouped into two programmes by Ofwat:

- Iver and Egham WTW's Cryptosporidium
- Blackford PFAS

### 3.3.1 Iver and Egham Cryptosporidium

Affinity Water estimates totex for both schemes of £61.3M. This includes capital expenditure of £45.2M for Iver and £14.1M for Egham and opex of £1.0M for each site.

Our view is that the approach taken is reasonable. There are necessarily a number of significant assumptions made in a bottom-up approach (such as the indirect cost uplift) for a project at this stage of development. The company has added further benchmarking to validate these estimates against more top-down data.

### 3.3.2 Blackford PFAS

The Company estimates a capital cost of £10.5M and opex of £0.3M in AMP8.

Our view is that the approach is reasonable for the stage of development of the project. The addition of a 30% uplift to the GAC filter system costs is not empirically based but we recognise that it is likely that further items of scope (unforeseen items, ancillary works etc) may emerge as the project develops.

## 3.4 Egham to Harefield Interconnector

We reviewed the approach to costing of the Egham to Harefield Interconnector.

We note that the costs of this scheme do not reconcile with the total in Ofwat's DD model. The Company thinks it likely that Ofwat has included the costs of both the Egham to Harefield and Egham/Chertsey/Walton DO schemes, but not the lengths and benefits of both. Our review is focused solely on the costs of the Egham to Harefield Interconnector.

At the time of the submission it was assumed that the pipeline would be 700mm diameter, have a length of 10.6km with eight crossings (four rail crossings and four major roads) and would require a 35Mld booster pumping station. The company estimates a capital cost of £61.4M and opex delta of £0.7M in AMP8.

Subsequent to the submission, the company has carried out further work on potential pipeline routes and found that the shortest feasible route is actually likely to be 11.9km and that 12 major crossings will be required rather than eight.

We consider that the cost estimation process is reasonable but may result in an underestimate. The project development work undertaken since the estimate was developed has already added a further 12% to the pipeline length, (i.e. more than the 10% risk allowance) as well as 50% more major crossings. Many of the costs of previous crossing projects have been excluded from the costs used in the estimate suggesting that they will be underestimates. It is also understood that the example project from which the booster pumping station cost has been derived is now under contract and has seen costs increase by approximately 30%.

It is not surprising to us that the cost per km of this project is higher than other companies' inter-connector submissions given the congested location of the proposed pipeline in the vicinity of Heathrow airport with many major roads and railways. Given their effect on costs we recommend highlighting the cost of the crossings as a separate cost element as well as providing details of the updated pipeline length in Affinity Water's DD response.

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# AMP7 Assurance Framework

## PR24 WINEP Assurance Report

### Affinity Water

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5202817 / CW / OUT / 248

# Notice

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Atkins assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 12 pages including the cover.

## Document history

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Document reference: 5202817 / CW / OUT / 248

| Revision | Purpose description | Originated | Checked | Reviewed | Authorised | Date |
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| 01 | Interim report | CW | JAJ | N/A | JAJ | 12/11/2022 |
| 02 | Final report | CW | N/A | JAJ | JAJ | 29/11/2022 |
| | | | | | | |
| | | | | | | |

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# Assurance Statement

Atkins has been engaged by Affinity Water to provide independent assurance on its PR24 WINEP submission.

Our scope agreed with the Company has focused on satisfying three areas:

1. Overall compliance of the WINEP to the overarching guidance and requirements.
2. Driver specific compliance of the options development with the relevant driver guidance.
3. Assurance that identification of the preferred and least cost options is underpinned by an adequate evidence base.

Affinity Water has developed programme through a number of Business Cases. Each Business Case covers a number of individual WINEP actions, generally under multiple drivers. Initially, the Company developed a comprehensive approach, methodology and tools for Business Case leads to follow when preparing their options for each WINEP action. This methodology has been designed to ensure that the options are developed in line with the Options Development Guidance and this has been done effectively in our opinion. The Business Case template has been designed to ensure it contains all of the information that the Environment Agency (EA) requires to be submitted in the Options Development Report (ODR) which accompany each WINEP action or set of actions.

The methodology was also designed to ensure that options development was carried out with regard to the six overarching WINEP principles. The Company has considered multiple options for each driver and taken a proportional approach to the number of options that were taken through the options appraisal process. There is also evidence that catchment and nature-based solutions have been considered under multiple drivers. The Company has also demonstrated that it has taken a collaborative approach to options development where appropriate. Examples include working in collaboration with SE Water and Thames Water through the Thames Catchment Management Steering Group in development of schemes under the DrWPA driver, and stakeholder engagement to inform the schemes being developed for the Biodiversity Business Case and Water Resources Business Case.

The Company's methodology and options appraisal process that has been used to assess the wider benefits of the schemes is also compliant with guidance in our opinion. The benefits assessment has focussed on Biodiversity Net Gain and associated Natural Capital benefits, which aligns with the EA's recommended approach. The approach ensures that the contribution of the options to the wider WINEP environmental outcomes is quantified, and uses natural capital metrics to inform development of the options and selection of the preferred and least cost options.

In the majority of cases, Business Case leads have followed the methodology and used the available tools which has meant that there is a strong and well evidenced decision-making trail for the preferred and least cost options (and alternative options where applicable) for each action that will be proposed in the WINEP submission. An alternative screening and optioneering approach and tool have been used for the Sustainability Reductions schemes. This is considered reasonable in our opinion, and also provides a sound evidence base for selection of the preferred options.

Our assurance of the approach to costing of options focused on the Sustainability Reductions Business Case and the Colne Business Case for catchment and nature-based solutions and river restoration schemes. At an early stage in our assurance process we raised a number of challenges and risks around the approach to costing for these two Business Cases. The Company has since made a number of changes to their methodology and assumptions that underpin the costings and we are satisfied that the approach taken is now in line with the guidance.. Our review of the overall approach to cost development for the other Business Cases found it to be reasonable and well documented in our sample.

Following our initial review, we raised concern about the Company's proposal to produce a single Options Assessment Report (OAR) , a single action ID and associated line in the WINEP for the Biodiversity Business Case. The Company has since confirmed that each action will now have its own WINEP entry, and we are of the opinion that this approach is now in line with the EA's expectations and guidance.

Our review of a sample of Business Cases and data that has been used to populate the final OARs found that they provided good documentation of the evidence trail of the options appraisal and decision-making process that had led to the selection of the preferred and least cost options. It is our opinion that they contain the information that the EA requires to be submitted in the Options Development Report.

For some Business Cases, the implications of the driver code that has been selected and the risks associated with this were not fully documented at the time of the initial review. A risk register has now been developed for each Business Case showing how risks have been identified, managed and, where appropriate, communicated within the business.

Overall, we formed the view that the methodology and process that Affinity Water has developed and implemented to produce its PR24 WINEP submission is compliant with the overarching guidance and requirements. The specific WINEP actions in each Business Case have also been developed in line with the more detailed guidance for each driver. The overall approach and methodology that has been used to develop the costs of each option and assess the benefits of each option appears to be sound, and provides a good audit trail of the decision-making process.

We confirm that Affinity Water has provided us with full and transparent access to its systems and processes, including unrestricted access to all systems, files and documents that we requested from the Company. During the assurance activities, we had free access to the senior management of the Water Resources team and the full co-operation of the people responsible for preparing the WINEP submission.

| | |
|---|---|
| Catherine Wilson | Julian Jacobs |
| Technical Lead | Assurance Lead |

# 1. Scope of work

We agreed a scope of work with Affinity Water which satisfies the Environment Agency's requirements that external assurance is required, and should focus at a minimum on schemes that are:

- relatively costly;
- have a higher than usual associated delivery risk; and/or
- address a significant risk to the environment.

The assurance must provide confidence of each option's suitability and reliability and also that options have been developed in line with the relevant guidance including:

- the WINEP methodology;
- the WINEP options development and assessment guidance;
- the WINEP wider environmental outcomes metrics
- individual driver specific guidance; and
- regulatory position statements.

The scope of work was also designed to give assurance that:

- the process Affinity has taken to develop its WINEP proposals meets all the requirements that are set out in the Environment Agency's Options Development Guidance; and
- the proposals offer best value and are based on sound and robust evidence.

# 2. Approach

Our approach to providing assurance was based on:

- A high-level audit of the overall approach which focused on:
  - the general methodology that has been used to develop the options, and ensuring the appropriate guidance has been followed.
  - the data and processes that have been used to develop the costs for each option.
  - the data and processes that have been used to assess the wider environmental outcomes, changes in natural assets and how changes in ecosystem services have been measured and monetised.
- A detailed audit of a set of schemes under each of the identified drivers. This focused on ensuring that driver specific guidance has been followed options development has been carried out following the 6 WINEP overarching principles, and that the evidence trail that has led to the identification of the preferred and least-cost options is sound and documented. We prioritised schemes which are likely to be greatest cost, or are likely to be subject to a greater level of external scrutiny by regulators and stakeholders.

We were looking to confirm:

- Overall compliance of the WINEP to the overarching guidance and requirements
- Driver specific compliance of the options development with the relevant driver guidance.
- Assurance that identification of the preferred and least cost options is underpinned by an adequate evidence base.

# 3. General Comments on Governance, Processes and Reporting

We confirm that Affinity Water has provided us with full and transparent access to its systems and processes, including unrestricted access to all systems, files and documents that we requested from the Company.

During the assurance activities, we had free access to the senior management of the Water Resources team and the full co-operation of the people responsible for preparing the WINEP submission.

Affinity Water has been engaging actively with its Board on its WINEP submission and they have had sight of our findings.

# 4. Findings and Issues Raised During Audits

We classify our findings into 'red', 'amber' and 'green' categories. The definition for each category as follows:

- 'Red'. These are material risks with the submission, relating to either the Company's methodology, the application of the methodology and/or the accuracy of the data and/or costs underpinning the submission.
- 'Amber'. These are potentially significant issues that cannot be quantified and/or addressed and may create uncertainty or the risk in relation to this submission. They may relate to the methodology and/or data.
- 'Green' signifies either no issues or relatively minor issues that are designed to provide continuous improvement to the process but do not represent material or significant risks.
- TBC signifies that information is still outstanding.

## Compliance with options development guidance

**Table 4-1 – Findings in relation to overall compliance of the WINEP with the overarching options development guidance and requirements**

| Area of guidance | Findings | Methodology | Data |
|---|---|---|---|
| General methodology that has been used to develop the options | The Company has employed an external consultant to develop a comprehensive approach, methodology and tools for Driver leads to follow when developing their options. This methodology is very closely aligned to the Options Development Guidance and has been designed to ensure that the options are developed in line with the guidance. Key aspects include:<br>• the Business Case template, which contains sections which cover each of the steps in the Options Development Guidance and which has been designed to ensure it contains all of the information that is required for the Options Development Report (ODR);<br>• the Options Evaluation tool, which is used to screen options and develop the list of feasible options which are carried forward for detailed assessment; and<br>• the Cost Benefit Assessment tool, which is used to quantify the benefits associated with each of the feasible options and, when combined with the cost estimates for each option, is use identify the preferred option and least cost options. | Green | Green |

| | | | |
|---|---|---|---|
| | Although the Company have developed a good methodology and tools, and demonstrated evidence of training materials that had been used to share the approach with Driver leads, there was evidence from the scheme specific audits that the approach and tools were not being used by all Driver leads (see Table 4-3). | | |
| Data and processes used to develop the costs of options | The approach to costings was assessed across a number of schemes.<br>A number of queries about the approach to costing were raised into the schemes developed under the Colne Catchment Business Case, including the risk allowance, the costing of different scheme types and definitions of unit types. The review of the Sustainability Reductions Business Case schemes also identified some significant risks.<br>These issues and risks were addressed following the initial audits and we are now satisfied that the methodology and data are compliant with the guidance. Other scheme audits (e.g. the Water Resources Business Case, DrWPA Business Case) looked at the broad approach to cost development and found it was reasonable and well documented. | Green | Green |
| Data and processes used to assess the wider environmental outcomes, changes in natural assets and how changes in ecosystem services have been measured and monetised. | The overall methodology and approach used to assess the wider benefits of the schemes is compliant with guidance. However the process documentation needs further work as some aspects of the process are not fully documented (hence the Amber rating), though we do not consider this presents a risk in relation to the WINEP submission.<br>The benefits assessment has focussed on Biodiversity Net Gain and associated Natural Capital benefits, and this aligns with the EA's recommended approach. The approach to the calculation of benefits appears to be compliant with guidance. | Green | Amber |

# Overarching principles

**Table 4-2 – Findings in relation to how overarching principles have been considered throughout the option development process**

| Overarching principles | Findings | Methodology | Documentation and Data |
|---|---|---|---|
| **Environmental Net** Gain – Options should deliver quantifiable benefits to the environment and society and contribute to the wider WINEP environmental outcomes | The Company's process demonstrates the quantifiable benefits to the environment of each feasible option and the contribution of each option to the wider WINEP outcomes, through its Cost Benefit Assessment tool.<br>The process is not fully documented (hence the Amber rating), though we do not consider this presents a risk in relation to the WINEP submission. | Green | Amber |
| **Natural Capital** – Relevant natural capital metrics should be used to inform options development | Assessment of options against Natural Capital outcomes forms part of the screening process (using the Options Evaluation tool) to develop the constrained and feasible options lists from the unconstrained list during options development. The Cost Benefit Assessment tool considers Natural Capital metrics as part of the process of quantifying the costs and benefits of each of the feasible options and selecting the preferred and least cost option.. | Green | Green |

| Overarching principles | Findings | Methodology | Documentation and Data |
|---|---|---|---|
| **Catchment and nature-based solutions** – should be considered where feasible and appropriate | There is evidence that catchment and nature-based solutions have been considered under multiple drivers, including the Drinking Water Protected Area schemes, and schemes under the Biodiversity Business Case and Water Resources Business Cases. | Green | Green |
| **Proportionality** should be applied when developing options. | The Company have taken a proportional approach to the number of options that were taken through the screening process for each driver. For all schemes the Company have considered multiple options. | Green | Green |
| **Evidence** – the options development should be evidence based and transparent with an audit trail of decisions made | The Business Case contains sections which record the evidence and decision-making process that has been used throughout the options development.<br>The Options Evaluation spreadsheet tool provides a good audit trail of the process that has been used to screen options and generate the list of feasible options.<br>Cost spreadsheets have been used to record how the costs of options have been developed. Minor improvements could be made to ensure any assumptions are documented.<br>The CBA spreadsheet tool provides a good audit trail to demonstrate how the preferred and least cost options have been determined.<br>These tools do not appear to have been used by all driver leads when developing their schemes and as the Business Cases were generally still in draft form at the time of audits the decision-making process has not yet always been fully documented. | Green | Green |
| **Collaboration** – where appropriate options should be co-designed with stakeholders to maximise wider environmental outcomes. | The Company have demonstrated that they have taken a collaborative approach to options development where appropriate. Examples include working in collaboration with SE Water and Thames Water through the Thames Catchment Management Steering Group in development of schemes under the DrWPA driver, and stakeholder engagement to inform the schemes being developed for the Biodiversity Business Case and Water Resources Business Case. | Green | Green |

## Driver specific schemes

In total Atkins audited 5 Business Cases. Each Business Case covered a number of individual WINEP schemes, and each audit covered the overall approach to the development of the schemes within each Business Case as well as looking at data associated with specific scheme examples.

**Table 4-3 – Findings in relation to review of driver specific schemes**

| Type of schemes | Findings | Methodology | Documentation/ Data |
|---|---|---|---|
| Biodiversity Business Case<br>(INNS, NERC and SSSI drivers) | The Business Case is clearly underpinned by evidence, including signed off AMP7 investigations and significant stakeholder engagement. Option development is underpinned by a well-structured evaluation which is documented in the options evaluation spreadsheet. A sensible approach to costings has been adopted and it is well documented within the spreadsheets. | Green | Green |

| Type of schemes | Findings | Methodology | Documentation/ Data |
|---|---|---|---|
| Water Resources Business Case<br><br>(WFD_SW_ND and WFD_INV_WRFlow drivers) | This Business Case focuses on investigations so potentially carries a lower risk than other items requiring implementation of demonstrable environmental change. The methodology was found to be in line with the options development guidance and driver specific guidance. The evidence trail for options development is well documented.<br><br>. | Green | Green |
| Sustainability Reductions Business Case<br><br>(WFD_IMP_WRFlow and WFD_ND_WRFlow drivers) | At the time of the audit it was clear that significant work has been undertaken to date for these schemes. However the programme was still under development and there were a number of areas still requiring finalising.<br><br>We are satisfied that the tool and approach used to derive the constrained option list and select the preferred option is reasonable.<br><br>We are also satisfied that the risks associated with the deriving the cost estimates for each option, that were identified during our initial audit, have now been addressed and the Company's approach is now in line with the guidance. | Green | Green |
| Colne Business Case for catchment and nature-based solutions and river restoration schemes<br><br>(WFD_IMP_Flow, NERC_IMP, EDWRMP_IMP, WFD_GW_ND drivers) | At the time of our initial audit, we raised a number of questions about the approach to costing including the risk allowance, different scheme types and definitions of unit types. The benefits were also still being developed and hence the final cost benefit assessment and selection of the preferred and least cost options had not been completed. We are satisfied that these issues have been addressed and the preferred and least cost options are underpinned by a good evidence base. | Green | Green |
| Lower Thames/ Wey Business Case<br><br>DrWPA_ND driver | There was well documented evidence for the need for the scheme and evidence that the scheme meets the criteria for use of the ND driver for DrWPA schemes in areas where the driver has been previously used in an earlier AMP period..<br><br>Development of unconstrained options is comprehensive and in line with guidance on principles of proportionality, catchment and nature-based solutions and collaboration. The Company's decision-making process for developing the list of constrained and feasible options is sound and well documented and the Options Evaluation Tool provides a good audit trail.<br><br>The approach to costings appeared sensible and evidence based. | Green | Green |

# 5. Conclusions

We concluded that:

- The methodology that has been used to develop the options for each scheme, screen the options, assess the wider benefits of each option and select the preferred and least cost option is in line with the Options Development Guidance.

- Options development appears to have been carried out in line with the six overarching WINEP principles..
- The approach to costing of options was audited as part of two separate Business Case audits: the Sustainability Reductions Business Case and the Colne Business Case for catchment and nature-based solutions and river restoration schemes. A number of questions were raised about the approach to costing and missing cost elements during our initial audits. The Company have since made a number of changes to address these concerns, and we are now satisfied that the methodology and data that underpin the cost estimates are compliant with the guidance.
- In a number of audits, the implications of the driver code that has been selected and the risks associated with this were not fully documented. We understand that each Business Case now includes a risk register to capture risks and mitigations at a Business Case level. The Company have also developed a WINEP risk register which will be integrated into their wider PR24 process.

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**SUMMARY REPORT**

**IN RESPECT OF**

**PROPOSED NEW ENTRANCE AT**

**AFFINITY WATER EGHAM**
**57 THE CAUSEWAY**
**STAINES**
**TW18 3BX**

**DATE OF REPORT:**

**AUGUST 2024**

**Issue: 01**
**Ref: B3418/23/APH/aph**
**Date: August 2024**

## 1.0 INTRODUCTION

1.1 Focus Consulting have been instructed by Affinity Water to prepare a Summary Report to review costs for a potential separated vehicle access location to the existing Contractor Yard area at the eastern boundary of the Affinity Water Site at 57 The Causeway, Staines TW18 3BX.

An initial site inspection was undertaken on 10 March 2023 by Tony Hulejczuk of Focus Consulting together with Nigel Buckland of Affinity, Stuart Magowan of the Civil Engineering Practice and Paul Burgess of Lewis and Co Planning Consultants. During our site visit we were able to inspect the external areas and adjoining roads and buildings from ground level.

The site is located to the north of The Causeway (A308) in Staines. The site is surrounded by industrial and office buildings to the east, south and west and the River Thames and Holm Island to the north. The site is located within Flood Zone 3 as well as Strategic Employment Area.

The Local Planning Authority for the area is Runnymede Borough Council with Surrey County Council the local Highways Dept.

The Affinity Water Egham site is a secure site and contains both an area of enhanced security with all treatment areas, some offices and a Contractors Yard currently within this enhanced secure area and further offices and less sensitive administration facilities within the general secure areas.

## 2.0 CONSIDERATIONS

### 2.1 Summary of Requirements

The Contractors Yard is currently accessed through the enhanced secure area of the site. Access by the contractors is not required to the enhanced secure areas and Affinity Water, as part of their review and prior to increased security arrangements being brought into place by the Government to secure water treatment facilities, have identified that access to their contractors Yard area should not be through the enhanced security areas of the site.

The Civil Engineering Practice prepared an Options Appraisal that identified four potential locations to provide alternative access to the Contractors Yard. After consultation with the Client, Option 2 was identified as providing the most separation of Contractor Yard and Secure site.

The works identified within The Civil engineering Practice's Appraisal Option 2 will require the following works:

1. Forming a new entrance from the A308 Causeway directly into the Contractor Yard area at the eastern end of the site.
2. Forming a new bell mouth junction of up to 7.3m in width to accommodate maximum legal vehicles.
3. Incorporating a bund within the site boundary.
4. Adaptation of existing utility services that may require lowering to accommodate the new vehicle access.
5. Accommodating left and right turn manoeuvrers from a new junction.
6. Obtaining Planning Permission for the new access and a S278 Agreement with Surrey CC Highways.
7. Designing the entrance to accommodate maximum legal vehicles of sufficient width to allow concurrent two-way use of the junction.
8. Further works required within the site to separate off the Contractor Yard from the remaining facility with a new fence line between buildings and the southern site boundary.

Drawings of the proposed layout of the works is attached within Appendix B.

## 2.2 Estimated Costs

A cost estimate was provided by Adentsar Civils and Engineering Services Quantity surveying services who specialise in this type of work. Their budget figures have been reviewed and adapted to the specific anticipated requirements of the project.

The estimated cost of works included withing Appendix A total **£611,630.15** plus VAT.

This is a budget estimate of potential costs and to establish an accurate cost, we would recommend that the works be tendered under a suitable NEC or JCT contract to a number of suitably qualified Contractors once the design has been progressed to sufficiently detailed level.

## 2.3 Statutory Requirements

Town & Country Planning

The new vehicle access and associated ground works on land outside the ownership of Affinity Water will require planning consent. The success of a planning application will depend on matters relating to highway safety, flood risk and retaining the pedestrian route along the north side of The Causeway. Any groundworks or new fencing within the site are likely to be permitted development.

Highways

S278 Agreements to complete the works will be required together with works for the existing flood defence dyke. Further pre-application consultation with Surrey Highways should be undertaken to ascertain the likelihood of successfully reinstating the existing entrance or creating the new entrance.

Building Regulations Approval

A full plans Building Regulations application is likely be required to be submitted to either the Local Building Authority or an Approved Inspector.

Health & Safety

The CDM (Construction Design & Management) Regulations 2015 will apply to this project and suitable parties appointed to act in accordance with the regulations.

## 3.0 SUMMARY

The works identified within Option 2 of the Appraisal Report prepared by The Civil Engineering Practice have been reviewed and a cost prepared plan providing a Budget Estimate of **£611,630.15** plus VAT.

**Signed**  **Date:** 14/08/2024

**Anthony P Hulejczuk** BSc (Hons) MRICS
Director
Email: tonyh@focuscs.co.uk

**Focus Consulting**
The Dock Hub
Wilbury Villas
Hove
BN3 6AH

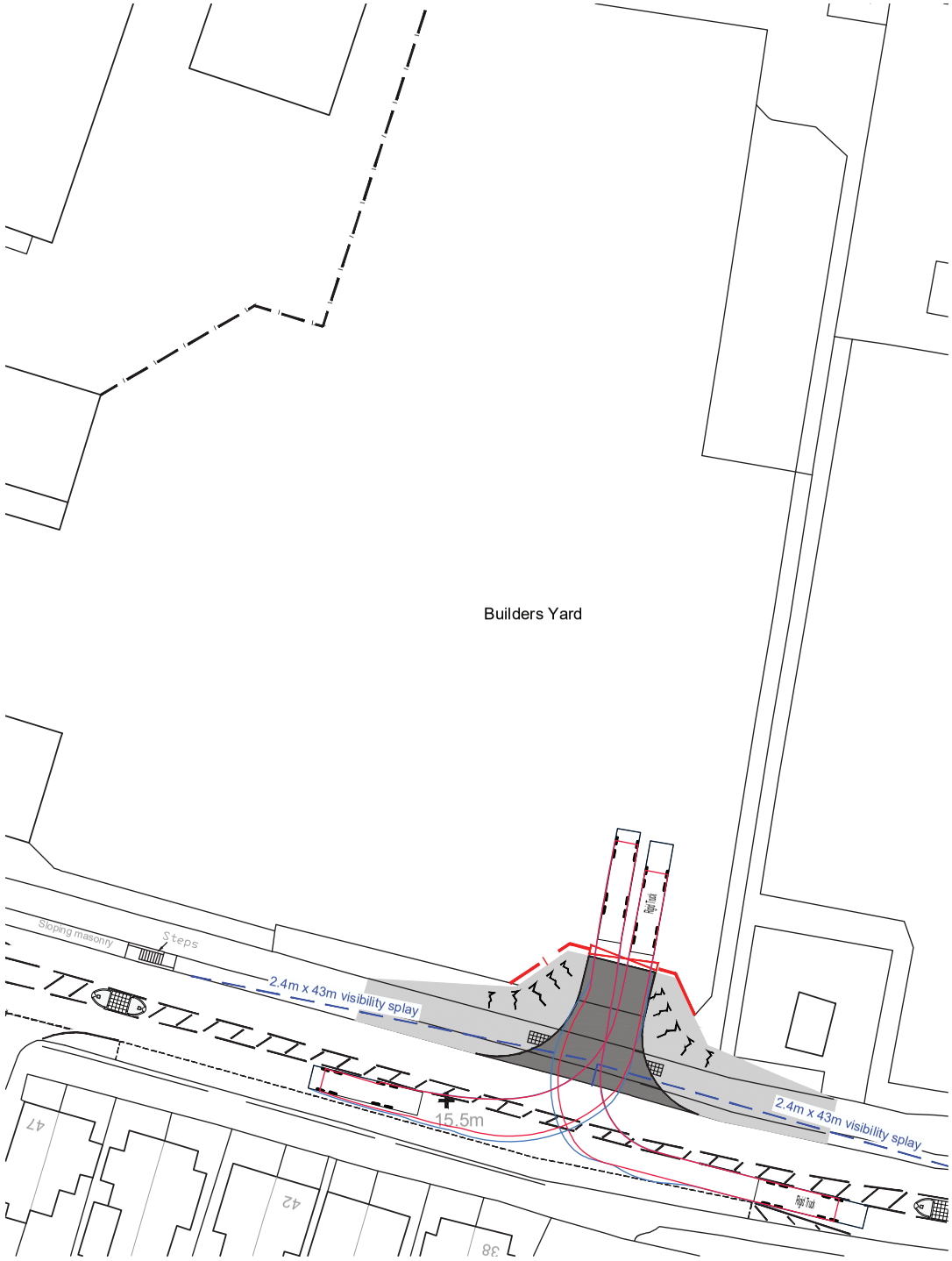
# APPENDIX A

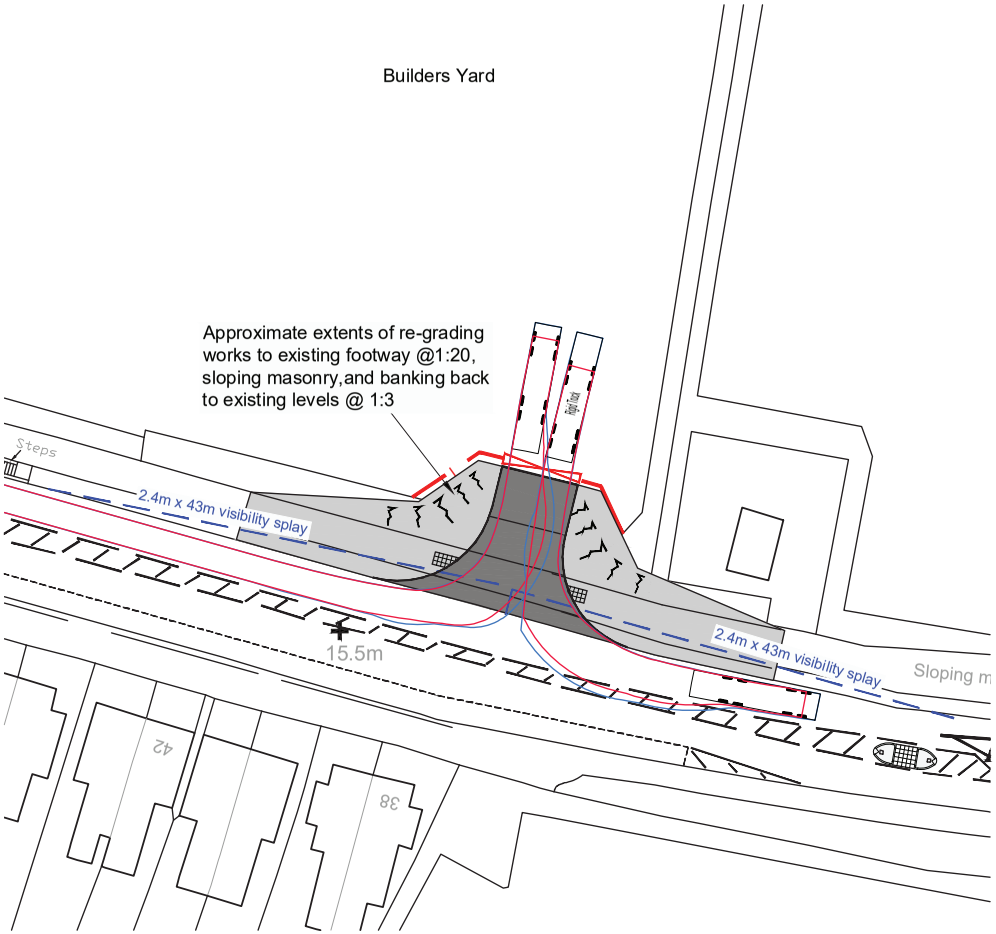
# ESTIMATED COSTS

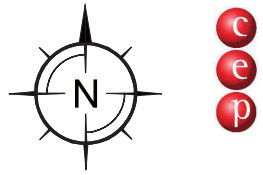
| Site Egham | Comments | Element | Unit cost (£) | Quanity | | Cost (CNI) | Cost (Base) | Options | |
|---|---|---|---|---|---|---|---|---|---|
| | Civils works to resurface Yard area<br>Contrctor Yard Plain off existing surfacing 40mm deep 2 days planer and removal of spill (m²) | 100% Yard area | 3.50 | 6,700 | m2 | | 23,450.00 | | |
| | | | | | | | | | 2 days planer and remove from site |
| | | 50% Yard area | | 4,500 | | | 15,750.00 | | |
| | | Minimum area to allow for grading of new entrance | | 1,000 | | 3,500.00 | | | |
| | Contractor Yard Lay 40mm of base course | 100% Yard area | 17.50 | 6,700 | m2 | | 117,250.00 | | |
| | | 50% Yard area | | 4,500 | | | 78,750.00 | | |
| | | Minimum area to allow for grading of new entrance | | 1,000 | | 17,500.00 | | | |
| | Formation of new entrance from Highway (S278 Works) | Install belmouth (part S278) works, earthworks, lower area, muck away, grading into yard | 200,000.00 | 1 | item | 200,000.00 | | | 125 - 250k depending on complexity |
| | | S278 Black top construction of 200mm surfacing, 150mm Type 1 and 400 mm 6f5 | 102.00 | 280 | m2 | 28,560.00 | | | |
| | | | 120.00 | 42 | m3 | 5,040.00 | | | |
| | | | 115.00 | 112 | m3 | 12,880.00 | | | |
| | | S278 Works Total | | | | | | | 246,480.00 |
| | | Lay topsoil 150mm thick | 125.00 | 60 | m3 | 7,500.00 | | | |
| | | Chain link fencing 1.8m high | 135.00 | 100 | lm | | | Basic Specification discounted | 13,500.00 |
| | | Double vehicle gates to suite | 5,000.00 | 1 | No. | | | Basic Specification discounted | 5,000.00 |
| | | Traffic Control | | | | 25,000.00 | | | |
| | | Lower LV cable (Provisional Sum) | | | | 35,000.00 | | | |
| | | Lower BT cable (Provisional Sum) | | | | 75,000.00 | | | |
| | | Preliminaries | | | | 67,646.70 | | | |
| | | Sub-total | | | | **£ 477,626.70** | | | |
| | | Highways Fees @12% of S278 works | | | | £ 29,577.60 | | | |
| | | Consultancy @ 10% of S278 | | | | £ 24,648.00 | | | |
| | | Revised total | | | | 531,852.30 | | | |
| | | Contingency @15% of total | | | | £ 79,777.85 | | | |
| | | **TOTAL ESTIMATED COSTS** | | | | **£ 611,630.15** | | | |

# APPENDIX B

# LAYOUT PLANS



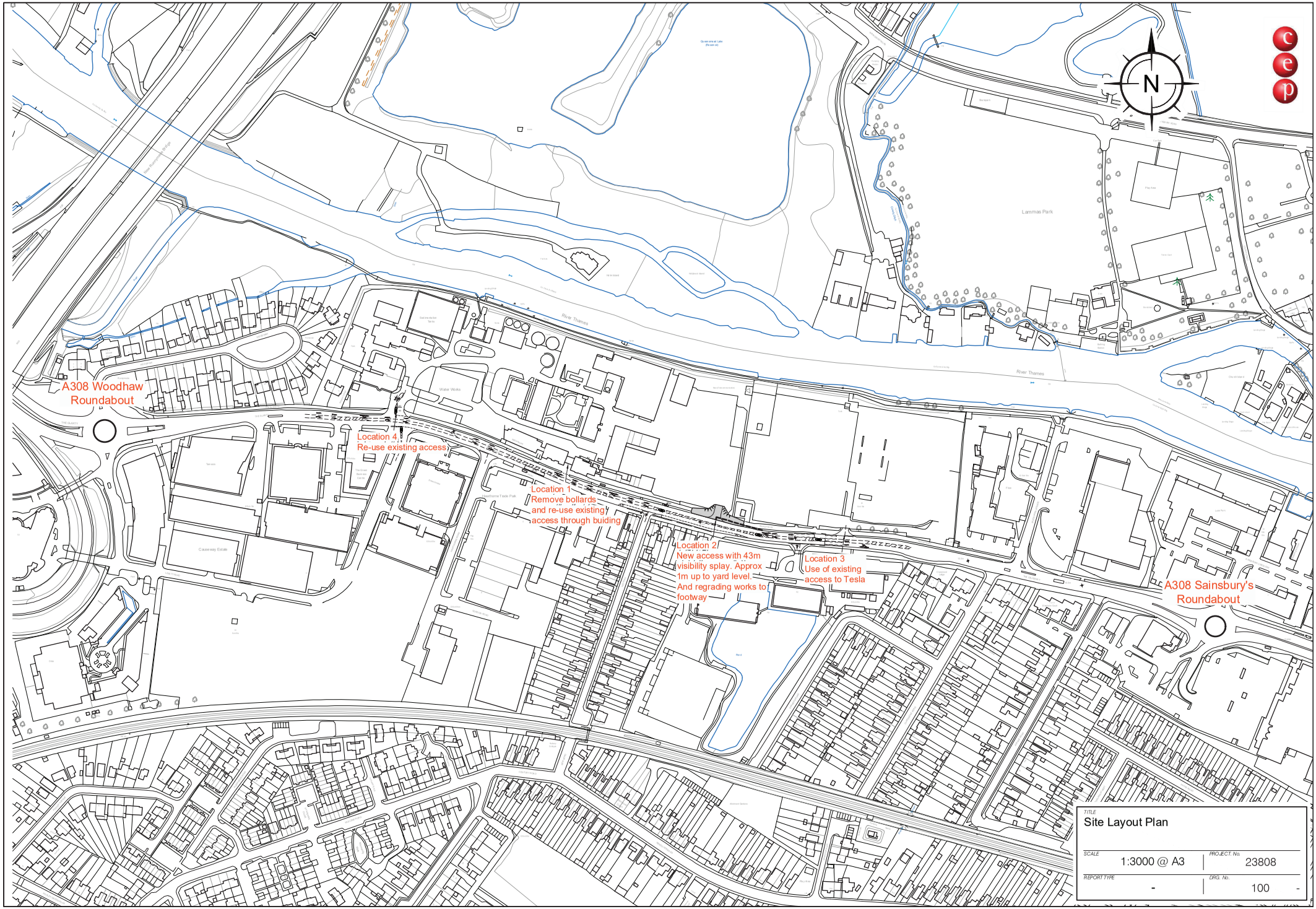





TITLE
Option 2 - New Access and Grading Works

| SCALE | PROJECT. No. |
|---|---|
| 1:500 @ A3 | 23808 |
| REPORT TYPE | DRG. No. |
| - | 102 - |




TITLE
Site Layout Plan

| SCALE | PROJECT. No. |
|---|---|
| 1:3000 @ A3 | 23808 |
| REPORT TYPE | ORG. No. |
| - | 100 - |

aquaconsultants
water · environment · energy

# Feasibility Estimate (Level B)

Egham WTW

June 2023 - Rev 1.3

# Feasibility Estimate

| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Egham WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |

## 1.0 Introduction

Stantec have engaged the services of Aqua Consultants, commercial engineering consultants with particular experience of the water industry, to produce cost and carbon estimates. Aqua hold a mature and extensive database of estimating material. Cost estimates have been prepared using a combination of cost models and unit costs based from our experience within the Water Industry, through AMP7 and AMP6, PR19 and PR24 as well as budget estimates from the market.

Carbon estimates for the embodied carbon have been prepared by using quantities for works items on historical projects and applying carbon values to these in a bottom up fashion. The carbon values for civils works were taken from CESMM4 Carbon & Pricebook 2013 and the M&E through a data capture exercise carried out in AMP5 with another Water Company, and then applying these to the quantities. These carbon values were then modelled for each asset, as broken down by our cost models to produce the Embodied CO2e estimates provided.

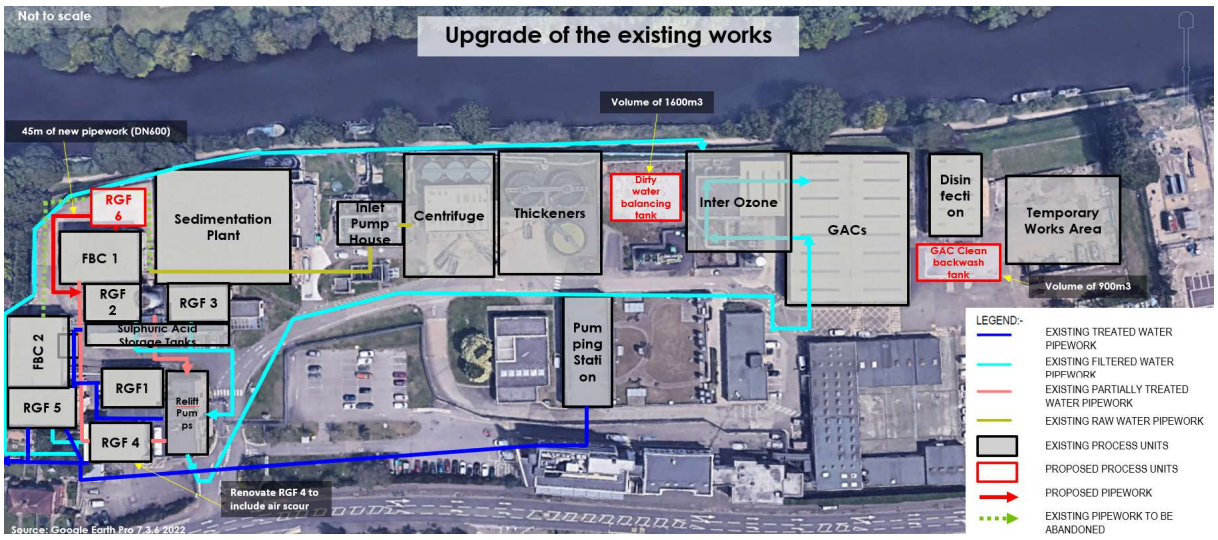
The operational carbon has been build up based on the Opex Headings. We used the following: Power a factor of 0.6958 kg/CO2 per kW, Maintenance 0.4626 kgCO2/£. This is inline with what we have been applying elsewhere with other water companies.

## 1.1 Existing Works Layout

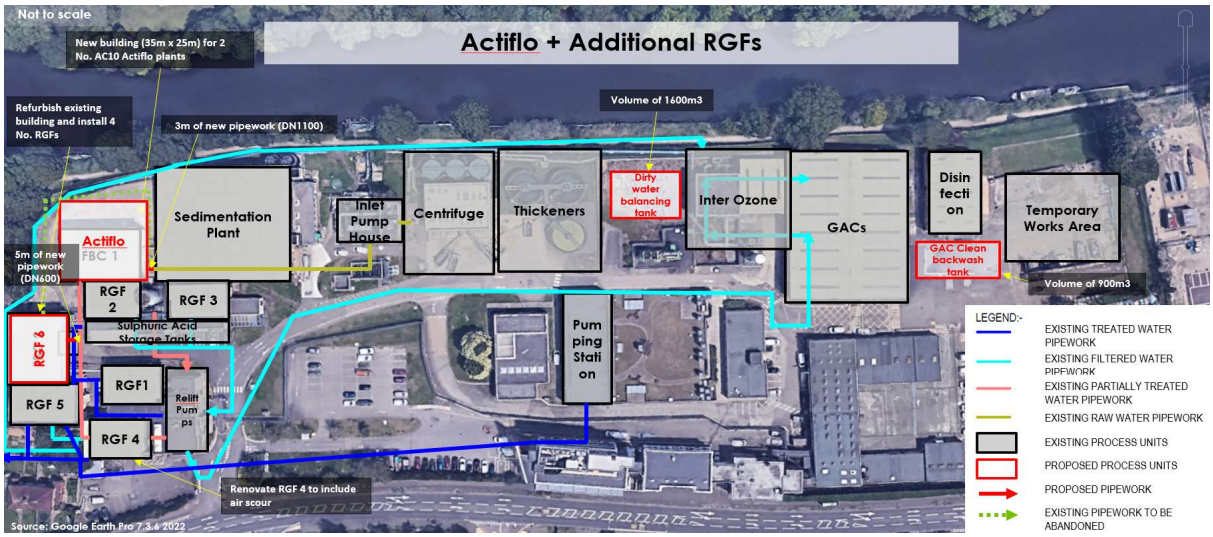
# Feasibility Estimate

| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Egham WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |

### 1.2a New RGF Site Layout



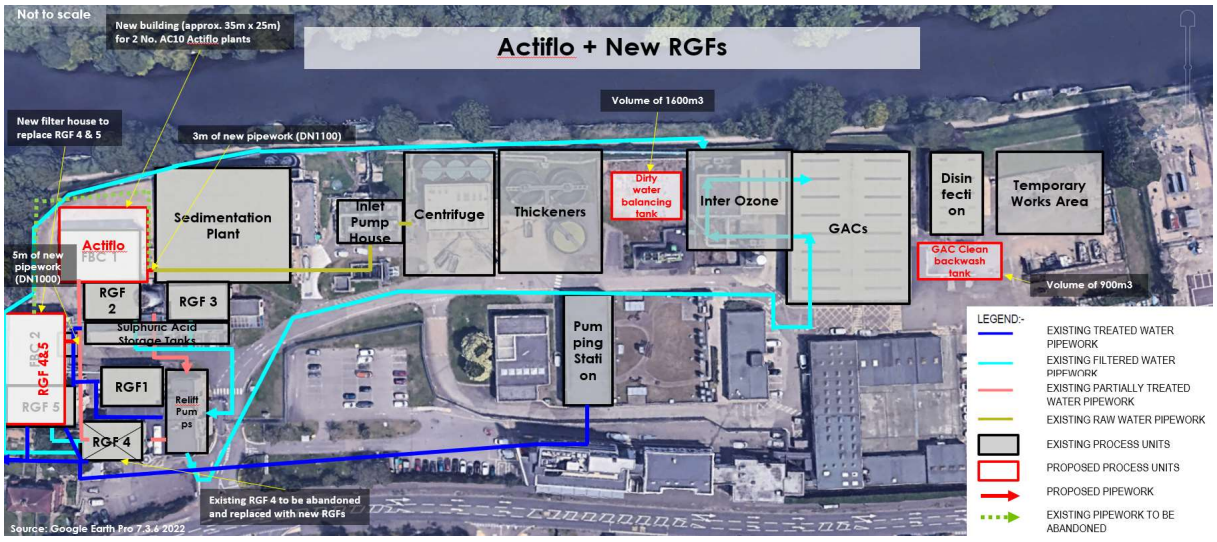

### 1.2b Actiflo + Additional RGF Site Layout



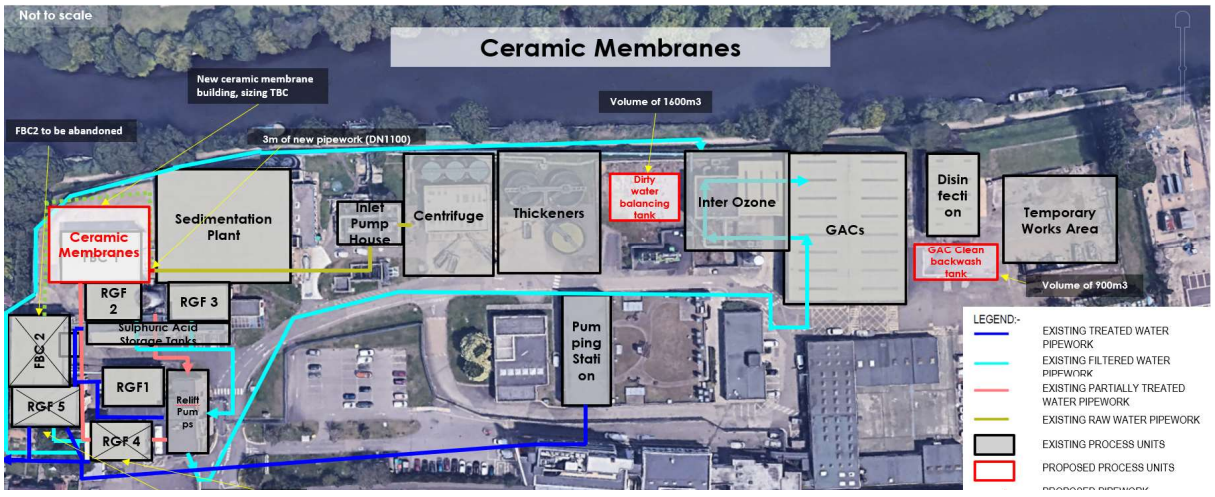
# Feasibility Estimate

| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Egham WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |

### 1.2c Actiflo + New RGF Site Layout



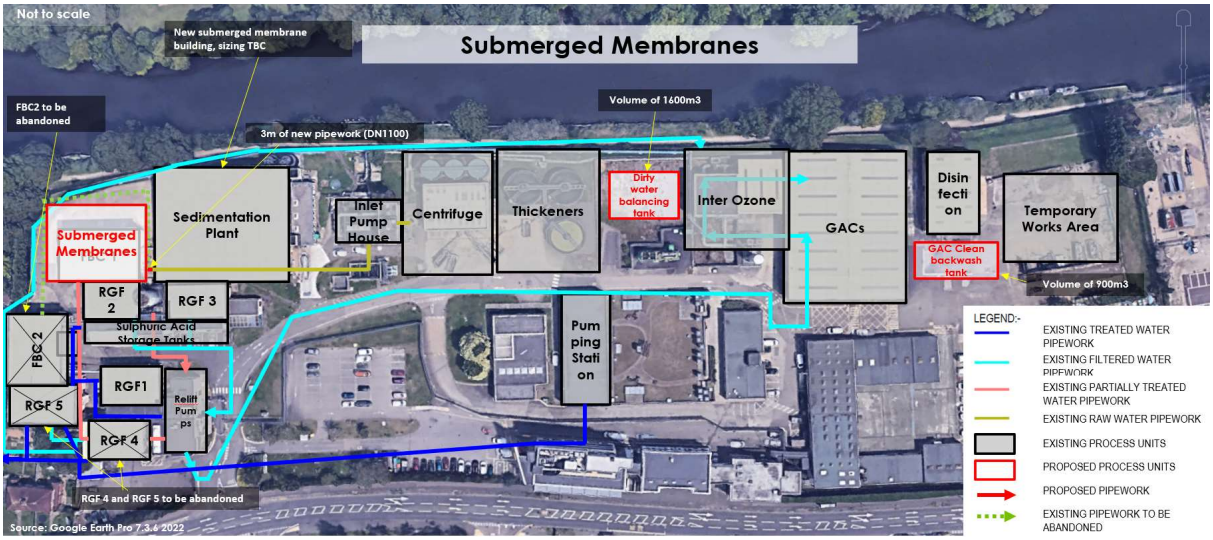

### 1.2d Ceramic Membrane Site Layout



# Feasibility Estimate

| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Egham WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |


### 1.2e Submerged Membrane Site Layout



# Feasibility Estimate

| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Egham WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |

# Feasibility Estimate

## Summary

| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Egham WTW | | |
| **Client:** | Stantec/Affinity Water | **Completed by:** | AW |
| **Cost base date:** | Q2 2023 | **Checked by:** | PA |
| **Issue Nr:** | 1.3 | | |

## 2 Summary

### 2.1 CAPEX

| | Option 1<br>Existing Assets + 1 RGF House | Option 2<br>Actiflo + Additional RGF's | Option 3<br>Actiflo + New RGF's [Concrete] | Option 4<br>Actiflo + New RGF's [Steel] | Option 5<br>Ceramic Membrane Plant | Option 6<br>Submerged Membrane Plant |
|---|---|---|---|---|---|---|
| Direct Works Costs | £ 8,089,581.42 | £ 20,233,797.91 | £ 27,594,086.38 | £ 27,594,086.38 | £ 31,455,244.81 | £ 23,844,896.25 |
| Indirect Costs | £ 3,367,522.21 | £ 8,422,903.53 | £ 11,486,836.46 | £ 11,486,836.46 | £ 13,094,155.33 | £ 9,926,127.65 |
| **Construction Costs** | **£ 11,457,103.63** | **£ 28,656,701.45** | **£ 39,080,922.84** | **£ 39,080,922.84** | **£ 44,549,400.13** | **£ 33,771,023.89** |
| Client On-costs | £ 1,660,134.32 | £ 4,152,356.04 | £ 5,662,825.72 | £ 5,662,825.72 | £ 6,455,208.08 | £ 4,893,421.36 |
| **Project Cost** | **£ 13,117,237.95** | **£ 32,809,057.49** | **£ 44,743,748.56** | **£ 44,743,748.56** | **£ 51,004,608.21** | **£ 38,664,445.26** |

### 2.2 OPEX

| | | | | | | |
|---|---|---|---|---|---|---|
| Total Annual Opex | £ 1,717,483.38 | £ 2,624,972.42 | £ 1,428,130.40 | £ 1,428,130.40 | £ 1,307,231.80 | £ 1,665,325.07 |
| Total 30 Year Opex | £ 51,524,501.40 | £ 78,749,172.71 | £ 42,843,912.11 | £ 42,843,912.11 | £ 39,216,954.03 | £ 49,959,752.00 |

### 2.3 NPV

| | | | | | | |
|---|---|---|---|---|---|---|
| NPV over 30 years | £ 49,389,965.27 | £ 91,611,069.92 | £ 79,491,524.86 | £ 79,491,524.86 | £ 96,406,374.39 | £ 93,779,350.39 |

### 2.4 Carbon

| | | | | | | |
|---|---|---|---|---|---|---|
| Embodied Carbon (tonnes) | 2,897.44 | 8,773.86 | 10,430.46 | 11,511.80 | 9,985.53 | 7,795.70 |
| Annual Operational Carbon (tonnes) | 358.54 | 1,801.08 | - 641.56 | - 641.56 | 109.43 | 86.17 |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.1 - Existing Assets + 1 RGF House
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| **Rapid Gravity Filters** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Renovate Exisitng RGF house 5 and 4 beds within. | RGF house 5 is to be renovated to include combined air and water scour<br>4 beds of area 36.8 m2. Length= 5.04m and width = 3.65 m per bay | 1 | 1 | Sum | | £ 100,000.00 | Allow £25k per filter assuming amendments may be needed to the existing air blower system |
| 2 | Refurbish FBC2/RGF5 Building. | Refurbishment FBC 2 by retrofitting an extension to increase the launder height of FBCs to manage throughput of 36MLD.<br>Rough dimensions FBC2/ RGF5 = 37 x 23 m | 1 | 1 | Sum | | £ 20,000.00 | Allow for amendments to FBC launder |
| 3 | Construct new RGF house 6 of equal size size to 4&5. | 4 RGFs, beds of area 36.8m2, Length = 5.04 and width 3.65 per bay | 1 | 73.584 | m2 | | £ 1,449,910.25 | Rapid Gravity Filter (m2) |
| 4 | New building dimension | 13 m x 19 m | 1 | 247 | m2 | | £ 520,557.34 | Operational Building (m2) |
| 5 | Mods to FBC 1 | Refurbish FBC 1 by retrofitting an extension to inlet channels to increase the launder height of FBCs to manage throughput of 36MLD | 1 | 1 | Sum | | £ 150,000.00 | PC Sum for Demolition |
| 6 | Steelwork and Panels Superstructure | 4m height 13m width 19m length | 1 | 247 | m2 | | £ - | Costed above |
| 7 | Concrete Substructure | 4m depth x 13m width x 19m length (3m depth excavation required). Spoil to be removed offsite | 1 | 988 | m3 | | £ - | Assumed to be the RGF structure |
| 8 | Clean washwater tank | Volume: 700m3 | 1 | 700 | m3 | | £ 311,874.66 | Concrete Tank; Open Top; Water Storage |
| 9 | Dirty washwater tank | Volume: 1200m3 | 1 | 1200 | m3 | | £ 379,526.77 | Concrete Tank; Open Top; Washwater Recovery |
| 10 | Dirty washwater delivery pipe (pumped) | 200m length, 300mm diameter | 200 | 300 | mm | | £ 106,292.30 | Interprocess Pipework; Below Ground |
| 11 | | | | | | | £ - | |
| 12 | | | | | | | £ - | |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | BACKWASH PUMPS | ~~3 No. D/A/S; Duty 1788m3/h @ 6.5m HD~~ - **USE EXISTING** | | | | | £ - | Existing Plant to be utilised |
| 2 | AIR SCOUR BLOWERS | ~~2 No. D/S; Duty 2679Nm3/hr @ 600mBar~~ - **USE EXISTING** | | | | | £ - | Existing Plant to be utilised |
| 3 | FILTER OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 4 | FILTER INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 5 | CLEAN BACKWASH INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 6 | DIRTY BACKWASH OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 7 | AIR SCOUR INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 8 | | | | | | | £ - | |
| 9 | RGF LCPs | | | | | | £ - | Incl. in RGF Model |
| 10 | HVAC | | | | | | £ - | Incl. in Building Model |
| 11 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 12 | Building services | | | | | | £ - | Incl. in Building Model |
| 13 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 14 | | | | | | | £ - | |
| 15 | Hydraulic Study | A hydraulic study of the Sedimentation plant cost has been estimated to be around £9000- assumed £100/hour for labour and total estimate for hours is 90 hours | 90 | 1 | HRS | | £ 9,000.00 | Allow for Hydraulic Study |
| 16 | Control Valves | Following the hydraulic study, it is likely we will be recommending flow meters and/or valves | 20 | 300 | Dia | | £ 291,701.60 | Flow Control Valve |
| 17 | Flowmeters | | 20 | 300 | Dia | | £ 78,069.00 | Magnetic Flow Meter |
| 18 | UV Treatment to GAC | The cost of retrofitting two GAC contactors with UV, including GAC backwash facilities has been approximated at £500,000 | 1 | 1 | Sum | | £ 500,000.00 | UV Plant to GAC's |
| 19 | | | | | | | £ - | |
| 20 | | | | | | | £ - | |
| **Tanks** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | DWW Balancing Tank | 1600 m3 | 1 | 1600 | m3 | | £ 425,654.59 | Concrete Tank; Open Top; Washwater Recovery |
| 2 | GAC Clean Backwash Tank | 900 m3 | 1 | 900 | m3 | | £ 340,711.77 | Concrete Tank; Open Top; Water Storage |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.1 - Existing Assets + 1 RGF House
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Other Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Delivery Pipework (to RGFs) DN1600 Fusion Bonded Epoxy Steel | 15m Length, 0.8m Diameter | 15 | 800 | mm | | £ 21,237.98 | Interprocess Pipework; Below Ground |
| 2 | Delivery Pipework (to RGFs) DN1000 Fusion Bonded Epoxy Steel | 250 m Length, 0.8m Diameter | 250 | 800 | mm | | £ 353,966.28 | Interprocess Pipework; Below Ground |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | RMU | 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | 1 | 1 | No. | | £ 100,000.00 | Allow |
| 2 | Cabling (3.3kV) | | 1 | 200 | m | | £ 95,997.25 | HV Cabling (m) |
| 3 | Cabling (LV) | | 1 | 200 | m | | £ 41,644.75 | General - LV Cabling with Ducts and Drawpits (m) |
| 4 | 400V | | 1 | 1200 | m | | £ 116,296.83 | General - LV Cabling with Ducts and Drawpits (m) |
| 5 | Comms | | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 6 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 7 | PLC network extension and network node box | | | | | | £ 50,000.00 | Allow |
| 8 | SCADA integration/configuration | | | | | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 9 | DNO charges (amendment to authorised supply capacity) | Load based on Drive List Please advise if different | 1 | 500.0 | kVA | | £ 196,171.33 | New Power Supply to Site |
| 10 | ERACS study | | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 11 | MCC (Design and installation) | Max. Installed kW of MCC - Taken from Drive List - Please advise if different | 1 | 293.0 | kW | | £ 222,452.79 | Motor Control Centre (MCC); Based on Load Schedule |
| 12 | Potential for standby generator? | | 1 | 2000 | kVA | | £ 498,893.28 | Emergency Power Generation |
| 13 | Electrical Installation | | | | | | £ - | Incl. in Cost Models |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | | | | | | | £ - | 0 |
| 2 | | | | | | | £ - | 0 |
| 3 | | | | | | | £ - | 0 |
| 4 | | | | | | | £ - | 0 |
| 5 | | | | | | | £ - | 0 |
| **MEICA** | | | | | | | | |
| 1 | Instrumentation | Level, pressure, flow instrumentation for each RGFs plus common instruments on inlet and outlet to RGF block. | | | | | £ - | Incl. in Cost Models |
| 2 | HMI | Including control software and modification to existing site control for plant shutdown and interfacing etc | | | | | £ - | Incl. in Cost Models |
| 3 | UPS | 2 kVA for 30 minutes | | | | | £ - | Standby Generator Included |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **DWW Thickener + Dewatering** | | | | | | | | |

# Feasibility Estimate

## Detailed Cost Breakdown

**Egham WTW**

### 3.1 - Existing Assets + 1 RGF House

*Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| **Civil** | | | | | | | | |
| 1 | WRc Thickener | Thickener Diameter 12.5m; Throughput of 4MLD; Thickened Sludge Solids Concentration 2.5% | 1 | 490.9 | m3 | | £ 563,461.98 | Wash Water Recovery Tank |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Centrifuge Dewaterer | Throughput of 1 MLD; Flow rate of 47m3/hr | 1 | 6.17 | TTDS/YR | | £ 797,717.21 | Centrifuge |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 8,089,581.42** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 41.6% | £ 3,367,522.21 | |

| | |
|---|---|
| **Construction Cost** | **£ 11,457,103.63** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 14.5% | £ 1,660,134.32 | |

| | |
|---|---|
| **Project Cost** | **£ 13,117,237.95** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.1 - Option 1 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | Consumption | | | 0 | £ 0.35 | £ 39,507.46 | Modelled Approach |
| RGF - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 1,580.18 | Modelled Approach |
| Clean washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ - | Use Existing |
| Dirty washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ - | Use Existing |
| DWW Balancing Tank | Add | Consumption | | | 0 | £ 0.35 | £ 13,160.03 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,909.30 | Modelled Approach |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| WRc Thickener | Add | Consumption | | | 0 | £ 0.35 | £ 11,143.77 | Modelled Approach |
| Centrifuge Dewaterer | Add | Consumption | | | 0 | £ 0.35 | £ 59,024.57 | Modelled Approach |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 138,167.4** | |
| **Annual Power Carbon** | | | | | | | **274676.751 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | Manual | | £ 29,044.64 | Modelled Approach |
| RGF - Operational Building | Add | Manual | | £ 5,742.32 | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Dirty washwater tank | Add | Manual | | £ 2,967.41 | Modelled Approach |
| DWW Balancing Tank | Add | Manual | | £ 3,259.18 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Manual | | £ 2,701.77 | Modelled Approach |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| Centrifuge Dewaterer | Add | Manual | | £ 88,935.47 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **150,783.07** | |
| **Annual Maintenance Carbon** | | | | **69752.248 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sulphuric Acid 96% | Add | | 110.7 | 1840 | 74360 | £ 356.93 | £ 130,279.45 | pH Control |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 18.3 | 1250 | 8359 | £ 57.16 | £ 20,863.40 | Pre-chlorination |
| Polyaluminium Chloride (PACl) 10% | Add | | 264.5 | 1200 | 115860 | £ 929.41 | £ 339,234.65 | Clarification (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 59.8 | 998 | 21782 | £ 15.04 | £ 5,489.60 | Clarification NHBC (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 67.4 | 998 | 24565 | £ 16.96 | £ 6,190.40 | Clarification SHBC (Sedimentation Plant) |
| Polyaluminium Chloride (PACl) 10% | Add | | 113.4 | 1200 | 49682 | £ 398.55 | £ 145,470.75 | Clarification FBC1 |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 52.0 | 998 | 18959 | £ 13.09 | £ 4,777.85 | Clarification FBC1 |
| Polyaluminium Chloride (PACl) 10% | Add | | 113.0 | 1200 | 49485 | £ 396.95 | £ 144,886.75 | Clarification FBC2 |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 52.0 | 998 | 18959 | £ 13.09 | £ 4,777.85 | Clarification FBC2 |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 63.3 | 1250 | 28876 | £ 197.45 | £ 72,069.25 | Disinfection |
| Orthophosphoric Acid | Add | | 205.5 | 1052 | 78916 | £ 273.60 | £ 99,864.00 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 23.2 | 1280 | 10853 | £ 110.59 | £ 40,365.35 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 122.0 | 1500 | 66817 | £ 659.02 | £ 240,542.30 | pH Control |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 30.5 | 998 | 11108 | £ 7.67 | £ 2,799.55 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 812.5 | 998 | 295995 | £ 204.36 | £ 74,591.40 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,332,202.6** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | | | £ 21,803.00 | Modelled Approach |
| RGF - Operational Building | Add | | | £ 208.31 | Modelled Approach |
| Clean washwater tank | Add | | | £ 2,642.56 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,150.18 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 3,459.92 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,868.18 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 2,458.81 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 2,450.23 | Modelled Approach |
| WRc Thickener | Add | | | £ 10,685.29 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 16,089.54 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual People Costs** | | | | **£ 65,816.02** | |
| **Annual People Carbon** | | | | **0 CO2 kg** | |

#### *Sludge*

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.1 - Option 1 Detailed OPEX Breakdown

| *Activity* | *Add / omit* | *tonnes Dry solids / day* | *Cost per tDS* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| **Annual Sludge Costs** | | | | **£** **-** | |
| **Annual Sludge Carbon** | | | | **0 CO2 kg** | |

### *Business Rates*

| *Item* | *Add / omit* | *Asset at 2008 Prices* | *Rateable Value %* | *Uniform Business Rate* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **Business Rates Costs** | | | | | **£** **-** | |

### *Other*

| *Item* | *Add / omit* | *Qty* | *rate* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Operational Building | Add | | | £ 2,736.14 | Modelled Approach |
| Clean washwater tank | Add | | | £ 2,684.86 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,200.61 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 3,515.30 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,914.09 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 644.80 | Modelled Approach |
| WRc Thickener | Add | | | £ 3,473.15 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 10,698.36 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual Other Costs** | | | | **£** **30,514.36** | |
| **Annual Other Carbon** | | | | **14115.943 CO** | |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **1,717,483.38** |
| **Total Annual Carbon** | | **358544.942 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Egham WTW**

aquaconsultants
water · environment · energy

### *30 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *2* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *3* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *4* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *5* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *6* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *7* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *8* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *9* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *10* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *11* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *12* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *13* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *14* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *15* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *16* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *17* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *18* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *19* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *20* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *21* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *22* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *23* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *24* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *25* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *26* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *27* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *28* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *29* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *30* | £ 138,167 | £ 150,783 | £ 1,332,203 | £ 65,816 | £ - | £ - | £ 30,514 | £ 1,717,483 |
| *31* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *32* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *33* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *34* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *35* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *36* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *37* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *38* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *39* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *40* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 51,524,501.40** |

# Feasibility Estimate

## Net Present Value

**Egham WTW**

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### 5.1 NPV Option 1

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| Yr | Capital Investment | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | |
| CAPEX Yr1 | £ 3,279,309 | | | | | | | | £ 3,279,309 |
| CAPEX Yr2 | £ 5,902,757 | | | | | | | | £ 5,902,757 |
| CAPEX Yr3 | £ 3,935,171 | | | | | | | | £ 3,935,171 |
| 1 | £ - | £ 134,247 | £ 146,505 | £ 1,294,406 | £ 63,949 | £ - | £ - | £ 29,649 | £ 1,668,756 |
| 2 | £ - | £ 130,439 | £ 142,349 | £ 1,257,682 | £ 62,134 | £ - | £ - | £ 28,807 | £ 1,621,411 |
| 3 | £ - | £ 126,738 | £ 138,310 | £ 1,221,999 | £ 60,372 | £ - | £ - | £ 27,990 | £ 1,575,409 |
| 4 | £ - | £ 123,142 | £ 134,386 | £ 1,187,329 | £ 58,659 | £ - | £ - | £ 27,196 | £ 1,530,712 |
| 5 | £ - | £ 119,648 | £ 130,573 | £ 1,153,643 | £ 56,994 | £ - | £ - | £ 26,424 | £ 1,487,283 |
| 6 | £ - | £ 116,254 | £ 126,869 | £ 1,120,912 | £ 55,377 | £ - | £ - | £ 25,675 | £ 1,445,087 |
| 7 | £ - | £ 112,955 | £ 123,269 | £ 1,089,110 | £ 53,806 | £ - | £ - | £ 24,946 | £ 1,404,087 |
| 8 | £ - | £ 109,751 | £ 119,772 | £ 1,058,210 | £ 52,280 | £ - | £ - | £ 24,239 | £ 1,364,251 |
| 9 | £ - | £ 106,637 | £ 116,374 | £ 1,028,187 | £ 50,796 | £ - | £ - | £ 23,551 | £ 1,325,545 |
| 10 | £ - | £ 103,611 | £ 113,072 | £ 999,016 | £ 49,355 | £ - | £ - | £ 22,883 | £ 1,287,937 |
| 11 | £ - | £ 100,672 | £ 109,864 | £ 970,672 | £ 47,955 | £ - | £ - | £ 22,233 | £ 1,251,397 |
| 12 | £ - | £ 97,816 | £ 106,747 | £ 943,133 | £ 46,594 | £ - | £ - | £ 21,603 | £ 1,215,893 |
| 13 | £ - | £ 95,040 | £ 103,718 | £ 916,375 | £ 45,273 | £ - | £ - | £ 20,990 | £ 1,181,396 |
| 14 | £ - | £ 92,344 | £ 100,776 | £ 890,376 | £ 43,988 | £ - | £ - | £ 20,394 | £ 1,147,878 |
| 15 | £ - | £ 89,724 | £ 97,917 | £ 865,115 | £ 42,740 | £ - | £ - | £ 19,816 | £ 1,115,311 |
| 16 | £ - | £ 87,178 | £ 95,138 | £ 840,570 | £ 41,527 | £ - | £ - | £ 19,253 | £ 1,083,668 |
| 17 | £ - | £ 84,705 | £ 92,439 | £ 816,722 | £ 40,349 | £ - | £ - | £ 18,707 | £ 1,052,922 |
| 18 | £ - | £ 82,302 | £ 89,817 | £ 793,550 | £ 39,204 | £ - | £ - | £ 18,176 | £ 1,023,049 |
| 19 | £ - | £ 79,967 | £ 87,268 | £ 771,036 | £ 38,092 | £ - | £ - | £ 17,661 | £ 994,024 |
| 20 | £ 2,258,497 | £ 77,698 | £ 84,792 | £ 749,160 | £ 37,011 | £ - | £ - | £ 17,160 | £ 3,224,319 |
| 21 | £ - | £ 75,494 | £ 82,387 | £ 727,905 | £ 35,961 | £ - | £ - | £ 16,673 | £ 938,420 |
| 22 | £ - | £ 73,352 | £ 80,049 | £ 707,254 | £ 34,941 | £ - | £ - | £ 16,200 | £ 911,795 |
| 23 | £ - | £ 71,271 | £ 77,778 | £ 687,188 | £ 33,950 | £ - | £ - | £ 15,740 | £ 885,926 |
| 24 | £ - | £ 69,249 | £ 75,571 | £ 667,691 | £ 32,987 | £ - | £ - | £ 15,294 | £ 860,791 |
| 25 | £ - | £ 67,284 | £ 73,427 | £ 648,748 | £ 32,051 | £ - | £ - | £ 14,860 | £ 836,369 |
| 26 | £ - | £ 65,375 | £ 71,344 | £ 630,342 | £ 31,141 | £ - | £ - | £ 14,438 | £ 812,640 |
| 27 | £ - | £ 63,520 | £ 69,320 | £ 612,458 | £ 30,258 | £ - | £ - | £ 14,028 | £ 789,584 |
| 28 | £ - | £ 61,718 | £ 67,353 | £ 595,082 | £ 29,399 | £ - | £ - | £ 13,630 | £ 767,183 |
| 29 | £ - | £ 59,967 | £ 65,442 | £ 578,198 | £ 28,565 | £ - | £ - | £ 13,244 | £ 745,416 |
| 30 | £ - | £ 58,266 | £ 63,586 | £ 561,794 | £ 27,755 | £ - | £ - | £ 12,868 | £ 724,268 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 49,389,965.27** |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

aquaconsultants
water · environment · energy

### 3.2 - Actiflo + Additional RGF's
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| **RGF's + FBC** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Renovate Exisitng RGF house 5 and 4 beds within. | RGF house 5 is to be renovated to include combined air and water scour<br><br>4 beds of area 36.8 m2. Length= 5.04m and width = 3.65 m per bay | 1 | 1 | Sum | | £ 100,000.00 | Allow £25k per filter assuming amendments may be needed to the existing air blower system |
| 2 | Refurbish FBC2/RGF5 Building. | Refurbishment FBC 2 by retrofitting an extension to increase the launder height of FBCs to manage throughput of 36MLD.<br><br>Rough dimensions FBC2/ RGF5 = 37 x 23 m | 1 | 1 | Sum | | £ 20,000.00 | Allow for amendments to FBC launder |
| 3 | Construct new RGF house 6 of equal size size to 4&5. | 4 RGFs, beds of area 36.8m2, Length = 5.04 and width 3.65 per bay | 1 | 73.584 | m2 | | £ 1,449,910.25 | Rapid Gravity Filter (m2) |
| 4 | FBC 1 to be demolished | 12m long, 4.5m wide, and 5.1m depth for FBC 1. | 1 | 275.4 | m3 | | £ 75,000.00 | PC Sum for Demolition |
| 5 | Steelwork and Panels Superstructure | 4m height 13m width 19m length | 1 | 247 | m2 | | £ 520,557.34 | Operational Building (m2) |
| 6 | Concrete Substructure | 4m depth x 13m width x 19m length (3m depth excavation required). Spoil to be removed offsite | 1 | 988 | m3 | | £ - | Assumed to be the RGF structure |
| 7 | Clean washwater tank | Volume: 700m3 | 1 | 700 | m3 | | £ 311,874.66 | Concrete Tank; Open Top; Water Storage |
| 8 | Dirty washwater tank | Volume: 1200m3 | 1 | 1200 | m3 | | £ 379,526.77 | Concrete Tank; Open Top; Washwater Recovery |
| 9 | Dirty washwater delivery pipe (pumped) | 220m length, 300mm diameter | 220 | 300 | mm | | £ 116,921.53 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |
| 11 | | | | | | | £ - | |
| 12 | | | | | | | £ - | |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | BACKWASH PUMPS | ~~3 No. D/A/S; Duty 1788m3/h @ 6.5m HD~~ - **USE EXISTING** | | | | | £ - | |
| 2 | AIR SCOUR BLOWERS | ~~2 No. D/S; Duty 2679Nm3/hr @ 600mBar~~ - **USE EXISTING** | | | | | £ - | |
| 3 | FILTER OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 4 | FILTER INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 5 | CLEAN BACKWASH INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 6 | DIRTY BACKWASH OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 7 | AIR SCOUR INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 8 | | | | | | | £ - | |
| 9 | RGF LCPs | | | | | | £ - | Incl. in RGF Model |
| 10 | HVAC | | | | | | £ - | Incl. in Building Model |
| 11 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 12 | Building services | | | | | | £ - | Incl. in Building Model |
| 13 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 14 | | | | | | | £ - | |
| 15 | Hydraulic Study | A hydraulic study of the Sedimentation plant cost has been estimated to be around £9000- assumed £100/hour for labour and total estimate for hours is 90 hours | 90 | 1 | HRS | | £ 9,000.00 | Allow for Hydraulic Study |
| 16 | Control Valves | Following the hydraulic study, it is likely we will be recommending flow meters and/or valves | 20 | 300 | Dia | | £ 291,701.60 | Flow Control Valve |
| 17 | Flowmeters | | 20 | 300 | Dia | | £ 78,069.00 | Magnetic Flow Meter |
| 18 | UV Treatment to GAC | The cost of retrofitting two GAC contactors with UV, including GAC backwash facilities has been approximated at £500,000 | 1 | 1 | Sum | | £ 500,000.00 | UV Plant to GAC's |
| 19 | | | | | | | £ - | |
| 20 | | | | | | | £ - | |
| **Actiflo Package Plant** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ 997,876.57 | Concrete Open Top Tank; Used to cost for 4m DP Substructure |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | Interconnecting Pipework - Inlet to AC10 Streams | Above ground pipework feeding each of the 2 No. streams | 20 | 1400 | mm | | £ 122,648.31 | Interprocess Pipework; Above Ground |
| 6 | Coagulation Tank | Rapid Mixer' tank - Length 6.8 m, Width 8.0 m, Depth 8.5 m; | 2 | 462.4 | m3 | | £ 734,174.25 | Concrete Tank - All Types |
| 7 | Flocculation Tank | Floc tank - Length 7.5 m, Width 10.28 m, Depth 8.5 m; | 2 | 655.4 | m3 | | £ 1,012,159.34 | Concrete Tank - All Types |
| 8 | Settler Tank | Actiflo Settler Tank - Length 10.28m, Width 10.28m Depth 8.5m; | 2 | 898.3 | m3 | | £ 1,362,136.73 | Concrete Tank - All Types |
| 9 | Interconnecting Pipework - Outlet from AC10 Streams | Below ground gravity DN1400 ; Ductile Iron; | 110 | 1400 | mm | | £ 265,273.92 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

aquaconsultants
water · environment · energy

### 3.2 - Actiflo + Additional RGF's
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| **MEICA** | | | | | | | | |
| 1 | Ballasted Coagulation System | 2x Actiflo turbo AC10 streams; Coagulation and flocculation mixers c/w supports; Lamellas, Sludge Recirc Pumps & Pipework; Hydrocyclones; Control and Instrumentation etc | 1 | 1 | No | | £ 2,700,000.00 | Actiflo Package; Quote from Veolia |
| 2 | Chemical Dosing - PAC | Dose Rate 5133.37 kg/d; Flow to be treated - 74.54 MLD | 1 | 74.54 | MLD | | £ 649,114.90 | Chemical Dosing; PAC Dosing |
| 3 | Chemical Dosing - Ferric | | | | | | £ - | |
| 4 | Chemical Dosing - Polymer | Dose Rate 18.63 kg/d; Flow to be treated - 74.54 MLD | 1 | 74.54 | MLD | | £ 217,109.18 | Chemical Dosing; Polyelectrolyte |
| 5 | Chemical Dosing - Sulphuric Acid | Dose Rate 4882.74 kg/d; Flow to be treated - 153.69 MLD | 1 | 153.69 | MLD | | £ 675,989.27 | Chemical Dosing; pH Adjustment |
| 6 | HVAC | | | | | | £ - | Incl. in Building Model |
| 7 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 8 | Building services | | | | | | £ - | Incl. in Building Model |
| 9 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 10 | Ballast material | Assume first fill of Storage silo | 1 | 15 | tonnes | | £ 15,000.00 | Based on £1,000/Tonne |
| 11 | LCP and Electrical Installation | All motor starters and VSD's, together with all site cabling, containment, Isolators and Junction Boxes. - Based on 7.5% of TSR Price | 1 | | sum | | £ 202,500.00 | Based on 7.5% of Actiflo Quote |
| 12 | Power, Control & Signal Cabling | Excluded from Evoqua scope - Based on 2.5% of TSR Scope | 1 | | sum | | £ 67,500.00 | Based on 2.5% of Actiflo Quote |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Tanks** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | DWW Balancing Tank | 1600 m3 | 1 | 1600 | m3 | | £ 425,654.59 | Concrete Tank; Open Top; Washwater Recovery |
| 2 | GAC Clean Backwash Tank | 900 m3 | 1 | 900 | m3 | | £ 340,711.77 | Concrete Tank; Open Top; Water Storage |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Access Roads, Drainage and Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 240m x 3.5m width | 1 | 840 | m2 | | £ 83,900.10 | Site Roads; All Types |
| 2 | Road drainage | 240m length | 1 | 240 | m | | £ 56,666.08 | Drainage |
| 3 | Membrane CIP waste pipe | 250m length, 200mm diameter | 250 | 200 | mm | | £ 95,582.24 | Interprocess Pipework; Below Ground |
| 4 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 184,613.15 | Interprocess Pipework; Below Ground |
| 5 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 10m length, DN 1000, buried | 10 | 1000 | mm | | £ 15,753.89 | Interprocess Pipework; Below Ground |
| 6 | Delivery Pipework (to Inter-ozone) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 184,613.15 | Interprocess Pipework; Below Ground |
| 7 | Overflow pipework (from PS) | 150m length 1m diameter 1m cover in hardstanding (to redundant SSF well) | 150 | 1000 | mm | | £ 236,308.38 | Interprocess Pipework; Below Ground |
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

aquaconsultants
water · environment · energy

### 3.2 - Actiflo + Additional RGF's
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 1 | RMU | 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | 1 | 1 | No. | | £ 100,000.00 | Allow |
| 2 | Cabling (3.3kV) | | 1 | 200 | m | | £ 95,997.25 | HV Cabling (m) |
| 3 | Cabling (LV) | | 1 | 200 | m | | £ 41,644.75 | General - LV Cabling with Ducts and Drawpits (m) |
| 4 | 400V | | 1 | 1200 | m | | £ 116,296.83 | General - LV Cabling with Ducts and Drawpits (m) |
| 5 | Comms | | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 6 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 7 | PLC network extension and network node box | | | | | | £ 50,000.00 | Allow |
| 8 | SCADA integration/configuration | | | | | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 9 | DNO charges (amendment to authorised supply capacity) | Load based on Drive List Please advise if different | 1 | 500.0 | kVA | | £ 196,171.33 | New Power Supply to Site |
| 10 | ERACS study | | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 11 | MCC (Design and installation) | Max. Installed kW of MCC - Taken from Drive List - Please advise if different | 1 | 174 | kW | | £ 171,963.62 | Motor Control Centre (MCC); Based on Load Schedule |
| 12 | Potential for standby generator? | | 1 | 2000 | kVA | | £ 498,893.28 | Emergency Power Generation |
| 13 | Electrical Installation | | | | | | £ - | Incl. in Cost Models |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Instrumentation | Level, pressure, flow instrumentation etc | | | | | £ - | |
| 2 | PLC and integration with UV reactor LCPs | Including control software and modification to existing site control for plant shutdown and interfacing etc | | | | | £ - | |
| 3 | HMI | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **DWW Thickener + Dewatering** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | WRc Thickener | Thickener Diameter 12.5m; Throughput of 4MLD; Thickened Sludge Solids Concentration 2.5% | 1 | 490.9 | m3 | | £ 563,461.98 | Wash Water Recovery Tank |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Centrifuge Dewaterer | Throughput of 1 MLD; Flow rate of 47m3/hr | 1 | 6.17 | TTDS/YR | | £ 797,717.21 | Centrifuge |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 20,233,797.91** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 41.6% | £ 8,422,903.53 | |

| | |
|---|---|
| **Construction Cost** | **£ 28,656,701.45** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 14.5% | £ 4,152,356.04 | |

| | |
|---|---|
| **Project Cost** | **£ 32,809,057.49** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.2 - Option 2 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | Consumption | | | 0 | £ 0.35 | £ 39,507.46 | Modelled Approach |
| RGF - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 1,580.18 | Modelled Approach |
| Clean washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ - | Use Existing |
| Dirty washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ - | Use Existing |
| Actiflo - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 14,910.53 | Modelled Approach |
| Actiflo - Coagulation Mixer 1 | Add | Consumption | 44.00 | 24 | 385440 | £ 0.35 | £ 134,904.00 | From Veolia Info. |
| Actiflo - Coagulation Mixer 2 | Add | Consumption | 44.00 | 24 | 385440 | £ 0.35 | £ 134,904.00 | From Veolia Info. |
| Actiflo - Flocculation Mixer | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Actiflo - Scraper | Add | Consumption | 3.82 | 24 | 33463 | £ 0.35 | £ 11,712.12 | From Veolia Info. |
| Actiflo - Recycle Pump (Duty) | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Chemical Dosing - PAC | Add | Consumption | | | 0 | £ 0.35 | £ 27,558.69 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Consumption | | | 0 | £ 0.35 | £ 6,951.89 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 12,226.37 | Modelled Approach |
| DWW Balancing Tank | Add | Consumption | | | 0 | £ 0.35 | £ 13,160.03 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,909.30 | Modelled Approach |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| WRc Thickener | Add | Consumption | | | 0 | £ 0.35 | £ 11,143.77 | Modelled Approach |
| Centrifuge Dewaterer | Add | Consumption | | | 0 | £ 0.35 | £ 59,024.57 | Modelled Approach |
| | | | | | | | | |
| FBC1 | Omit | Consumption | 0 | 0 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| FBC2 | Omit | Consumption | 0 | 0 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| RGF Block 4 | Omit | Consumption | 344 | 0 | 0 | £ 0.35 | £ - | Duty load taken from latest electrical load schedule |
| RGF Block 5 | Omit | Consumption | 63 | 0 | 0 | £ 0.35 | £ - | Duty load taken from latest electrical load schedule |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 805,104.6** | |
| **Annual Power Carbon** | | | | | | | **1600547.892 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | Manual | | £ 29,044.64 | Modelled Approach |
| RGF - Operational Building | Add | Manual | | £ 5,742.32 | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Dirty washwater tank | Add | Manual | | £ 2,967.41 | Modelled Approach |
| Actiflo - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| Chemical Dosing - PAC | Add | Manual | | £ 154,180.59 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Manual | | £ 1,951.68 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Manual | | £ 16,060.50 | Modelled Approach |
| DWW Balancing Tank | Add | Manual | | £ 3,259.18 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Manual | | £ 2,701.77 | Modelled Approach |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| Centrifuge Dewaterer | Add | Manual | | £ 88,935.47 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **377,160.20** | |
| **Annual Maintenance Carbon** | | | | **174474.309 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sulphuric Acid 96% | Add | | 110.7 | 1840 | 74360 | £ 356.33 | £ 130,060.45 | pH Control |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 18.3 | 1250 | 8359 | £ 57.07 | £ 20,830.55 | Pre-chlorination |
| Polyaluminium Chloride (PACl) 10% | Add | | 247.3 | 1200 | 108304 | £ 868.80 | £ 317,112.00 | Clarification (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 55.9 | 998 | 20361 | £ 14.06 | £ 5,131.90 | Clarification NHBC (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 63.0 | 998 | 22962 | £ 15.85 | £ 5,785.25 | Clarification SHBC (Sedimentation Plant) |
| Polyaluminium Chloride (PACl) 10% | Add | | 178.2 | 1200 | 78047 | £ 626.08 | £ 228,519.20 | Clarification Actiflo [New] |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 155.5 | 998 | 56664 | £ 39.12 | £ 14,278.80 | Clarification Actiflo [New] |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 63.0 | 1250 | 28730 | £ 196.48 | £ 71,715.20 | Disinfection |
| Orthophosphoric Acid | Add | | 204.5 | 1052 | 78528 | £ 272.26 | £ 99,374.90 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 23.1 | 1280 | 10797 | £ 110.05 | £ 40,168.25 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 121.4 | 1500 | 66488 | £ 655.78 | £ 239,359.70 | pH Control |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 29.9 | 998 | 10900 | £ 7.52 | £ 2,744.80 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 796.4 | 998 | 290134 | £ 200.31 | £ 73,113.15 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,248,194.2** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | | | £ 21,803.00 | Modelled Approach |
| RGF - Operational Building | Add | | | £ 208.31 | Modelled Approach |
| Clean washwater tank | Add | | | £ 2,642.56 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,150.18 | Modelled Approach |
| Actiflo - Operational Building | Add | | | £ 1,965.56 | Modelled Approach |
| Chemical Dosing - PAC | Add | | | £ 56,942.71 | Modelled Approach |
| Chemical Dosing - Polymer | Add | | | £ 739.70 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | | | £ 12,717.04 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 3,459.92 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,868.18 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 2,458.81 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 2,450.23 | Modelled Approach |
| WRc Thickener | Add | | | £ 10,685.29 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 16,089.54 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual People Costs** | | | | **£ 138,181.03** | |
| **Annual People Carbon** | | | | **0 CO2 kg** | |

### *Other*

| *Item* | *Add / omit* | *Qty* | *rate* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Operational Building | Add | | | £ 2,736.14 | Modelled Approach |
| Clean washwater tank | Add | | | £ 2,684.86 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,200.61 | Modelled Approach |
| Actiflo - Operational Building | Add | | | £ 25,818.11 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 3,515.30 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,914.09 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 644.80 | Modelled Approach |
| WRc Thickener | Add | | | £ 3,473.15 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 10,698.36 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual Other Costs** | | | | **£ 56,332.47** | |
| **Annual Other Carbon** | | | | **26059.401 CO** | |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **2,624,972.42** |
| **Total Annual Carbon** | | **1801081.601 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Egham WTW**

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### *30 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *2* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *3* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *4* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *5* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *6* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *7* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *8* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *9* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *10* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *11* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *12* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *13* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *14* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *15* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *16* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *17* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *18* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *19* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *20* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *21* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *22* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *23* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *24* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *25* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *26* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *27* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *28* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *29* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *30* | £ 805,105 | £ 377,160 | £ 1,248,194 | £ 138,181 | £ - | £ - | £ 56,332 | £ 2,624,972 |
| *31* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *32* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *33* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *34* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *35* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *36* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *37* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *38* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *39* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *40* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 78,749,172.71** |

# Feasibility Estimate

## Net Present Value

**Egham WTW**

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### 5.2 NPV Option 2

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| Yr | Capital Investment | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | |
| CAPEX Yr1 | £ 8,202,264 | | | | | | | | £ 8,202,264 |
| CAPEX Yr2 | £ 14,764,076 | | | | | | | | £ 14,764,076 |
| CAPEX Yr3 | £ 9,842,717 | | | | | | | | £ 9,842,717 |
| 1 | £ - | £ 782,263 | £ 366,460 | £ 1,212,781 | £ 134,261 | £ - | £ - | £ 54,734 | £ 2,550,498 |
| 2 | £ - | £ 760,069 | £ 356,063 | £ 1,178,372 | £ 130,451 | £ - | £ - | £ 53,181 | £ 2,478,136 |
| 3 | £ - | £ 738,504 | £ 345,961 | £ 1,144,940 | £ 126,750 | £ - | £ - | £ 51,672 | £ 2,407,828 |
| 4 | £ - | £ 717,552 | £ 336,145 | £ 1,112,456 | £ 123,154 | £ - | £ - | £ 50,206 | £ 2,339,514 |
| 5 | £ - | £ 697,194 | £ 326,608 | £ 1,080,894 | £ 119,660 | £ - | £ - | £ 48,782 | £ 2,273,138 |
| 6 | £ - | £ 677,413 | £ 317,342 | £ 1,050,228 | £ 116,265 | £ - | £ - | £ 47,398 | £ 2,208,646 |
| 7 | £ - | £ 658,194 | £ 308,338 | £ 1,020,431 | £ 112,967 | £ - | £ - | £ 46,053 | £ 2,145,983 |
| 8 | £ - | £ 639,520 | £ 299,590 | £ 991,480 | £ 109,762 | £ - | £ - | £ 44,747 | £ 2,085,098 |
| 9 | £ - | £ 621,376 | £ 291,090 | £ 963,350 | £ 106,647 | £ - | £ - | £ 43,477 | £ 2,025,941 |
| 10 | £ - | £ 603,746 | £ 282,832 | £ 936,018 | £ 103,622 | £ - | £ - | £ 42,244 | £ 1,968,462 |
| 11 | £ - | £ 586,617 | £ 274,807 | £ 909,462 | £ 100,682 | £ - | £ - | £ 41,045 | £ 1,912,613 |
| 12 | £ - | £ 569,974 | £ 267,011 | £ 883,659 | £ 97,825 | £ - | £ - | £ 39,881 | £ 1,858,350 |
| 13 | £ - | £ 553,803 | £ 259,435 | £ 858,588 | £ 95,050 | £ - | £ - | £ 38,749 | £ 1,805,625 |
| 14 | £ - | £ 538,091 | £ 252,075 | £ 834,229 | £ 92,353 | £ - | £ - | £ 37,650 | £ 1,754,397 |
| 15 | £ - | £ 522,824 | £ 244,923 | £ 810,561 | £ 89,733 | £ - | £ - | £ 36,582 | £ 1,704,622 |
| 16 | £ - | £ 507,991 | £ 237,974 | £ 787,564 | £ 87,187 | £ - | £ - | £ 35,544 | £ 1,656,259 |
| 17 | £ - | £ 493,578 | £ 231,222 | £ 765,219 | £ 84,713 | £ - | £ - | £ 34,535 | £ 1,609,269 |
| 18 | £ - | £ 479,575 | £ 224,662 | £ 743,509 | £ 82,310 | £ - | £ - | £ 33,555 | £ 1,563,611 |
| 19 | £ - | £ 465,968 | £ 218,288 | £ 722,414 | £ 79,975 | £ - | £ - | £ 32,603 | £ 1,519,249 |
| 20 | £ 6,815,241 | £ 452,748 | £ 212,095 | £ 701,918 | £ 77,706 | £ - | £ - | £ 31,678 | £ 8,291,387 |
| 21 | £ - | £ 439,903 | £ 206,077 | £ 682,004 | £ 75,501 | £ - | £ - | £ 30,780 | £ 1,434,265 |
| 22 | £ - | £ 427,422 | £ 200,231 | £ 662,654 | £ 73,359 | £ - | £ - | £ 29,906 | £ 1,393,573 |
| 23 | £ - | £ 415,296 | £ 194,550 | £ 643,854 | £ 71,278 | £ - | £ - | £ 29,058 | £ 1,354,035 |
| 24 | £ - | £ 403,513 | £ 189,030 | £ 625,587 | £ 69,255 | £ - | £ - | £ 28,233 | £ 1,315,619 |
| 25 | £ - | £ 392,065 | £ 183,667 | £ 607,838 | £ 67,291 | £ - | £ - | £ 27,432 | £ 1,278,293 |
| 26 | £ - | £ 380,941 | £ 178,456 | £ 590,592 | £ 65,381 | £ - | £ - | £ 26,654 | £ 1,242,026 |
| 27 | £ - | £ 370,133 | £ 173,393 | £ 573,836 | £ 63,526 | £ - | £ - | £ 25,898 | £ 1,206,787 |
| 28 | £ - | £ 359,632 | £ 168,474 | £ 557,556 | £ 61,724 | £ - | £ - | £ 25,163 | £ 1,172,549 |
| 29 | £ - | £ 349,429 | £ 163,694 | £ 541,737 | £ 59,973 | £ - | £ - | £ 24,449 | £ 1,139,282 |
| 30 | £ - | £ 339,515 | £ 159,050 | £ 526,367 | £ 58,271 | £ - | £ - | £ 23,756 | £ 1,106,959 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 91,611,069.92** |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.3 - Actiflo + New RGF's [Concrete]
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| **RGF's + FBC** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | RGF 4 & 5 to be abandoned + Demolished | Scope of work required<br>4 beds of area 36.8 m2. Length= 5.04m and width = 3.65 m per bay | 1 | 1 | Sum | | £ 50,000.00 | PC Sum for Demolition assuming tanks are 3m Deep. |
| 2 | FBC 2 to be abandoned / demolished and replaced by new RGFs | Scope of work required<br>Rough dimensions FBC2/ RGF5 = 37 x 23 m | 1 | 1 | Sum | | £ 200,000.00 | PC Sum for Demolition |
| 3 | Install 12 No. New RGF's | 12 No. RGF Cells; Single Bed Type; beds of area 36.8m2, Length = 10.8 and width 3.6 per bay | 1 | 466.56 | m2 | | £ 6,846,517.40 | Rapid Gravity Filter (m2) |
| 4 | FBC 1 to be demolished | 12m long, 4.5m wide, and 5.1m depth for FBC 1. | 1 | 275.4 | m3 | | £ 75,000.00 | PC Sum for Demolition |
| 5 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building (m2) |
| 6 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ - | Assumed to be incl. in RGF |
| 7 | Clean washwater tank | Volume: 700m3 | 1 | 700 | m3 | | £ 311,874.66 | Concrete Tank; Open Top; Water Storage |
| 8 | Dirty washwater tank | Volume: 1200m3 | 1 | 1200 | m3 | | £ 379,526.77 | Concrete Tank; Open Top; Washwater Recovery |
| 9 | Dirty washwater delivery pipe (pumped) | 220m length, 300mm diameter | 220 | 300 | mm | | £ 116,921.53 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |
| 11 | | | | | | | £ - | |
| 12 | | | | | | | £ - | |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | BACKWASH PUMPS | 3 No. D/A/S; Duty 1788m3/h @ 6.5m HD | 1 | 44 | kW | | £ 188,650.92 | Interprocess Pumping |
| 2 | AIR SCOUR BLOWERS | 2 No. D/S; Duty 2679Nm3/hr @ 600mBar | 1 | 2679 | Nm3/hr | | £ 87,974.28 | Air Blower |
| 3 | FILTER OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 4 | FILTER INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 5 | CLEAN BACKWASH INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 6 | DIRTY BACKWASH OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 7 | AIR SCOUR INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 8 | | | | | | | £ - | Incl. in RGF Model |
| 9 | RGF LCPs | | | | | | £ - | Incl. in Building Model |
| 10 | HVAC | | | | | | £ - | Incl. in Building Model |
| 11 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 12 | Building services | | | | | | £ - | Incl. in Building/Process Unit Models |
| 13 | Access steelwork | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | Hydraulic Study | A hydraulic study of the Sedimentation plant cost has been estimated to be around £9000- assumed £100/hour for labour and total estimate for hours is 90 hours | 90 | 1 | HRS | | £ 9,000.00 | Allow for Hydraulic Study |
| 16 | Control Valves | Following the hydraulic study, it is likely we will be recommending flow meters and/or valves | 20 | 300 | Dia | | £ 291,701.60 | Flow Control Valve |
| 17 | Flowmeters | | 20 | 300 | Dia | | £ 78,069.00 | Magnetic Flow Meter |
| 18 | UV Treatment to GAC | The cost of retrofitting two GAC contactors with UV, including GAC backwash facilities has been approximated at £500,000 | 1 | 1 | Sum | | £ 500,000.00 | UV Plant to GAC's |
| 19 | | | | | | | £ - | |
| 20 | | | | | | | £ - | |
| **Actiflo Package Plant** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ 399,150.63 | Concrete Open Top Tank; Used to cost for 4m DP Substructure<br>Allow 40% of cost to be offset against tank costs in Actiflo scope which it is assumed will form the majority of the basement area. |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | Interconnecting Pipework - Inlet to AC10 Streams | Above ground pipework feeding each of the 2 No. streams | 20 | 1400 | mm | | £ 122,648.31 | Interprocess Pipework; Above Ground |
| 6 | Coagulation Tank | Rapid Mixer' tank - Length 6.8 m, Width 8.0 m, Depth 8.5 m; | 2 | 462.4 | m3 | | £ 734,174.25 | Concrete Tank - All Types |
| 7 | Flocculation Tank | Floc tank - Length 7.5 m, Width 10.28 m, Depth 8.5 m; | 2 | 655.4 | m3 | | £ 1,012,159.34 | Concrete Tank - All Types |
| 8 | Settler Tank | Actiflo Settler Tank - Length 10.28m, Width 10.28m Depth 8.5m; | 2 | 898.3 | m3 | | £ 1,362,136.73 | Concrete Tank - All Types |
| 9 | Interconnecting Pipework - Outlet from AC10 Streams | Below ground gravity DN1400 ; Ductile Iron; | 110 | 1400 | mm | | £ 265,273.92 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.3 - Actiflo + New RGF's [Concrete]
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 1 | Ballasted Coagulation System | 2x Actiflo turbo AC10 streams; Coagulation and flocculation mixers c/w supports; Lamellas, Sludge Recirc Pumps & Pipework; Hydrocyclones; Control and Instrumentation etc | 1 | 1 | No | | £ 2,700,000.00 | Actiflo Package; Quote from Veolia |
| 2 | Chemical Dosing - PAC | Dose Rate 5133.37 kg/d; Flow to be treated - 74.54 MLD | 1 | 74.54 | MLD | | £ 649,114.90 | Chemical Dosing; PAC Dosing |
| 3 | Chemical Dosing - Ferric | ?? | | | | | £ - | |
| 4 | Chemical Dosing - Polymer | Dose Rate 18.63 kg/d; Flow to be treated - 74.54 MLD | 1 | 74.54 | MLD | | £ 217,109.18 | Chemical Dosing; Polyelectrolyte |
| 5 | Chemical Dosing - Sulphuric Acid | Dose Rate 4882.74 kg/d; Flow to be treated - 153.69 MLD | 1 | 153.69 | MLD | | £ 675,989.27 | Chemical Dosing; pH Adjustment |
| 6 | HVAC | | | | | | £ - | Incl. in Building Model |
| 7 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 8 | Building services | | | | | | £ - | Incl. in Building Model |
| 9 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 10 | Ballast material | Assume first fill of Storage silo | 1 | 15 | tonnes | | £ 15,000.00 | Based on £1,000/Tonne |
| 11 | LCP and Electrical Installation | All motor starters and VSD's, together with all site cabling, containment, Isolators and Junction Boxes. - Based on 7.5% of TSR Price | 1 | | sum | | £ 202,500.00 | Based on 7.5% of Actiflo Quote |
| 12 | Power, Control & Signal Cabling | Excluded from Evoqua scope - Based on 2.5% of TSR Scope | 1 | | sum | | £ 67,500.00 | Based on 2.5% of Actiflo Quote |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Civil** | | | | | | | | |
| 1 | DWW Balancing Tank | 1600 m3 | 1 | 1600 | m3 | | £ 425,654.59 | Concrete Tank; Open Top; Washwater Recovery |
| 2 | GAC Clean Backwash Tank | 900 m3 | 1 | 900 | m3 | | £ 340,711.77 | Concrete Tank; Open Top; Water Storage |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Access Roads, Drainage and Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 240m x 3.5m width | 1 | 840 | m2 | | £ 83,900.10 | Site Roads; All Types |
| 2 | Road drainage | 240m length | 1 | 240 | m | | £ 56,666.08 | Drainage |
| 3 | Membrane CIP waste pipe | 250m length, 200mm diameter | 250 | 200 | mm | | £ 105,037.28 | Interprocess Pipework; Below Ground |
| 4 | landscaping | 2000m2 (10m width around works to be made good on completion) | 1 | 2000 | m2 | | £ 25,549.26 | Landscaping + Planting |
| 5 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 204,984.40 | Interprocess Pipework; Below Ground |
| 6 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 10m length, DN 1000, buried | 10 | 1000 | mm | | £ 17,477.70 | Interprocess Pipework; Below Ground |
| 7 | Delivery Pipework (to Inter-ozone) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 204,984.40 | Interprocess Pipework; Below Ground |
| 8 | Overflow pipework (from PS) | 150m length 1m diameter 1m cover in hardstanding (to redundant SSF well) | 150 | 1000 | mm | | £ 262,165.27 | Interprocess Pipework; Below Ground |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | RMU | 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | 1 | 1 | No. | | £ 100,000.00 | Allow |

# Feasibility Estimate

## Detailed Cost Breakdown

**Egham WTW**

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### 3.3 - Actiflo + New RGF's [Concrete]

*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 2 | Cabling (3.3kV) | | 1 | 200 | m | | £ 95,997.25 | HV Cabling (m) |
| 3 | Cabling (LV) | | 1 | 200 | m | | £ 41,644.75 | General - LV Cabling with Ducts and Drawpits (m) |
| 4 | 400V | | 1 | 1200 | m | | £ 116,296.83 | General - LV Cabling with Ducts and Drawpits (m) |
| 5 | Comms | | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 6 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 7 | PLC network extension and network node box | | | | | | £ 50,000.00 | Allow |
| 8 | SCADA integration/configuration | | | | | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 9 | DNO charges (amendment to authorised supply capacity) | Load based on Drive List Please advise if different | 1 | 500.0 | kVA | | £ 54,986.35 | New Power Supply to Site |
| 10 | ERACS study | | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 11 | MCC (Design and installation) | Max. Installed kW of MCC - Taken from Drive List - Please advise if different | 1 | 293 | kW | | £ 130,799.25 | Motor Control Centre (MCC); Based on Load Schedule |
| 12 | Potential for standby generator? | | 1 | 2000 | kVA | | £ 498,893.28 | Emergency Power Generation |
| 13 | Electrical Installation | | | | | | £ - | Incl. in Cost Models |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Instrumentation | Level, pressure, flow instrumentation etc | | | | | £ - | Incl. in Cost Models |
| 2 | PLC and integration with UV reactor LCPs | Including control software and modification to existing site control for plant shutdown and interfacing etc | | | | | £ - | Incl. in Cost Models |
| 3 | HMI | | | | | | £ - | Standby Generator Included |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **DWW Thickener + Dewatering** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | WRc Thickener | Thickener Diameter 12.5m; Throughput of 4MLD; Thickened Sludge Solids Concentration 2.5% | 1 | 490.9 | m3 | | £ 563,461.98 | Wash Water Recovery Tank |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Centrifuge Dewaterer | Throughput of 1 MLD; Flow rate of 47m3/hr | 1 | 6.17 | TTDS/YR | | £ 797,717.21 | Centrifuge |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 27,594,086.38** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 41.6% | £ 11,486,836.46 | |

| | |
|---|---|
| **Construction Cost** | **£ 39,080,922.84** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 14.5% | £ 5,662,825.72 | |

| | |
|---|---|
| **Project Cost** | **£ 44,743,748.56** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.3 - Option 3 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | Consumption | | | 0 | £ 0.35 | £ 53,535.92 | Modelled Approach |
| RGF - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 1,580.18 | Modelled Approach |
| Clean washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ - | Use Existing |
| Dirty washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ - | Use Existing |
| Actiflo - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 14,910.53 | Modelled Approach |
| Actiflo - Coagulation Mixer 1 | Add | Consumption | 44.00 | 24 | 385440 | £ 0.35 | £ 134,904.00 | From Veolia Info. |
| Actiflo - Coagulation Mixer 2 | Add | Consumption | 44.00 | 24 | 385440 | £ 0.35 | £ 134,904.00 | From Veolia Info. |
| Actiflo - Flocculation Mixer | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Actiflo - Scraper | Add | Consumption | 3.82 | 24 | 33463 | £ 0.35 | £ 11,712.12 | From Veolia Info. |
| Actiflo - Recycle Pump (Duty) | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Chemical Dosing - PAC | Add | Consumption | | | 0 | £ 0.35 | £ 27,558.69 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Consumption | | | 0 | £ 0.35 | £ 6,951.89 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 12,226.37 | Modelled Approach |
| DWW Balancing Tank | Add | Consumption | | | 0 | £ 0.35 | £ 13,160.03 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,909.30 | Modelled Approach |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| WRc Thickener | Add | Consumption | | | 0 | £ 0.35 | £ 11,143.77 | Modelled Approach |
| Centrifuge Dewaterer | Add | Consumption | | | 0 | £ 0.35 | £ 59,024.57 | Modelled Approach |
| | | | | | | | | |
| FBC1 | Omit | Consumption | 0 | 24 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| FBC2 | Omit | Consumption | 0 | 24 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| RGF Block 4 | Omit | Consumption | 344 | 24 | 3013440 | £ 0.35 | -£ 1,054,704.00 | Duty load taken from latest electrical load schedule |
| RGF Block 5 | Omit | Consumption | 63 | 24 | 551880 | £ 0.35 | -£ 193,158.00 | Duty load taken from latest electrical load schedule |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **-£ 428,729.0** | |
| **Annual Power Carbon** | | | | | | | **-852313.185 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | Manual | | £ 39,357.91 | Modelled Approach |
| RGF - Operational Building | Add | Manual | | £ 5,742.32 | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Dirty washwater tank | Add | Manual | | £ 2,967.41 | Modelled Approach |
| Actiflo - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| Chemical Dosing - PAC | Add | Manual | | £ 154,180.59 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Manual | | £ 1,951.68 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Manual | | £ 16,060.50 | Modelled Approach |
| DWW Balancing Tank | Add | Manual | | £ 3,259.18 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Manual | | £ 2,701.77 | Modelled Approach |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| Centrifuge Dewaterer | Add | Manual | | £ 88,935.47 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **399,240.96** | |
| **Annual Maintenance Carbon** | | | | **184688.868 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sulphuric Acid 96% | Add | | 111.2 | 1840 | 74682 | £ 358.47 | £ 130,841.55 | pH Control |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 18.4 | 1250 | 8395 | £ 57.41 | £ 20,954.65 | Pre-chlorination |
| Polyaluminium Chloride (PACl) 10% | Add | | 248.8 | 1200 | 108953 | £ 874.02 | £ 319,017.30 | Clarification (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 56.2 | 998 | 20485 | £ 14.14 | £ 5,161.10 | Clarification NHBC (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 63.4 | 998 | 23101 | £ 15.95 | £ 5,821.75 | Clarification SHBC (Sedimentation Plant) |
| Polyaluminium Chloride (PACl) 10% | Add | | 179.3 | 1200 | 78516 | £ 629.84 | £ 229,891.60 | Clarification Actiflo [New] |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 156.5 | 998 | 57003 | £ 39.36 | £ 14,366.40 | Clarification Actiflo [New] |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 63.3 | 1250 | 28885 | £ 197.52 | £ 72,094.80 | Disinfection |
| Orthophosphoric Acid | Add | | 205.6 | 1052 | 78943 | £ 273.70 | £ 99,900.50 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 23.2 | 1280 | 10853 | £ 110.63 | £ 40,379.95 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 122.1 | 1500 | 66839 | £ 659.25 | £ 240,626.25 | pH Control |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 31.9 | 998 | 11603 | £ 8.01 | £ 2,923.65 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 799.3 | 998 | 291201 | £ 201.05 | £ 73,383.25 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.3 - Option 3 Detailed OPEX Breakdown

| | |
|---|---|
| **Annual Chemical Costs** | **£ 1,255,362.8** |
| **Annual Chemical Carbon** | **0 CO2 kg** |

### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | | | £ 29,545.16 | Modelled Approach |
| RGF - Operational Building | Add | | | £ 208.31 | Modelled Approach |
| Clean washwater tank | Add | | | £ 2,642.56 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,150.18 | Modelled Approach |
| Actiflo - Operational Building | Add | | | £ 1,965.56 | Modelled Approach |
| Chemical Dosing - PAC | Add | | | £ 56,942.71 | Modelled Approach |
| Chemical Dosing - Polymer | Add | | | £ 739.70 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | | | £ 12,717.04 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 3,459.92 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,868.18 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 2,458.81 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 2,450.23 | Modelled Approach |
| WRc Thickener | Add | | | £ 10,685.29 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 16,089.54 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual People Costs** | | | | **£ 145,923.19** | |
| **Annual People Carbon** | | | | **0 CO2 kg** | |

### *Other*

| *Item* | *Add / omit* | *Qty* | *rate* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Operational Building | Add | | | £ 2,736.14 | Modelled Approach |
| Clean washwater tank | Add | | | £ 2,684.86 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,200.61 | Modelled Approach |
| Actiflo - Operational Building | Add | | | £ 25,818.11 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 3,515.30 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,914.09 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 644.80 | Modelled Approach |
| WRc Thickener | Add | | | £ 3,473.15 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 10,698.36 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual Other Costs** | | | | **£ 56,332.47** | |
| **Annual Other Carbon** | | | | **26059.401 CO2 kg** | |

| | |
|---|---|
| **Total Annual Opex** | **£ 1,428,130.40** |
| **Total Annual Carbon** | **-641564.917 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Egham WTW**

aquaconsultants
water · environment · energy

### *30 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *2* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *3* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *4* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *5* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *6* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *7* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *8* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *9* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *10* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *11* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *12* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *13* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *14* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *15* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *16* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *17* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *18* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *19* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *20* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *21* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *22* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *23* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *24* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *25* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *26* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *27* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *28* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *29* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *30* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *31* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *32* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *33* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *34* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *35* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *36* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *37* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *38* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *39* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *40* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 42,843,912.11** |

# Feasibility Estimate

## Net Present Value

**Egham WTW**

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### 5.3 NPV Option 3

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| *Yr* | *Capital Investment* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|---|
| | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | |
| *CAPEX Yr1* | £ *11,185,937* | | | | | | | | £ *11,185,937* |
| *CAPEX Yr2* | £ *20,134,687* | | | | | | | | £ *20,134,687* |
| *CAPEX Yr3* | £ *13,423,125* | | | | | | | | £ *13,423,125* |
| ***1*** | £ - | -£ 416,565 | £ 387,914 | £ 1,219,746 | £ 141,783 | £ - | £ - | £ 54,734 | £ 1,387,612 |
| ***2*** | £ - | -£ 404,747 | £ 376,908 | £ 1,185,140 | £ 137,761 | £ - | £ - | £ 53,181 | £ 1,348,243 |
| ***3*** | £ - | -£ 393,263 | £ 366,215 | £ 1,151,516 | £ 133,852 | £ - | £ - | £ 51,672 | £ 1,309,992 |
| ***4*** | £ - | -£ 382,106 | £ 355,825 | £ 1,118,846 | £ 130,054 | £ - | £ - | £ 50,206 | £ 1,272,825 |
| ***5*** | £ - | -£ 371,265 | £ 345,729 | £ 1,087,102 | £ 126,365 | £ - | £ - | £ 48,782 | £ 1,236,713 |
| ***6*** | £ - | -£ 360,732 | £ 335,920 | £ 1,056,259 | £ 122,779 | £ - | £ - | £ 47,398 | £ 1,201,626 |
| ***7*** | £ - | -£ 350,497 | £ 326,390 | £ 1,026,292 | £ 119,296 | £ - | £ - | £ 46,053 | £ 1,167,534 |
| ***8*** | £ - | -£ 340,553 | £ 317,130 | £ 997,174 | £ 115,911 | £ - | £ - | £ 44,747 | £ 1,134,409 |
| ***9*** | £ - | -£ 330,891 | £ 308,132 | £ 968,883 | £ 112,623 | £ - | £ - | £ 43,477 | £ 1,102,224 |
| ***10*** | £ - | -£ 321,503 | £ 299,390 | £ 941,394 | £ 109,428 | £ - | £ - | £ 42,244 | £ 1,070,952 |
| ***11*** | £ - | -£ 312,381 | £ 290,896 | £ 914,685 | £ 106,323 | £ - | £ - | £ 41,045 | £ 1,040,568 |
| ***12*** | £ - | -£ 303,519 | £ 282,643 | £ 888,734 | £ 103,306 | £ - | £ - | £ 39,881 | £ 1,011,045 |
| ***13*** | £ - | -£ 294,907 | £ 274,624 | £ 863,519 | £ 100,375 | £ - | £ - | £ 38,749 | £ 982,360 |
| ***14*** | £ - | -£ 286,540 | £ 266,832 | £ 839,020 | £ 97,528 | £ - | £ - | £ 37,650 | £ 954,489 |
| ***15*** | £ - | -£ 278,411 | £ 259,262 | £ 815,216 | £ 94,761 | £ - | £ - | £ 36,582 | £ 927,409 |
| ***16*** | £ - | -£ 270,512 | £ 251,906 | £ 792,087 | £ 92,072 | £ - | £ - | £ 35,544 | £ 901,097 |
| ***17*** | £ - | -£ 262,837 | £ 244,759 | £ 769,614 | £ 89,460 | £ - | £ - | £ 34,535 | £ 875,531 |
| ***18*** | £ - | -£ 255,380 | £ 237,815 | £ 747,779 | £ 86,922 | £ - | £ - | £ 33,555 | £ 850,691 |
| ***19*** | £ - | -£ 248,134 | £ 231,068 | £ 726,563 | £ 84,456 | £ - | £ - | £ 32,603 | £ 826,556 |
| ***20*** | £ 6,464,093 | -£ 241,094 | £ 224,512 | £ 705,950 | £ 82,059 | £ - | £ - | £ 31,678 | £ 7,267,198 |
| ***21*** | £ - | -£ 234,254 | £ 218,142 | £ 685,921 | £ 79,731 | £ - | £ - | £ 30,780 | £ 780,320 |
| ***22*** | £ - | -£ 227,608 | £ 211,953 | £ 666,460 | £ 77,469 | £ - | £ - | £ 29,906 | £ 758,181 |
| ***23*** | £ - | -£ 221,151 | £ 205,940 | £ 647,552 | £ 75,271 | £ - | £ - | £ 29,058 | £ 736,670 |
| ***24*** | £ - | -£ 214,876 | £ 200,097 | £ 629,180 | £ 73,136 | £ - | £ - | £ 28,233 | £ 715,770 |
| ***25*** | £ - | -£ 208,780 | £ 194,420 | £ 611,329 | £ 71,061 | £ - | £ - | £ 27,432 | £ 695,462 |
| ***26*** | £ - | -£ 202,856 | £ 188,904 | £ 593,984 | £ 69,045 | £ - | £ - | £ 26,654 | £ 675,731 |
| ***27*** | £ - | -£ 197,101 | £ 183,544 | £ 577,132 | £ 67,086 | £ - | £ - | £ 25,898 | £ 656,559 |
| ***28*** | £ - | -£ 191,509 | £ 178,337 | £ 560,758 | £ 65,182 | £ - | £ - | £ 25,163 | £ 637,932 |
| ***29*** | £ - | -£ 186,076 | £ 173,277 | £ 544,848 | £ 63,333 | £ - | £ - | £ 24,449 | £ 619,832 |
| ***30*** | £ - | -£ 180,796 | £ 168,361 | £ 529,390 | £ 61,536 | £ - | £ - | £ 23,756 | £ 602,247 |
| ***31*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***32*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***33*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***34*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***35*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***36*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***37*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***38*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***39*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***40*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 79,491,524.86** |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.4 - Actiflo + New RGF's [Steel]
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| **RGF's + FBC** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | RGF 4 & 5 to be abandoned + Demolished | Scope of work required<br>4 beds of area 36.8 m2. Length= 5.04m and width = 3.65 m per bay | 1 | 1 | Sum | | £ 50,000.00 | PC Sum for Demolition assuming tanks are 3m Deep. |
| 2 | FBC 2 to be abandoned / demolished and replaced by new RGFs | Scope of work required<br>Rough dimensions FBC2/ RGF5 = 37 x 23 m | 1 | 1 | Sum | | £ 200,000.00 | PC Sum for Demolition |
| 3 | Install 12 No. New RGF's | 12 No. RGF Cells; Single Bed Type; beds of area 36.8m2, Length = 10.8 and width 3.6 per bay | 1 | 466.56 | m2 | | £ 6,846,517.40 | Rapid Gravity Filter (m2) |
| 4 | FBC 1 to be demolished | 12m long, 4.5m wide, and 5.1m depth for FBC 1. | 1 | 275.4 | m3 | | £ 75,000.00 | PC Sum for Demolition |
| 5 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building (m2) |
| 6 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ - | Assumed to be incl. in RGF |
| 7 | Clean washwater tank | Volume: 700m3 | 1 | 700 | m3 | | £ 311,874.66 | Concrete Tank; Open Top; Water Storage |
| 8 | Dirty washwater tank | Volume: 1200m3 | 1 | 1200 | m3 | | £ 379,526.77 | Concrete Tank; Open Top; Washwater Recovery |
| 9 | Dirty washwater delivery pipe (pumped) | 220m length, 300mm diameter | 220 | 300 | mm | | £ 116,921.53 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | BACKWASH PUMPS | 3 No. D/A/S; Duty 1788m3/h @ 6.5m HD | 1 | 44 | kW | | £ 188,650.92 | Interprocess Pumping |
| 2 | AIR SCOUR BLOWERS | 2 No. D/S; Duty 2679Nm3/hr @ 600mBar | 1 | 2679 | Nm3/hr | | £ 87,974.28 | Air Blower |
| 3 | FILTER OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 4 | FILTER INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 5 | CLEAN BACKWASH INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 6 | DIRTY BACKWASH OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 7 | AIR SCOUR INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 8 | | | | | | | £ - | Incl. in RGF Model |
| 9 | RGF LCPs | | | | | | £ - | Incl. in Building Model |
| 10 | HVAC | | | | | | £ - | Incl. in Building Model |
| 11 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 12 | Building services | | | | | | £ - | Incl. in Building/Process Unit Models |
| 13 | Access steelwork | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | Hydraulic Study | A hydraulic study of the Sedimentation plant cost has been estimated to be around £9000- assumed £100/hour for labour and total estimate for hours is 90 hours | 90 | 1 | HRS | | £ 9,000.00 | Allow for Hydraulic Study |
| 16 | Control Valves | Following the hydraulic study, it is likely we will be recommending flow meters and/or valves | 20 | 300 | Dia | | £ 291,701.60 | Flow Control Valve |
| 17 | Flowmeters | | 20 | 300 | Dia | | £ 78,069.00 | Magnetic Flow Meter |
| 18 | UV Treatment to GAC | The cost of retrofitting two GAC contactors with UV, including GAC backwash facilities has been approximated at £500,000 | 1 | 1 | Sum | | £ 500,000.00 | UV Plant to GAC's |
| 19 | | | | | | | £ - | |
| 20 | | | | | | | £ - | |
| **Actiflo Package Plant** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ 399,150.63 | Concrete Open Top Tank; Used to cost for 4m DP Substructure<br>Allow 40% of cost to be offset against tank costs in Actiflo scope which it is assumed will form the majority of the basement area. |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | Interconnecting Pipework - Inlet to AC10 Streams | Above ground pipework feeding each of the 2 No. streams | 20 | 1400 | mm | | £ 122,648.31 | Interprocess Pipework; Above Ground |
| 6 | Coagulation Tank | Rapid Mixer' tank - Length 6.8 m, Width 8.0 m, Depth 8.5 m; | 2 | 462.4 | m3 | | £ 734,174.25 | Concrete Tank - All Types |
| 7 | Flocculation Tank | Floc tank - Length 7.5 m, Width 10.28 m, Depth 8.5 m; | 2 | 655.4 | m3 | | £ 1,012,159.34 | Concrete Tank - All Types |
| 8 | Settler Tank | Actiflo Settler Tank - Length 10.28m, Width 10.28m Depth 8.5m; | 2 | 898.3 | m3 | | £ 1,362,136.73 | Concrete Tank - All Types |
| 9 | Interconnecting Pipework - Outlet from AC10 Streams | Below ground gravity DN1400 ; Ductile Iron; | 110 | 1400 | mm | | £ 265,273.92 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |
| 11 | | | | | | | £ - | |
| 12 | | | | | | | £ - | |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

aquaconsultants
water · environment · energy

### 3.4 - Actiflo + New RGF's [Steel]
***Direct Works***

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| 1 | Ballasted Coagulation System | 2x Actiflo turbo AC10 streams; Coagulation and flocculation mixers c/w supports; Lamellas, Sludge Recirc Pumps & Pipework; Hydrocyclones; Control and Instrumentation etc | 1 | 1 | No | | £ 2,700,000.00 | Actiflo Package; Quote from Veolia |
| 2 | Chemical Dosing - PAC | Dose Rate 5133.37 kg/d; Flow to be treated - 74.54 MLD | 1 | 74.54 | MLD | | £ 649,114.90 | Chemical Dosing; PAC Dosing |
| 3 | Chemical Dosing - Ferric | ?? | | | | | £ - | |
| 4 | Chemical Dosing - Polymer | Dose Rate 18.63 kg/d; Flow to be treated - 74.54 MLD | 1 | 74.54 | MLD | | £ 217,109.18 | Chemical Dosing; Polyelectrolyte |
| 5 | Chemical Dosing - Sulphuric Acid | Dose Rate 4882.74 kg/d; Flow to be treated - 153.69 MLD | 1 | 153.69 | MLD | | £ 675,989.27 | Chemical Dosing; pH Adjustment |
| 6 | HVAC | | | | | | £ - | Incl. in Building Model |
| 7 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 8 | Building services | | | | | | £ - | Incl. in Building Model |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Access Roads, Drainage and Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 240m x 3.5m width | 1 | 840 | m2 | | £ 83,900.10 | Site Roads; All Types |
| 2 | Road drainage | 240m length | 1 | 240 | m | | £ 56,666.08 | Drainage |
| 3 | Membrane CIP waste pipe | 250m length, 200mm diameter | 250 | 200 | mm | | £ 105,037.28 | Interprocess Pipework; Below Ground |
| 4 | landscaping | 2000m2 (10m width around works to be made good on completion) | 1 | 2000 | m2 | | £ 25,549.26 | Landscaping + Planting |
| 5 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 204,984.40 | Interprocess Pipework; Below Ground |
| 6 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 10m length, DN 1000, buried | 10 | 1000 | mm | | £ 17,477.70 | Interprocess Pipework; Below Ground |
| 7 | Delivery Pipework (to Inter-ozone) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 204,984.40 | Interprocess Pipework; Below Ground |
| 8 | Overflow pipework (from PS) | 150m length 1m diameter 1m cover in hardstanding (to redundant SSF well) | 150 | 1000 | mm | | £ 262,165.27 | Interprocess Pipework; Below Ground |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | RMU | 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | 1 | 1 | No. | | £ 100,000.00 | Allow |
| 2 | Cabling (3.3kV) | | 1 | 200 | m | | £ 95,997.25 | HV Cabling (m) |
| 3 | Cabling (LV) | | 1 | 200 | m | | £ 41,644.75 | General - LV Cabling with Ducts and Drawpits (m) |
| 4 | 400V | | 1 | 1200 | m | | £ 116,296.83 | General - LV Cabling with Ducts and Drawpits (m) |
| 5 | Comms | | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 6 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 7 | PLC network extension and network node box | | | | | | £ 50,000.00 | Allow |
| 8 | SCADA integration/configuration | | | | | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 9 | DNO charges (amendment to authorised supply capacity) | Load based on Drive List Please advise if different | 1 | 500.0 | kVA | | £ 54,986.35 | New Power Supply to Site |
| 10 | ERACS study | | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 11 | MCC (Design and installation) | Max. Installed kW of MCC - Taken from Drive List - Please advise if different | 1 | 293 | kW | | £ 130,799.25 | Motor Control Centre (MCC); Based on Load Schedule |
| 12 | Potential for standby generator? | | 1 | 2000 | kVA | | £ 498,893.28 | Emergency Power Generation |
| 13 | Electrical Installation | | | | | | £ - | |
| 14 | | | | | | | £ - | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

### 3.4 - Actiflo + New RGF's [Steel]
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 15 | | | | | | | £ - | |
| **ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Instrumentation | Level, pressure, flow instrumentation etc | | | | | £ - | 0 |
| 2 | PLC and integration with UV reactor LCPs | Including control software and modification to existing site control for plant shutdown and interfacing etc | | | | | £ - | 0 |
| 3 | HMI | | | | | | £ - | 0 |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **DWW Thickener + Dewatering** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | WRc Thickener | Thickener Diameter 12.5m; Throughput of 4MLD; Thickened Sludge Solids Concentration 2.5% | 1 | 490.9 | m3 | | £ 563,461.98 | Wash Water Recovery Tank |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Centrifuge Dewaterer | Throughput of 1 MLD; Flow rate of 47m3/hr | 1 | 6.17 | TTDS/YR | | £ 797,717.21 | Centrifuge |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 27,594,086.38** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 41.6% | £ 11,486,836.46 | |

| | | |
|---|---|---|
| **Construction Cost** | **£** | **39,080,922.84** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 14.5% | £ 5,662,825.72 | |

| | | |
|---|---|---|
| **Project Cost** | **£** | **44,743,748.56** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.4 - Option 4 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | Consumption | | | 0 | £ 0.350 | £ 53,535.92 | Modelled Approach |
| RGF - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 1,580.18 | Modelled Approach |
| Clean washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ - | Use Existing |
| Dirty washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ - | Use Existing |
| Actiflo - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 14,910.53 | Modelled Approach |
| Actiflo - Coagulation Mixer 1 | Add | Consumption | 44.00 | 24 | 385440 | £ 0.35 | £ 134,904.00 | From Veolia Info. |
| Actiflo - Coagulation Mixer 2 | Add | Consumption | 44.00 | 24 | 385440 | £ 0.35 | £ 134,904.00 | From Veolia Info. |
| Actiflo - Flocculation Mixer | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Actiflo - Scraper | Add | Consumption | 3.82 | 24 | 33463 | £ 0.35 | £ 11,712.12 | From Veolia Info. |
| Actiflo - Recycle Pump (Duty) | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Chemical Dosing - PAC | Add | Consumption | | | 0 | £ 0.35 | £ 27,558.69 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Consumption | | | 0 | £ 0.35 | £ 6,951.89 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 12,226.37 | Modelled Approach |
| DWW Balancing Tank | Add | Consumption | | | 0 | £ 0.35 | £ 13,160.03 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,909.30 | Modelled Approach |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| WRc Thickener | Add | Consumption | | | 0 | £ 0.35 | £ 11,143.77 | Modelled Approach |
| Centrifuge Dewaterer | Add | Consumption | | | 0 | £ 0.35 | £ 59,024.57 | Modelled Approach |
| | | | | | | | | |
| FBC1 | Omit | Consumption | 0 | 24 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| FBC2 | Omit | Consumption | 0 | 24 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| RGF Block 4 | Omit | Consumption | 344 | 24 | 3013440 | £ 0.35 | -£ 1,054,704.00 | Duty load taken from latest electrical load schedule |
| RGF Block 5 | Omit | Consumption | 63 | 24 | 551880 | £ 0.35 | -£ 193,158.00 | Duty load taken from latest electrical load schedule |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **-£ 428,729.0** | |
| **Annual Power Carbon** | | | | | | | **-852313.185 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | Manual | | £ 39,357.91 | Modelled Approach |
| RGF - Operational Building | Add | Manual | | £ 5,742.32 | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Dirty washwater tank | Add | Manual | | £ 2,967.41 | Modelled Approach |
| Actiflo - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| Chemical Dosing - PAC | Add | Manual | | £ 154,180.59 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Manual | | £ 1,951.68 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Manual | | £ 16,060.50 | Modelled Approach |
| DWW Balancing Tank | Add | Manual | | £ 3,259.18 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Manual | | £ 2,701.77 | Modelled Approach |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| Centrifuge Dewaterer | Add | Manual | | £ 88,935.47 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **399,240.96** | |
| **Annual Maintenance Carbon** | | | | **184688.868 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/tonne)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sulphuric Acid 96% | Add | | 111.2 | 1840 | 74682 | £ 358.47 | £ 130,841.55 | pH Control |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 18.4 | 1250 | 8395 | £ 57.41 | £ 20,954.65 | Pre-chlorination |
| Polyaluminium Chloride (PACl) 10% | Add | | 248.8 | 1200 | 108953 | £ 874.02 | £ 319,017.30 | Clarification (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 56.2 | 998 | 20485 | £ 14.14 | £ 5,161.10 | Clarification NHBC (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 63.4 | 998 | 23101 | £ 15.95 | £ 5,821.75 | Clarification SHBC (Sedimentation Plant) |
| Polyaluminium Chloride (PACl) 10% | Add | | 179.3 | 1200 | 78516 | £ 629.84 | £ 229,891.60 | Clarification Actiflo [New] |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 156.5 | 998 | 57003 | £ 39.36 | £ 14,366.40 | Clarification Actiflo [New] |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 63.3 | 1250 | 28885 | £ 197.52 | £ 72,094.80 | Disinfection |
| Orthophosphoric Acid | Add | | 205.6 | 1052 | 78943 | £ 273.70 | £ 99,900.50 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 23.2 | 1280 | 10853 | £ 110.63 | £ 40,379.95 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 122.1 | 1500 | 66839 | £ 659.25 | £ 240,626.25 | pH Control |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 31.9 | 998 | 11603 | £ 8.01 | £ 2,923.65 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 799.3 | 998 | 291201 | £ 201.05 | £ 73,383.25 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,255,362.8** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.4 - Option 4 Detailed OPEX Breakdown

***People***

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Rapid Gravity Filters | Add | | | £ 29,545.16 | Modelled Approach |
| RGF - Operational Building | Add | | | £ 208.31 | Modelled Approach |
| Clean washwater tank | Add | | | £ 2,642.56 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,150.18 | Modelled Approach |
| Actiflo - Operational Building | Add | | | £ 1,965.56 | Modelled Approach |
| Chemical Dosing - PAC | Add | | | £ 56,942.71 | Modelled Approach |
| Chemical Dosing - Polymer | Add | | | £ 739.70 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | | | £ 12,717.04 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 3,459.92 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,868.18 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 2,458.81 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 2,450.23 | Modelled Approach |
| WRc Thickener | Add | | | £ 10,685.29 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 16,089.54 | Modelled Approach |
| | | | | | |
| **Annual People Costs** | | | | **£ 145,923.19** | |
| **Annual People Carbon** | | | | **0 CO2 kg** | |

***Other***

| *Item* | *Add / omit* | *Qty* | *rate* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| RGF - Operational Building | Add | | | £ 2,736.14 | Modelled Approach |
| Clean washwater tank | Add | | | £ 2,684.86 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,200.61 | Modelled Approach |
| Actiflo - Operational Building | Add | | | £ 25,818.11 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 3,515.30 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,914.09 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 644.80 | Modelled Approach |
| WRc Thickener | Add | | | £ 3,473.15 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 10,698.36 | Modelled Approach |
| | | | | | |
| **Annual Other Costs** | | | | **£ 56,332.47** | |
| **Annual Other Carbon** | | | | **26059.401 CO2 kg** | |

| | |
|---|---|
| **Total Annual Opex** | **£ 1,428,130.40** |
| **Total Annual Carbon** | **-641564.917 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Egham WTW**

aquaconsultants
water · environment · energy

### *30 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *2* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *3* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *4* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *5* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *6* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *7* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *8* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *9* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *10* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *11* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *12* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *13* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *14* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *15* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *16* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *17* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *18* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *19* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *20* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *21* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *22* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *23* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *24* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *25* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *26* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *27* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *28* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *29* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *30* | -£ 428,729 | £ 399,241 | £ 1,255,363 | £ 145,923 | £ - | £ - | £ 56,332 | £ 1,428,130 |
| *31* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *32* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *33* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *34* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *35* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *36* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *37* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *38* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *39* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *40* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 42,843,912.11** |

# Feasibility Estimate

## Net Present Value

**Egham WTW**

aquaconsultants
water · environment · energy

### 5.4 NPV Option 4

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| *Yr* | *Capital Investment* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|---|
| | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | |
| *CAPEX Yr1* | £ *11,185,937* | | | | | | | | £ *11,185,937* |
| *CAPEX Yr2* | £ *20,134,687* | | | | | | | | £ *20,134,687* |
| *CAPEX Yr3* | £ *13,423,125* | | | | | | | | £ *13,423,125* |
| ***1*** | £ - | -£ 416,565 | £ 387,914 | £ 1,219,746 | £ 141,783 | £ - | £ - | £ 54,734 | £ 1,387,612 |
| ***2*** | £ - | -£ 404,747 | £ 376,908 | £ 1,185,140 | £ 137,761 | £ - | £ - | £ 53,181 | £ 1,348,243 |
| ***3*** | £ - | -£ 393,263 | £ 366,215 | £ 1,151,516 | £ 133,852 | £ - | £ - | £ 51,672 | £ 1,309,992 |
| ***4*** | £ - | -£ 382,106 | £ 355,825 | £ 1,118,846 | £ 130,054 | £ - | £ - | £ 50,206 | £ 1,272,825 |
| ***5*** | £ - | -£ 371,265 | £ 345,729 | £ 1,087,102 | £ 126,365 | £ - | £ - | £ 48,782 | £ 1,236,713 |
| ***6*** | £ - | -£ 360,732 | £ 335,920 | £ 1,056,259 | £ 122,779 | £ - | £ - | £ 47,398 | £ 1,201,626 |
| ***7*** | £ - | -£ 350,497 | £ 326,390 | £ 1,026,292 | £ 119,296 | £ - | £ - | £ 46,053 | £ 1,167,534 |
| ***8*** | £ - | -£ 340,553 | £ 317,130 | £ 997,174 | £ 115,911 | £ - | £ - | £ 44,747 | £ 1,134,409 |
| ***9*** | £ - | -£ 330,891 | £ 308,132 | £ 968,883 | £ 112,623 | £ - | £ - | £ 43,477 | £ 1,102,224 |
| ***10*** | £ - | -£ 321,503 | £ 299,390 | £ 941,394 | £ 109,428 | £ - | £ - | £ 42,244 | £ 1,070,952 |
| ***11*** | £ - | -£ 312,381 | £ 290,896 | £ 914,685 | £ 106,323 | £ - | £ - | £ 41,045 | £ 1,040,568 |
| ***12*** | £ - | -£ 303,519 | £ 282,643 | £ 888,734 | £ 103,306 | £ - | £ - | £ 39,881 | £ 1,011,045 |
| ***13*** | £ - | -£ 294,907 | £ 274,624 | £ 863,519 | £ 100,375 | £ - | £ - | £ 38,749 | £ 982,360 |
| ***14*** | £ - | -£ 286,540 | £ 266,832 | £ 839,020 | £ 97,528 | £ - | £ - | £ 37,650 | £ 954,489 |
| ***15*** | £ - | -£ 278,411 | £ 259,262 | £ 815,216 | £ 94,761 | £ - | £ - | £ 36,582 | £ 927,409 |
| ***16*** | £ - | -£ 270,512 | £ 251,906 | £ 792,087 | £ 92,072 | £ - | £ - | £ 35,544 | £ 901,097 |
| ***17*** | £ - | -£ 262,837 | £ 244,759 | £ 769,614 | £ 89,460 | £ - | £ - | £ 34,535 | £ 875,531 |
| ***18*** | £ - | -£ 255,380 | £ 237,815 | £ 747,779 | £ 86,922 | £ - | £ - | £ 33,555 | £ 850,691 |
| ***19*** | £ - | -£ 248,134 | £ 231,068 | £ 726,563 | £ 84,456 | £ - | £ - | £ 32,603 | £ 826,556 |
| ***20*** | £ 6,464,093 | -£ 241,094 | £ 224,512 | £ 705,950 | £ 82,059 | £ - | £ - | £ 31,678 | £ 7,267,198 |
| ***21*** | £ - | -£ 234,254 | £ 218,142 | £ 685,921 | £ 79,731 | £ - | £ - | £ 30,780 | £ 780,320 |
| ***22*** | £ - | -£ 227,608 | £ 211,953 | £ 666,460 | £ 77,469 | £ - | £ - | £ 29,906 | £ 758,181 |
| ***23*** | £ - | -£ 221,151 | £ 205,940 | £ 647,552 | £ 75,271 | £ - | £ - | £ 29,058 | £ 736,670 |
| ***24*** | £ - | -£ 214,876 | £ 200,097 | £ 629,180 | £ 73,136 | £ - | £ - | £ 28,233 | £ 715,770 |
| ***25*** | £ - | -£ 208,780 | £ 194,420 | £ 611,329 | £ 71,061 | £ - | £ - | £ 27,432 | £ 695,462 |
| ***26*** | £ - | -£ 202,856 | £ 188,904 | £ 593,984 | £ 69,045 | £ - | £ - | £ 26,654 | £ 675,731 |
| ***27*** | £ - | -£ 197,101 | £ 183,544 | £ 577,132 | £ 67,086 | £ - | £ - | £ 25,898 | £ 656,559 |
| ***28*** | £ - | -£ 191,509 | £ 178,337 | £ 560,758 | £ 65,182 | £ - | £ - | £ 25,163 | £ 637,932 |
| ***29*** | £ - | -£ 186,076 | £ 173,277 | £ 544,848 | £ 63,333 | £ - | £ - | £ 24,449 | £ 619,832 |
| ***30*** | £ - | -£ 180,796 | £ 168,361 | £ 529,390 | £ 61,536 | £ - | £ - | £ 23,756 | £ 602,247 |
| ***31*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***32*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***33*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***34*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***35*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***36*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***37*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***38*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***39*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***40*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 79,491,524.86** |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.5 - Ceramic Membrane Plant
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| **RGF's + FBC** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | RGF 4 & 5 to be abandoned | Scope of work required<br>4 beds of area 36.8 m2. Length= 5.04m and width = 3.65 m per bay | 1 | 147.2 | m2 | | £ 50,000.00 | PC Sum for Demolition assuming tanks are 3m Deep. |
| 2 | FBC 2 to be abandoned and FBC1 to be demolished | Scope of work required<br>Rough dimensions FBC2/ RGF5 = 37 x 23 m | 1 | 851 | m2 | | £ 200,000.00 | PC Sum for Demolition |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Hydraulic Study | A hydraulic study of the Sedimentation plant cost has been estimated to be around £9000- assumed £100/hour for labour and total estimate for hours is 90 hours | 90 | 1 | HRS | | £ 9,000.00 | Allow for Hydraulic Study |
| 2 | Control Valves | Following the hydraulic study, it is likely we will be recommending flow meters and/or valves | 20 | 300 | Dia | | £ 291,701.60 | Flow Control Valve |
| 3 | Flowmeters | | 20 | 300 | Dia | | £ 78,069.00 | Magnetic Flow Meter |
| 4 | UV Treatment to GAC | The cost of retrofitting two GAC contactors with UV, including GAC backwash facilities has been approximated at £500,000 | 1 | 1 | Sum | | £ 500,000.00 | UV Plant to GAC's |
| 5 | | | | | | | £ - | |
| **Ceramic Membrane Building** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 7m height 36.4m width 23.7m length | 1 | 862.68 | m2 | | £ 1,291,060.23 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | | | | | | £ - | Assumed to be a flat slab |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | **Ceramic Membrane Package Plant** | Budget Q' from Nanostone; Dated 21st April 2023 | | | | | £ - | Ceramic Package; Budget Q' from Nanostone |
| 2 | | **Pre Capex 3 Design** | | | | | £ - | 0 |
| 3 | | Stage 1 | 1 | 1 | Sum | | £ 212,140.35 | 0 |
| 4 | | Stage 2 - HAZOP 1 Closeout | 1 | 1 | Sum | | £ 212,140.35 | 0 |
| 5 | | Stage 3 | 1 | 1 | Sum | | £ 212,140.35 | 0 |
| 6 | | Stage 4 - HAZOP 2 Closeout / Design Approval | 1 | 1 | Sum | | £ 212,140.35 | 0 |
| 7 | | **Electrical** | | | | | £ - | 0 |
| 8 | | Coagulation | 1 | 1 | Sum | | £ 58,933.06 | 0 |
| 9 | | Membrane | 1 | 1 | Sum | | £ 1,561,665.39 | 0 |
| 10 | | Backwash/CIP/CEBW | 1 | 1 | Sum | | £ 348,364.73 | 0 |
| 11 | | Chemical Waste/Balance of Plant | 1 | 1 | Sum | | £ 358,397.01 | 0 |
| 12 | | Instrumentation & Valves | 1 | 1 | Sum | | £ 741,820.18 | 0 |
| 13 | | **Mechanical** | | | | | £ - | 0 |
| 14 | *Feed Conditioning/Coagulation Tanks* | Feed Conditioning/Coagulation Tanks | 1 | 1 | Sum | | £ 768,329.03 | 0 |
| 15 | *Membrane Feed Pipework* | Membrane Feed Pipework | 1 | 1 | Sum | | £ 379,243.90 | 0 |
| 16 | *Membrane, Valve & Header Skids/Compressed Air System* | Membrane, Valve & Header Skids/Compressed Air System | 1 | 1 | Sum | | £ 12,299,964.67 | 0 |
| 17 | *Membrane Outlet Pipework* | Membrane Outlet Pipework | 1 | 1 | Sum | | £ 54,974.32 | 0 |
| 18 | *Membrane Backwash System* | Membrane Backwash System | 1 | 1 | Sum | | £ 642,366.52 | 0 |
| 19 | *CIP System & CEBW System/RO Plant* | CIP System & CEBW System/RO Plant | 1 | 1 | Sum | | £ 528,675.13 | 0 |
| 20 | | Neutralisation System & Dirty Backwash | 1 | 1 | Sum | | £ - | 0 |
| 21 | | | | | | | £ - | 0 |
| 22 | | Training & Commissioning | 1 | 1 | Sum | | £ 229,905.79 | 0 |
| 23 | | Module Unit Transport | 1 | 1 | Sum | | £ 386,241.73 | 0 |
| 24 | | Pressure Testing & Sterilisation | 1 | 1 | Sum | | £ 52,251.32 | 0 |
| 25 | | Standard O&M's | 1 | 1 | Sum | | £ 23,408.59 | 0 |
| 26 | | **On-Costs** | | | | | £ - | 0 |
| 27 | | Management Fee (15%) | 1 | 1 | Sum | | £ 2,892,465.41 | 0 |
| 28 | | MDP Generic Risk (1%) | 1 | 1 | Sum | | £ 192,831.03 | 0 |
| 29 | | **Additional Options Description** | | | | | £ - | 0 |
| 30 | | FDS, Software & Associated Commissioning (exc. Scada) | 1 | 1 | Sum | | £ 543,780.29 | 0 |
| 31 | | Management Fee (15%) | 1 | 1 | Sum | | £ 81,567.04 | 0 |
| 32 | | MDP Generic Risk (1%) | 1 | 1 | Sum | | £ 6,253.48 | 0 |
| 33 | | | | | | | £ - | 0 |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.5 - Ceramic Membrane Plant
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 34 | | | | | | | £ - | 0 |
| 35 | Membrane MCC | 10m in building electrical room - See MCC below | | | | | £ - | See Overall MCC below |
| 36 | HVAC | | | | | | £ - | Incl. in Building Model |
| 37 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 38 | Building services | | | | | | £ - | Incl. in Building Model |
| 39 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models/RSE Quote |
| 40 | | | | | | | £ - | 0 |
| **Chemical Storage** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Chemicals Delivery Area | Assume 40m2 per Package | 2 | 40 | m2 | | £ 26,067.93 | Hardstanding Area |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Chemical storage - pH Control - Sulphuric Acid | Dose Rate 4788.82 kg/d; Flow to be treated - 150.73 MLD | 1 | 150.73 | MLD | | £ 671,929.02 | Chemical Dosing; pH Adjustment |
| 2 | Chemical storage - Coag. - Aluminium Sulphate | Dose Rate 99.58 kg/d; Flow to be treated - 68.58 MLD | 1 | 68.58 | MLD | | £ 311,652.38 | Chemical Dosing; Coagulant |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Tanks** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | DWW Balancing Tank | Provisional - 700 m3 | 1 | 700 | m3 | | £ 311,874.66 | Concrete Tank; Open Top; Washwater Recovery |
| 2 | GAC Clean Backwash Tank | 900 m3 | 1 | 900 | m3 | | £ 340,711.77 | Concrete Tank; Open Top; Water Storage |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Access Roads, Drainage and Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 240m x 3.5m width | 1 | 840 | m2 | | £ 83,900.10 | Site Roads; All Types |
| 2 | Road drainage | 240m length | 1 | 240 | m | | £ 56,666.08 | Drainage |
| 3 | Membrane CIP waste pipe | 250m length, 200mm diameter | 250 | 200 | mm | | £ 105,037.28 | Interprocess Pipework; Below Ground |
| 4 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 204,984.40 | Interprocess Pipework; Below Ground |
| 5 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 10m length, DN 1000, buried | 10 | 1000 | mm | | £ 17,477.70 | Interprocess Pipework; Below Ground |
| 6 | Delivery Pipework (to Inter-ozone) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 204,984.40 | Interprocess Pipework; Below Ground |
| 7 | Overflow pipework (from PS) | 150m length 1m diameter 1m cover in hardstanding (to redundant SSF well) | 150 | 1000 | mm | | £ 262,165.57 | Interprocess Pipework; Below Ground |
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.5 - Ceramic Membrane Plant
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Cabling (11kV) | 400m | 1 | 400 | m | | £ 169,484.99 | HV Cabling (m) |
| 2 | 400V | 800m | 1 | 800 | m | | £ 92,180.46 | General - LV Cabling with Ducts and Drawpits (m) |
| 3 | Comms | 200m | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 4 | Transformer x 2 No. (3.3kV - 400V) 800 kVA | Allow £50k for purchase, extra for installation. | 2 | 800 | kVA | | £ 150,637.89 | Transformer |
| 5 | UPS | allow £50k supply only | | | | | £ 75,000.00 | Allow |
| 6 | PLC network extension and network node box | Break into existing network in adjacent GAC building. | | | | | £ 50,000.00 | Allow |
| 7 | SCADA integration/configuration | | 1 | 1 | No. | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 8 | DNO charges (amendment to authorised supply capacity) | No Load Data available - ~~Use 800kVA unless advised otherwise~~ | 1 | 2000.0 | kVA | | £ 372,020.26 | New Power Supply to Site |
| 9 | ERACS study | allow 15k | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 10 | 2 No. RMUs (non extendible) One for each transformer | A non extendible RMU is approx £15k | | | | | £ 50,000.00 | Allow |
| 11 | Existing dated 11kV site cabling to be replaced | 400m | 1 | 400 | m | | £ 169,484.99 | HV Cabling (m) |
| 12 | MCC | No scope item for MCC to serve new scope items (except IPS) | 1 | 1140.8 | kW | | £ 693,680.11 | Motor Control Centre (MCC) |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Instrumentation | Level, pressure, flow instrumentation etc | | | | | £ - | 0 |
| 2 | PLC and integration with UV reactor LCPs | Including control software and modification to existing site control for plant shutdown and interfacing etc | | | | | £ - | 0 |
| 3 | HMI | | | | | | £ - | 0 |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **DWW Thickener + Dewatering** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | WRc Thickener | Thickener Diameter 12.5m; Throughput of 4MLD; Thickened Sludge Solids Concentration 2.5% | 1 | 490.9 | m3 | | £ 563,461.98 | Wash Water Recovery Tank |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Centrifuge Dewaterer | Throughput of 1 MLD; Flow rate of 47m3/hr | 1 | 6.17 | TTDS/YR | | £ 797,717.21 | Centrifuge |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 31,455,244.81** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 41.6% | £ 13,094,155.33 | |

| | |
|---|---|
| **Construction Cost** | **£ 44,549,400.13** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 14.5% | £ 6,455,208.08 | |

| | |
|---|---|
| **Project Cost** | **£ 51,004,608.21** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.5 - Option 5 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Ceramic Membrane - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 5,305.66 | Modelled Approach |
| Ceramic Membrane Package Plant | Add | Consumption | | | 0 | £ 0.350 | £ - | No Info. |
| | Add | Consumption | | | | £ 0.35 | | |
| Feed Pumps | Add | Consumption | 500.00 | 16 | 2920000 | £ 0.35 | £ 1,022,000.00 | INDICATIVE - Membrane CIP |
| BW Pumps | Add | Consumption | 180.00 | 4 | 262800 | £ 0.35 | £ 91,980.00 | INDICATIVE - Membrane CIP |
| Coagulant Dosing Pump | Add | Consumption | 0.25 | 16 | 1460 | £ 0.35 | £ 511.00 | INDICATIVE - Membrane CIP |
| Coagulant Dispersion Pump | Add | Consumption | 1.10 | 16 | 6424 | £ 0.35 | £ 2,248.40 | INDICATIVE - Membrane CIP |
| | Add | Consumption | | | | £ 0.35 | | INDICATIVE - Membrane CIP |
| Sodium Hypo Dosing Pump | Add | Consumption | 0.25 | 4 | 365 | £ 0.35 | £ 127.75 | INDICATIVE - Membrane CIP |
| Caustic Dosing Pump | Add | Consumption | 0.15 | 4 | 219 | £ 0.35 | £ 76.65 | INDICATIVE - Membrane CIP |
| Sulphuric Acid Dosing Pump | Add | Consumption | 0.15 | 4 | 219 | £ 0.35 | £ 76.65 | INDICATIVE - Membrane CIP |
| Neutralisation Circulation Pump | Add | Consumption | 16.00 | 4 | 23360 | £ 0.35 | £ 8,176.00 | INDICATIVE - Membrane CIP |
| CIP Pump | Add | Consumption | 6.00 | 4 | 8760 | £ 0.35 | £ 3,066.00 | INDICATIVE - Membrane CIP |
| Air Compressors | Add | Consumption | 5.50 | 4 | 8030 | £ 0.35 | £ 2,810.50 | INDICATIVE - Membrane CIP |
| | Add | Consumption | | | | £ 0.35 | | |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 12,112.30 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | Consumption | | | 0 | £ 0.35 | £ 2,994.05 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 12,226.37 | Modelled Approach |
| DWW Balancing Tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,909.30 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,051.15 | Modelled Approach |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| WRc Thickener | Add | Consumption | | | 0 | £ 0.35 | £ 11,143.77 | Modelled Approach |
| Centrifuge Dewaterer | Add | Consumption | | | 0 | £ 0.35 | £ 59,024.57 | Modelled Approach |
| | | | | | | | | |
| FBC1 | Omit | Consumption | 0 | 24 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| FBC2 | Omit | Consumption | 0 | 24 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| RGF Block 4 | Omit | Consumption | 344 | 24 | 3013440 | £ 0.35 | -£ 1,054,704.00 | Duty load taken from latest electrical load schedule |
| RGF Block 5 | Omit | Consumption | 63 | 24 | 551880 | £ 0.35 | -£ 193,158.00 | Duty load taken from latest electrical load schedule |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 9,820.2** | |
| **Annual Power Carbon** | | | | | | | **19522.532 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| Ceramic Membrane - Operational Building | Add | Manual | | £ 19,280.59 | Modelled Approach |
| Ceramic Membrane Package Plant | Add | Manual | | | No Info. |
| Clean washwater tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Ceramic Membrane Package Plant | Add | Modelled | £ - | | Modelled Approach |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | Manual | | £ 15,910.65 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | Manual | | £ 4,887.07 | Modelled Approach |
| DWW Balancing Tank | Add | Manual | | £ 2,701.77 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| Centrifuge Dewaterer | Add | Manual | | £ 88,935.47 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **164,104.56** | |
| **Annual Maintenance Carbon** | | | | **75914.769 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sulphuric Acid 96% | Add | | 111.2 | 1840 | 74682 | £ 349.31 | £ 127,498.15 | pH Control |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 18.4 | 1250 | 8395 | £ 55.94 | £ 20,418.10 | Pre-chlorination |
| Polyaluminium Chloride (PACl) 10% | Add | | 248.8 | 1200 | 108953 | £ 909.56 | £ 331,989.40 | Clarification (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 56.2 | 998 | 20485 | £ 14.72 | £ 5,372.80 | Clarification NHBC (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 63.4 | 998 | 23101 | £ 16.60 | £ 6,059.00 | Clarification SHBC (Sedimentation Plant) |
| Aluminium Sulphate 8% Solution | Add | | 179.3 | 2710 | 177315 | £ 74.04 | £ 27,025.71 | Ceramic Membrane |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 63.3 | 1250 | 28885 | £ 197.52 | £ 72,094.80 | Disinfection |
| Orthophosphoric Acid | Add | | 205.6 | 1052 | 78943 | £ 273.70 | £ 99,900.50 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 23.2 | 1280 | 10853 | £ 110.63 | £ 40,379.95 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 122.1 | 1500 | 66839 | £ 659.25 | £ 240,626.25 | pH Control |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 31.9 | 998 | 11603 | £ 5.92 | £ 2,160.80 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 799.3 | 998 | 291201 | £ 192.57 | £ 70,288.05 | Sludge Dewatering |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,043,813.5** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.5 - Option 5 Detailed OPEX Breakdown

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Ceramic Membrane - Operational Building | Add | | | £ 699.41 | Modelled Approach |
| Ceramic Membrane Package Plant | Add | | | | No Info. |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | | | £ 12,598.39 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | | | £ 8,751.88 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 2,868.18 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,642.56 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 2,458.81 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 2,450.23 | Modelled Approach |
| WRc Thickener | Add | | | £ 10,685.29 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 16,089.54 | Modelled Approach |
| | | | | | |
| **Annual People Costs** | | | | **£ 59,244.29** | |
| **Annual People Carbon** | | | | **0 CO2 kg** | |

#### *Other*

| *Item* | *Add / omit* | *Qty* | *rate* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Ceramic Membrane - Operational Building | Add | | | £ 9,186.94 | Modelled Approach |
| Ceramic Membrane Package Plant | Add | | | | No Info. |
| DWW Balancing Tank | Add | | | £ 2,914.09 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ 2,684.86 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 644.80 | Modelled Approach |
| WRc Thickener | Add | | | £ 3,473.15 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ 10,698.36 | Modelled Approach |
| | | | | | |
| **Annual Other Costs** | | | | **£ 30,249.25** | |
| **Annual Other Carbon** | | | | **13993.303 CO** | |

| | |
|---|---|
| **Total Annual Opex** | **£ 1,307,231.80** |
| **Total Annual Carbon** | **109430.605 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Egham WTW**

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### *30 Year OPEX intervention*

Costs at estimate base date

| Yr | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | £ - |
| 1 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 2 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 3 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 4 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 5 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 6 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 7 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 8 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 9 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 10 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 11 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 12 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 13 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 14 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 15 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 16 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 17 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 18 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 19 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 20 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 21 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 22 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 23 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 24 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 25 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 26 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 27 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 28 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 29 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 30 | £ 9,820 | £ 164,105 | £ 1,043,814 | £ 59,244 | £ - | £ - | £ 30,249 | £ 1,307,232 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 39,216,954.03** |

# Feasibility Estimate

## Net Present Value

**Egham WTW**

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### 5.5 NPV Option 5

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| *Yr* | *Capital Investment* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|---|
| | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | |
| *CAPEX Yr1* | £ *12,751,152* | | | | | | | | £ *12,751,152* |
| *CAPEX Yr2* | £ *22,952,074* | | | | | | | | £ *22,952,074* |
| *CAPEX Yr3* | £ *15,301,382* | | | | | | | | £ *15,301,382* |
| ***1*** | £ - | £ 9,542 | £ 159,449 | £ 1,014,199 | £ 57,563 | £ - | £ - | £ 29,391 | £ 1,270,144 |
| ***2*** | £ - | £ 9,271 | £ 154,925 | £ 985,425 | £ 55,930 | £ - | £ - | £ 28,557 | £ 1,234,108 |
| ***3*** | £ - | £ 9,008 | £ 150,529 | £ 957,466 | £ 54,343 | £ - | £ - | £ 27,747 | £ 1,199,094 |
| ***4*** | £ - | £ 8,752 | £ 146,259 | £ 930,302 | £ 52,802 | £ - | £ - | £ 26,960 | £ 1,165,074 |
| ***5*** | £ - | £ 8,504 | £ 142,109 | £ 903,908 | £ 51,304 | £ - | £ - | £ 26,195 | £ 1,132,019 |
| ***6*** | £ - | £ 8,263 | £ 138,077 | £ 878,262 | £ 49,848 | £ - | £ - | £ 25,452 | £ 1,099,902 |
| ***7*** | £ - | £ 8,028 | £ 134,160 | £ 853,345 | £ 48,434 | £ - | £ - | £ 24,730 | £ 1,068,696 |
| ***8*** | £ - | £ 7,800 | £ 130,353 | £ 829,134 | £ 47,060 | £ - | £ - | £ 24,028 | £ 1,038,375 |
| ***9*** | £ - | £ 7,579 | £ 126,655 | £ 805,610 | £ 45,724 | £ - | £ - | £ 23,346 | £ 1,008,915 |
| ***10*** | £ - | £ 7,364 | £ 123,062 | £ 782,754 | £ 44,427 | £ - | £ - | £ 22,684 | £ 980,291 |
| ***11*** | £ - | £ 7,155 | £ 119,570 | £ 760,546 | £ 43,167 | £ - | £ - | £ 22,040 | £ 952,478 |
| ***12*** | £ - | £ 6,952 | £ 116,178 | £ 738,968 | £ 41,942 | £ - | £ - | £ 21,415 | £ 925,455 |
| ***13*** | £ - | £ 6,755 | £ 112,882 | £ 718,002 | £ 40,752 | £ - | £ - | £ 20,807 | £ 899,198 |
| ***14*** | £ - | £ 6,563 | £ 109,679 | £ 697,631 | £ 39,596 | £ - | £ - | £ 20,217 | £ 873,687 |
| ***15*** | £ - | £ 6,377 | £ 106,567 | £ 677,839 | £ 38,472 | £ - | £ - | £ 19,643 | £ 848,899 |
| ***16*** | £ - | £ 6,196 | £ 103,544 | £ 658,607 | £ 37,381 | £ - | £ - | £ 19,086 | £ 824,814 |
| ***17*** | £ - | £ 6,020 | £ 100,606 | £ 639,921 | £ 36,320 | £ - | £ - | £ 18,545 | £ 801,413 |
| ***18*** | £ - | £ 5,850 | £ 97,752 | £ 621,766 | £ 35,290 | £ - | £ - | £ 18,018 | £ 778,676 |
| ***19*** | £ - | £ 5,684 | £ 94,978 | £ 604,125 | £ 34,289 | £ - | £ - | £ 17,507 | £ 756,583 |
| ***20*** | £ 19,512,443 | £ 5,522 | £ 92,284 | £ 586,985 | £ 33,316 | £ - | £ - | £ 17,011 | £ 20,247,561 |
| ***21*** | £ - | £ 5,366 | £ 89,665 | £ 570,332 | £ 32,371 | £ - | £ - | £ 16,528 | £ 714,262 |
| ***22*** | £ - | £ 5,213 | £ 87,122 | £ 554,151 | £ 31,452 | £ - | £ - | £ 16,059 | £ 693,997 |
| ***23*** | £ - | £ 5,066 | £ 84,650 | £ 538,428 | £ 30,560 | £ - | £ - | £ 15,603 | £ 674,307 |
| ***24*** | £ - | £ 4,922 | £ 82,248 | £ 523,152 | £ 29,693 | £ - | £ - | £ 15,161 | £ 655,176 |
| ***25*** | £ - | £ 4,782 | £ 79,915 | £ 508,310 | £ 28,850 | £ - | £ - | £ 14,731 | £ 636,588 |
| ***26*** | £ - | £ 4,646 | £ 77,647 | £ 493,888 | £ 28,032 | £ - | £ - | £ 14,313 | £ 618,527 |
| ***27*** | £ - | £ 4,515 | £ 75,444 | £ 479,876 | £ 27,237 | £ - | £ - | £ 13,907 | £ 600,978 |
| ***28*** | £ - | £ 4,387 | £ 73,304 | £ 466,261 | £ 26,464 | £ - | £ - | £ 13,512 | £ 583,927 |
| ***29*** | £ - | £ 4,262 | £ 71,224 | £ 453,033 | £ 25,713 | £ - | £ - | £ 13,129 | £ 567,360 |
| ***30*** | £ - | £ 4,141 | £ 69,203 | £ 440,179 | £ 24,983 | £ - | £ - | £ 12,756 | £ 551,264 |
| ***31*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***32*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***33*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***34*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***35*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***36*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***37*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***38*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***39*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***40*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 96,406,374.39** |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.6 - Submerged Membrane Plant
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| **RGF's + FBC** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | RGF 4 & 5 to be abandoned | Scope of work required<br>4 beds of area 36.8 m2. Length= 5.04m and width = 3.65 m per bay | 1 | 147.2 | m2 | | £ 50,000.00 | PC Sum for Demolition assuming tanks are 3m Deep. |
| 2 | FBC 2 to be abandoned and FBC1 to be demolished | Scope of work required<br>Rough dimensions FBC2/ RGF5 = 37 x 23 m | 1 | 851 | m2 | | £ 200,000.00 | PC Sum for Demolition |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Hydraulic Study | A hydraulic study of the Sedimentation plant cost has been estimated to be around £9000- assumed £100/hour for labour and total estimate for hours is 90 hours | 90 | 1 | HRS | | £ 9,000.00 | Allow for Hydraulic Study |
| 2 | Control Valves | Following the hydraulic study, it is likely we will be recommending flow meters and/or valves | 20 | 300 | Dia | | £ 291,701.60 | Flow Control Valve |
| 3 | Flowmeters | | 20 | 300 | Dia | | £ 78,069.00 | Magnetic Flow Meter |
| 4 | UV Treatment to GAC | The cost of retrofitting two GAC contactors with UV, including GAC backwash facilities has been approximated at £500,000 | 1 | 1 | Sum | | £ 500,000.00 | UV Plant to GAC's |
| 5 | | | | | | | £ - | |
| **Submerged Membrane Building** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 7m height 36.4m width 23.7m length | 1 | 862.68 | m2 | | £ 1,291,060.23 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | | | | | | £ - | Assumed to be a flat slab |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Submerged Membrane Package - Pre Treatment | Pre-treatment | 1 | 1 | Sum | | £ 1,392,069.00 | Hollow Fibre 'ZeeWeed' Ultrafiltration Proposal; Budget Q' from Veolia |
| 2 | Submerged Membrane Package - Primary Filtration | Primary Filtration | 1 | 1 | Sum | | £ 4,723,112.00 | Plant less cost of Membranes (Membrane cost below) |
| 3 | Submerged Membrane Package - Ancillary Equipment | Ancillary Equipment | 1 | 1 | Sum | | £ 1,392,069.00 | 0 |
| 4 | Submerged Membrane Package - Chemical Dosing | Chemical Dosing | 1 | 1 | Sum | | £ 928,046.00 | 0 |
| 5 | Submerged Membrane Package - Design Engineering | Design & Engineering | 1 | 1 | Sum | | £ 2,320,114.00 | 0 |
| 6 | Submerged Membrane Package - Membranes Replaceme | Membranes [for Yr1 Replacement] | 1 | 1 | Sum | | £ 1,178,005.00 | for Phased Replacement - First Train |
| 7 | Submerged Membrane Package - Membranes Replaceme | Membranes [for Yr2 Replacement] | 1 | 1 | Sum | | £ 1,178,005.00 | for Phased Replacement - Second Train |
| 8 | Submerged Membrane Package - Membranes Replaceme | Membranes [for Yr3 Replacement] | 1 | 1 | Sum | | £ 1,178,005.00 | for Phased Replacement - Third Train |
| 9 | Submerged Membrane Package - Membranes Replaceme | Membranes [for Yr4 Replacement] | 1 | 1 | Sum | | £ 1,178,005.00 | for Phased Replacement - Fourth Train |
| 10 | Membrane MCC | 10m in building electrical room - **Incl. in Veolia Scope for UF Plant** | | | | | £ - | Incl. in Submerged Membrane Package |
| 11 | HVAC | | | | | | £ - | Incl. in Building Model |
| 12 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 13 | Building services | | | | | | £ - | Incl. in Building Model |
| 14 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models/RSE Quote |
| 15 | | | | | | | £ - | |
| **Chemical Storage** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Chemicals Delivery Area | Assume 40m2 per Package | 2 | 40 | m2 | | £ 26,067.93 | Hardstanding Area |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Chemical storage - pH Control - Sulphuric Acid | Dose Rate 4788.82 kg/d; Flow to be treated - 150.73 MLD | 1 | 150.73 | MLD | | £ 671,929.02 | Chemical Dosing; pH Adjustment |
| 2 | Chemical storage - Coag. - Aluminium Sulphate | Dose Rate 99.58 kg/d; Flow to be treated - 68.58 MLD | 1 | 68.58 | MLD | | £ 311,652.38 | Chemical Dosing; Coagulant |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Tanks** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | DWW Balancing Tank | Provisional - 700 m3 | 1 | 700 | m3 | | £ 311,874.66 | Concrete Tank; Open Top; Washwater Recovery |
| 2 | GAC Clean Backwash Tank | 900 m3 | 1 | 900 | m3 | | £ 340,711.77 | Concrete Tank; Open Top; Water Storage |
| 3 | Ancillary equipment.? Pumps, blowers, mixers etc | | | | | | £ - | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

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### 3.6 - Submerged Membrane Plant
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Access Roads, Drainage and Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 240m x 3.5m width | 1 | 840 | m2 | | £ 83,900.10 | Site Roads; All Types |
| 2 | Road drainage | 240m length | 1 | 240 | m | | £ 56,666.08 | Drainage |
| 3 | Membrane CIP waste pipe | 250m length, 200mm diameter | 250 | 200 | mm | | £ 95,582.24 | Interprocess Pipework; Below Ground |
| 4 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 184,613.15 | Interprocess Pipework; Below Ground |
| 5 | Delivery Pipework (to Membrane Plant PS) DN1200 Fusion Bonded Epoxy Steel | 10m length, DN 1000, buried | 10 | 1000 | mm | | £ 15,753.89 | Interprocess Pipework; Below Ground |
| 6 | Delivery Pipework (to Inter-ozone) DN1200 Fusion Bonded Epoxy Steel | 85m length 1.4m diameter 1m cover | 85 | 1400 | mm | | £ 184,613.15 | Interprocess Pipework; Below Ground |
| 7 | Overflow pipework (from PS) | 150m length 1m diameter 1m cover in hardstanding (to redundant SSF well) | 150 | 1000 | mm | | £ 236,308.38 | Interprocess Pipework; Below Ground |
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Cabling (11kV) | 400m | 1 | 400 | m | | £ 169,484.99 | HV Cabling (m) |
| 2 | 400V | 800m | 1 | 800 | m | | £ 92,180.46 | General - LV Cabling with Ducts and Drawpits (m) |
| 3 | Comms | 200m | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 4 | Transformer x 2 No. (3.3kV - 400V) 800 kVA | Allow £50k for purchase, extra for installation. | 2 | 800 | kVA | | £ 150,637.89 | Transformer |
| 5 | UPS | allow £50k supply only | | | | | £ 75,000.00 | Allow |
| 6 | PLC network extension and network node box | Break into existing network in adjacent GAC building. | | | | | £ 50,000.00 | Allow |
| 7 | SCADA integration/configuration | | 1 | 1 | No. | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 8 | DNO charges (amendment to authorised supply capacity) | No Load Data available - ~~Use 800kVA unless advised otherwise~~ | 1 | 2000.0 | kVA | | £ 372,020.26 | New Power Supply to Site |
| 9 | ERACS study | allow 15k | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 10 | 2 No. RMUs (non extendible) One for each transformer | A non extendible RMU is approx £15k | | | | | £ 50,000.00 | Allow |
| 11 | Existing dated 11kV site cabling to be replaced | 400m | 1 | 400 | m | | £ 169,484.99 | HV Cabling (m) |
| 12 | MCC | No scope item for MCC to serve new scope items (except IPS) | 1 | 1140.8 | kW | | £ 693,680.11 | Motor Control Centre (MCC) |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Egham WTW**

aquaconsultants
water · environment · energy

### 3.6 - Submerged Membrane Plant
*Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| **MEICA** | | | | | | | | |
| 1 | Instrumentation | Level, pressure, flow instrumentation etc | | | | | £ - | 0 |
| 2 | PLC and integration with UV reactor LCPs | Including control software and modification to existing site control for plant shutdown and interfacing etc | | | | | £ - | 0 |
| 3 | HMI | | | | | | £ - | 0 |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **DWW Thickener + Dewatering** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | WRc Thickener | Thickener Diameter 12.5m; Throughput of 4MLD; Thickened Sludge Solids Concentration 2.5% | 1 | 490.9 | m3 | | £ 563,461.98 | Wash Water Recovery Tank |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Centrifuge Dewaterer | Throughput of 1 MLD; Flow rate of 47m3/hr | 1 | 6.17 | TTDS/YR | | £ 797,717.21 | Centrifuge |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 23,844,896.25** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 41.6% | £ 9,926,127.65 | |

| | |
|---|---|
| **Construction Cost** | **£ 33,771,023.89** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 14.5% | £ 4,893,421.36 | |

| | |
|---|---|
| **Project Cost** | **£ 38,664,445.26** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.6 - Option 6 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Submerged Membrane - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 5,305.66 | Modelled Approach |
| Submerged Membrane Package Plant | Add | Consumption | | | 0 | £ 0.350 | £ 1,000,000.00 | Allow based on Ceramic Membrane |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 12,112.30 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | Consumption | | | 0 | £ 0.35 | £ 2,994.05 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 12,226.37 | Modelled Approach |
| DWW Balancing Tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,909.30 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,051.15 | Modelled Approach |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| WRc Thickener | Add | Consumption | | | 0 | £ 0.35 | £ 11,143.77 | Modelled Approach |
| Centrifuge Dewaterer | Add | Consumption | | | 0 | £ 0.35 | £ 59,024.57 | Modelled Approach |
| | | | | | | | | |
| FBC1 | Omit | Consumption | 0 | 24 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| FBC2 | Omit | Consumption | 0 | 24 | 0 | £ 0.35 | £ - | No loads detailed in latest electrical load schedule |
| RGF Block 4 | Omit | Consumption | 344 | 24 | 3013440 | £ 0.35 | -£ 1,054,704.00 | Duty load taken from latest electrical load schedule |
| RGF Block 5 | Omit | Consumption | 63 | 24 | 551880 | £ 0.35 | -£ 193,158.00 | Duty load taken from latest electrical load schedule |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **-£ 121,252.8** | |
| **Annual Power Carbon** | | | | | | | **-241050.492 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| Submerged Membrane - Operational Building | Add | Manual | | £ 19,280.59 | Modelled Approach |
| Submerged Membrane Package - Pre Treatment | Add | Modelled | £ 84,215.32 | | Modelled Approach |
| Submerged Membrane Package - Primary Filtratic | Add | Modelled | £ 285,731.82 | | Modelled Approach |
| Submerged Membrane Package - Ancillary Equipr | Add | Modelled | £ 84,215.32 | | Modelled Approach |
| Submerged Membrane Package - Chemical Dosir | Add | Modelled | £ 56,143.55 | | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 2,489.24 | |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | Manual | | £ 15,910.65 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | Manual | | £ 4,887.07 | Modelled Approach |
| DWW Balancing Tank | Add | Manual | | £ 2,701.77 | Modelled Approach |
| GAC Clean Backwash Tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| WRc Thickener | Add | Manual | | £ 11,767.49 | Modelled Approach |
| Centrifuge Dewaterer | Add | Manual | | £ 88,935.47 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **674,410.58** | |
| **Annual Maintenance Carbon** | | | | **311982.334 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sulphuric Acid 96% | Add | | 109.4 | 1840 | 73453 | £ 352.57 | £ 128,688.05 | pH Control |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 18.1 | 1250 | 8258 | £ 56.46 | £ 20,607.90 | Pre-chlorination |
| Polyaluminium Chloride (PACl) 10% | Add | | 261.3 | 1200 | 114445 | £ 918.05 | £ 335,088.25 | Clarification (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 59.1 | 998 | 21516 | £ 14.86 | £ 5,423.90 | Clarification NHBC (Sedimentation Plant) |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 66.6 | 998 | 24263 | £ 16.75 | £ 6,113.75 | Clarification SHBC (Sedimentation Plant) |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 63.3 | 1250 | 28885 | £ 197.51 | £ 72,091.15 | Disinfection |
| Orthophosphoric Acid | Add | | 205.6 | 1052 | 78943 | £ 273.69 | £ 99,896.85 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 23.2 | 1280 | 10853 | £ 110.63 | £ 40,379.95 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 122.1 | 1500 | 66839 | £ 659.23 | £ 240,618.95 | pH Control |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 26.4 | 998 | 9632 | £ 6.65 | £ 2,427.25 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 747.8 | 998 | 272428 | £ 188.09 | £ 68,652.85 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,019,988.9** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Submerged Membrane - Operational Building | Add | | | £ 699.41 | Modelled Approach |
| Submerged Membrane Package Plant | Add | | | | No Info. |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | | | £ 12,598.39 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | | | £ 8,751.88 | Modelled Approach |
| DWW Balancing Tank | Add | | | £ 2,868.18 | Modelled Approach |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Egham WTW**

### 4.6 - Option 6 Detailed OPEX Breakdown

| | | | | | | |
|---|---|---|---|---|---|---|
| GAC Clean Backwash Tank | Add | | | £ | 2,642.56 | Modelled Approach |
| Transformer Kiosk | Add | | | £ | 2,458.81 | Modelled Approach |
| Switchgear kiosk | Add | | | £ | 2,450.23 | Modelled Approach |
| WRc Thickener | Add | | | £ | 10,685.29 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ | 16,089.54 | Modelled Approach |
| | | | | | | |
| **Annual People Costs** | | | | **£** | **59,244.29** | |
| **Annual People Carbon** | | | | | **0 CO2 kg** | |

### *Other*

| *Item* | *Add / omit* | *Qty* | *rate* | | Annual Total | *Comments* |
|---|---|---|---|---|---|---|
| Submerged Membrane - Operational Building | Add | | | £ | 9,186.94 | Modelled Approach |
| Submerged Membrane Package Plant | Add | | | £ | 2,684.86 | No Info. |
| DWW Balancing Tank | Add | | | £ | 2,914.09 | Modelled Approach |
| GAC Clean Backwash Tank | Add | | | £ | 2,684.86 | Modelled Approach |
| Transformer Kiosk | Add | | | £ | 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ | 644.80 | Modelled Approach |
| WRc Thickener | Add | | | £ | 3,473.15 | Modelled Approach |
| Centrifuge Dewaterer | Add | | | £ | 10,698.36 | Modelled Approach |
| | | | | | | |
| **Annual Other Costs** | | | | **£** | **32,934.11** | |
| **Annual Other Carbon** | | | | | **15235.319 CO** | |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **1,665,325.07** |
| **Total Annual Carbon** | | **86167.161 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Egham WTW**

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### *30 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *2* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *3* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *4* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *5* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *6* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *7* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *8* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *9* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *10* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *11* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *12* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *13* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *14* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *15* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *16* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *17* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *18* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *19* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *20* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *21* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *22* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *23* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *24* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *25* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *26* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *27* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *28* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *29* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *30* | -£ 121,253 | £ 674,411 | £ 1,019,989 | £ 59,244 | £ - | £ - | £ 32,934 | £ 1,665,325 |
| *31* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *32* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *33* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *34* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *35* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *36* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *37* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *38* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *39* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *40* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 49,959,752.00** |

# Feasibility Estimate

## Net Present Value

**Egham WTW**

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### 5.6 NPV Option 6

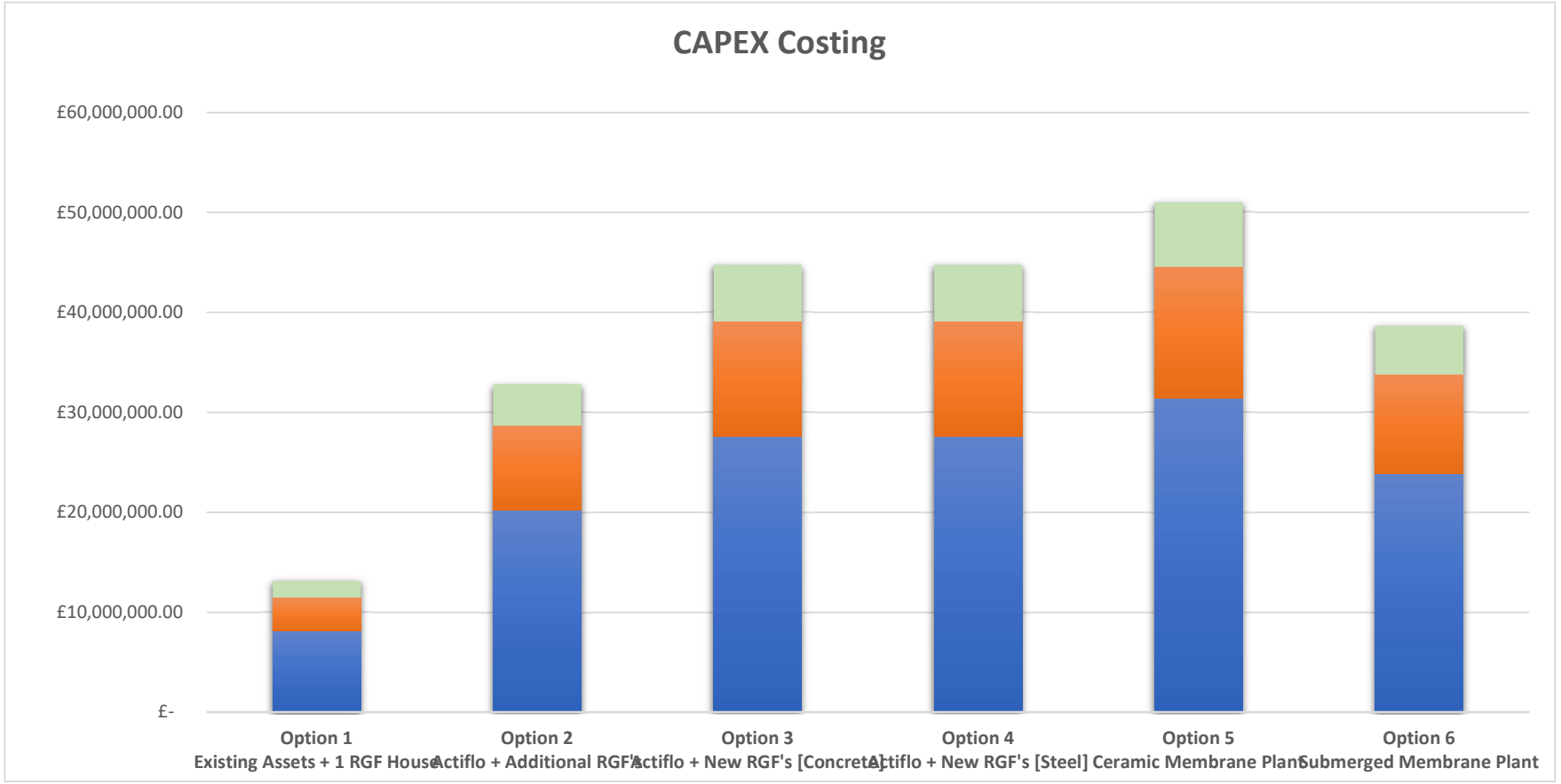
***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| *Yr* | *Capital Investment* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|---|
| | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | *2.9%* | |
| *CAPEX Yr1* | £ *9,666,111* | | | | | | | | £ *9,666,111* |
| *CAPEX Yr2* | £ *17,399,000* | | | | | | | | £ *17,399,000* |
| *CAPEX Yr3* | £ *11,599,334* | | | | | | | | £ *11,599,334* |
| ***1*** | £ - | -£ 117,813 | £ 655,277 | £ 991,050 | £ 57,563 | £ - | £ - | £ 32,000 | £ 1,618,077 |
| ***2*** | £ - | -£ 114,470 | £ 636,685 | £ 962,933 | £ 55,930 | £ - | £ - | £ 31,092 | £ 1,572,170 |
| ***3*** | £ - | -£ 111,222 | £ 618,622 | £ 935,613 | £ 54,343 | £ - | £ - | £ 30,210 | £ 1,527,565 |
| ***4*** | £ - | -£ 108,067 | £ 601,070 | £ 909,068 | £ 52,802 | £ - | £ - | £ 29,353 | £ 1,484,226 |
| ***5*** | £ - | -£ 105,001 | £ 584,017 | £ 883,276 | £ 51,304 | £ - | £ - | £ 28,520 | £ 1,442,116 |
| ***6*** | £ - | -£ 102,022 | £ 567,448 | £ 858,216 | £ 49,848 | £ - | £ - | £ 27,711 | £ 1,401,201 |
| ***7*** | £ - | -£ 99,127 | £ 551,348 | £ 833,867 | £ 48,434 | £ - | £ - | £ 26,924 | £ 1,361,446 |
| ***8*** | £ - | -£ 96,315 | £ 535,706 | £ 810,209 | £ 47,060 | £ - | £ - | £ 26,161 | £ 1,322,820 |
| ***9*** | £ 1,474,231 | -£ 93,582 | £ 520,507 | £ 787,222 | £ 45,724 | £ - | £ - | £ 25,418 | £ 2,759,520 |
| ***10*** | £ 1,432,405 | -£ 90,927 | £ 505,739 | £ 764,888 | £ 44,427 | £ - | £ - | £ 24,697 | £ 2,681,229 |
| ***11*** | £ 1,391,765 | -£ 88,347 | £ 491,391 | £ 743,187 | £ 43,167 | £ - | £ - | £ 23,997 | £ 2,605,158 |
| ***12*** | £ 1,352,279 | -£ 85,841 | £ 477,449 | £ 722,101 | £ 41,942 | £ - | £ - | £ 23,316 | £ 2,531,246 |
| ***13*** | £ - | -£ 83,405 | £ 463,903 | £ 701,614 | £ 40,752 | £ - | £ - | £ 22,654 | £ 1,145,518 |
| ***14*** | £ - | -£ 81,039 | £ 450,741 | £ 681,708 | £ 39,596 | £ - | £ - | £ 22,011 | £ 1,113,018 |
| ***15*** | £ - | -£ 78,740 | £ 437,953 | £ 662,367 | £ 38,472 | £ - | £ - | £ 21,387 | £ 1,081,440 |
| ***16*** | £ - | -£ 76,506 | £ 425,528 | £ 643,575 | £ 37,381 | £ - | £ - | £ 20,780 | £ 1,050,758 |
| ***17*** | £ - | -£ 74,335 | £ 413,455 | £ 625,316 | £ 36,320 | £ - | £ - | £ 20,191 | £ 1,020,946 |
| ***18*** | £ 1,137,804 | -£ 72,226 | £ 401,725 | £ 607,574 | £ 35,290 | £ - | £ - | £ 19,618 | £ 2,129,784 |
| ***19*** | £ - | -£ 70,177 | £ 390,327 | £ 590,337 | £ 34,289 | £ - | £ - | £ 19,061 | £ 963,836 |
| ***20*** | £ 12,495,603 | -£ 68,186 | £ 379,253 | £ 573,588 | £ 33,316 | £ - | £ - | £ 18,520 | £ 13,432,094 |
| ***21*** | £ - | -£ 66,252 | £ 368,493 | £ 557,314 | £ 32,371 | £ - | £ - | £ 17,995 | £ 909,921 |
| ***22*** | £ 1,014,071 | -£ 64,372 | £ 358,038 | £ 541,502 | £ 31,452 | £ - | £ - | £ 17,484 | £ 1,898,176 |
| ***23*** | £ - | -£ 62,546 | £ 347,880 | £ 526,139 | £ 30,560 | £ - | £ - | £ 16,988 | £ 859,022 |
| ***24*** | £ 957,346 | -£ 60,771 | £ 338,010 | £ 511,212 | £ 29,693 | £ - | £ - | £ 16,506 | £ 1,791,996 |
| ***25*** | £ - | -£ 59,047 | £ 328,420 | £ 496,708 | £ 28,850 | £ - | £ - | £ 16,038 | £ 810,970 |
| ***26*** | £ - | -£ 57,372 | £ 319,102 | £ 482,615 | £ 28,032 | £ - | £ - | £ 15,583 | £ 787,961 |
| ***27*** | £ 878,152 | -£ 55,744 | £ 310,049 | £ 468,923 | £ 27,237 | £ - | £ - | £ 15,141 | £ 1,643,757 |
| ***28*** | £ - | -£ 54,162 | £ 301,252 | £ 455,619 | £ 26,464 | £ - | £ - | £ 14,711 | £ 743,884 |
| ***29*** | £ - | -£ 52,626 | £ 292,705 | £ 442,692 | £ 25,713 | £ - | £ - | £ 14,294 | £ 722,779 |
| ***30*** | £ - | -£ 51,133 | £ 284,401 | £ 430,132 | £ 24,983 | £ - | £ - | £ 13,888 | £ 702,273 |
| ***31*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***32*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***33*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***34*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***35*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***36*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***37*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***38*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***39*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| ***40*** | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 93,779,350.39** |

## 6 Overview

### *CAPEX Breakdown*



# Feasibility Estimate
## Assumptions
**Egham WTW**

## 7 Assumptions and Comments

*The following assumptions have been made in the development of the estimate:*

1) Estimate is based on the scope as derived during various correspondence between Aquaconsultants and Stantec last dated 26th April 2023 and comments received 2nd May 2023
2) No allowance has been made for works to existing processes that are not part of the scope activities.
3) NPV allowances; (Includes 15% Oncost allowance)
4) Discount Rate for NPV calculation - 2.92% / year
5) Design Life - Pipework - 80 years
6) Design Life - Civils - 60 years
7) Design Life - Kiosks - 40 years
8) Design Life - M&E - 20 years
9) No OPEX figures have been made available for the Ceramic Membrane Package Plant option however, we have been able to incorporate some OPEX costs by extrapolating from historic information. There is however a significant risk to this and this should be taken into consideration when evaluating the whole life cost.
10) A Risk allowance of 5.0% has been included.
11) A Design allowance of 11.3% has been included.
12) An allowance of 14.49 % has been included for Affinity Water's own project oncosts.
13)
14)

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# Feasibility Estimate (Level B)

Iver WTW

June 2023 - Rev 1.3

# Feasibility Estimate

| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Iver WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |

## 1.0 Introduction

Stantec have engaged the services of Aqua Consultants, commercial engineering consultants with particular experience of the water industry, to produce cost and carbon estimates. Aqua hold a mature and extensive database of estimating material. Cost estimates have been prepared using a combination of cost models and unit costs based from our experience within the Water Industry, through AMP7 and AMP6, PR19 and PR24 as well as budget estimates from the market.

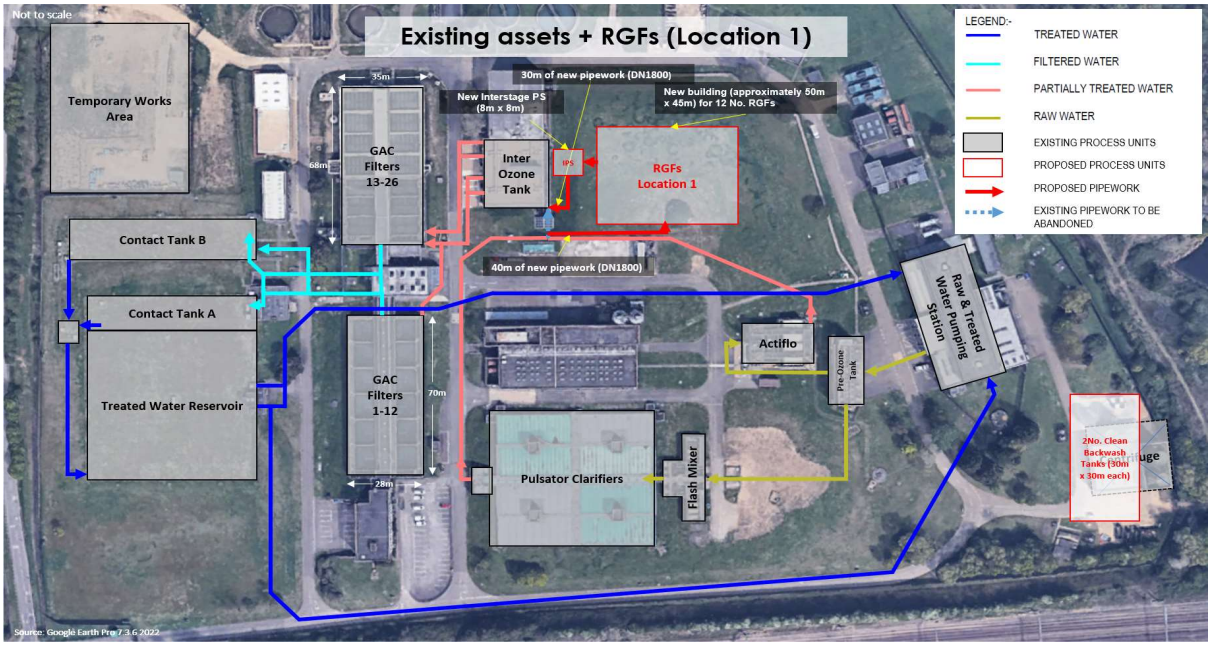
Carbon estimates for the embodied carbon have been prepared by using quantities for works items on historical projects and applying carbon values to these in a bottom up fashion. The carbon values for civils works were taken from CESMM4 Carbon & Pricebook 2013 and the M&E through a data capture exercise carried out in AMP5 with another Water Company, and then applying these to the quantities. These carbon values were then modelled for each asset, as broken down by our cost models to produce the Embodied CO2e estimates provided.

The operational carbon has been build up based on the Opex Headings. We used the following: Power a factor of 0.6958 kg/CO2 per kW, Maintenance 0.4626 kgCO2/£. This is inline with what we have been applying elsewhere with other water companies.

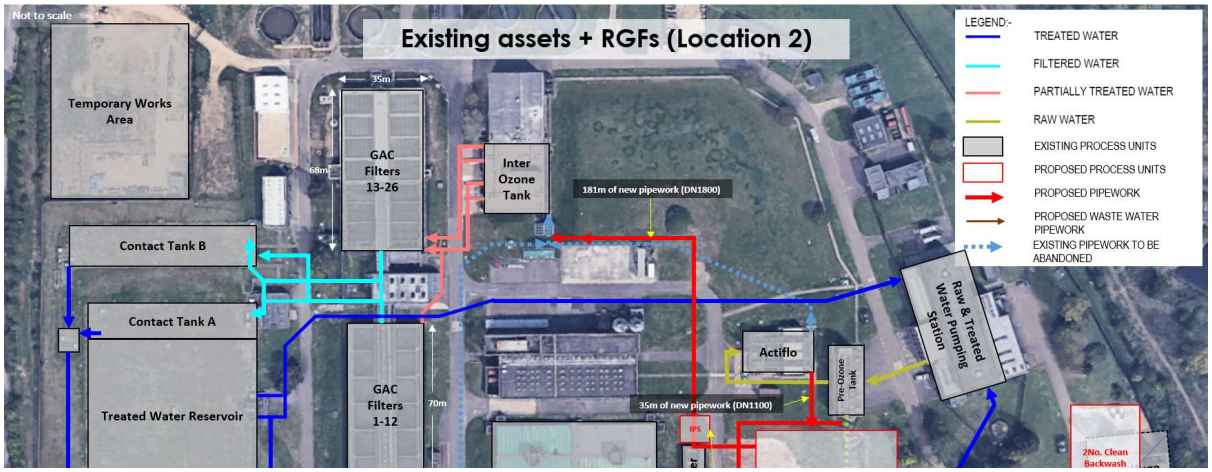
## 1.1 Existing Works Layout

| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Iver WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |

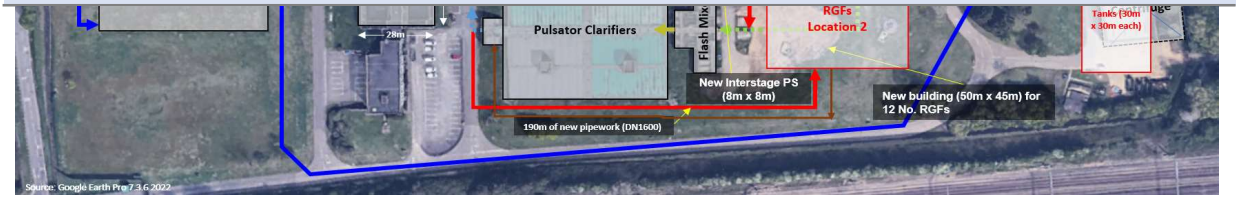
### 1.2a Existing Assets + RGF's Site Layout - Location 1



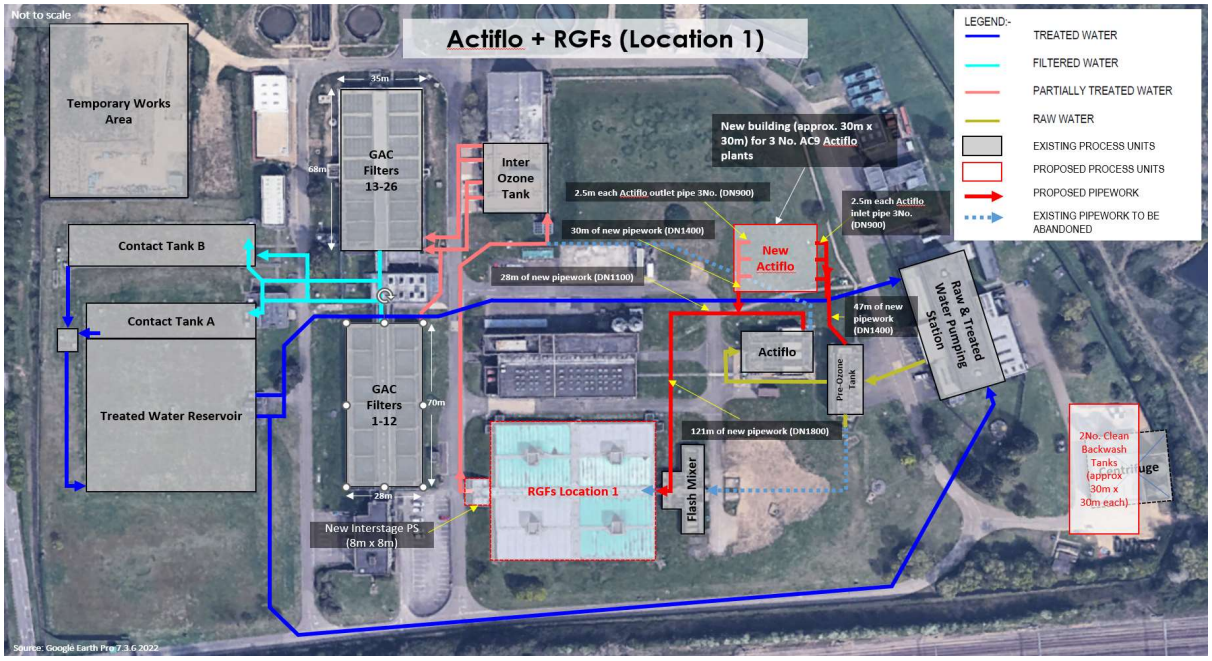

### 1.2b Existing Assets + RGF's Site Layout - Location 2



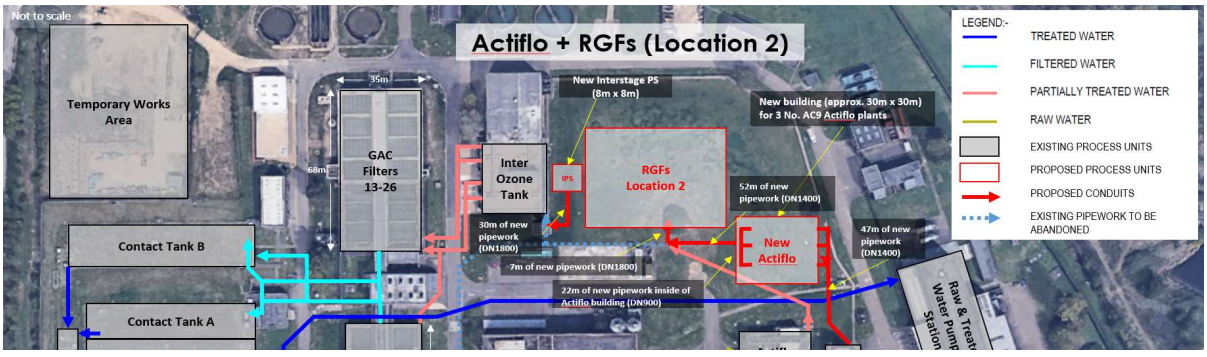
| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Iver WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |



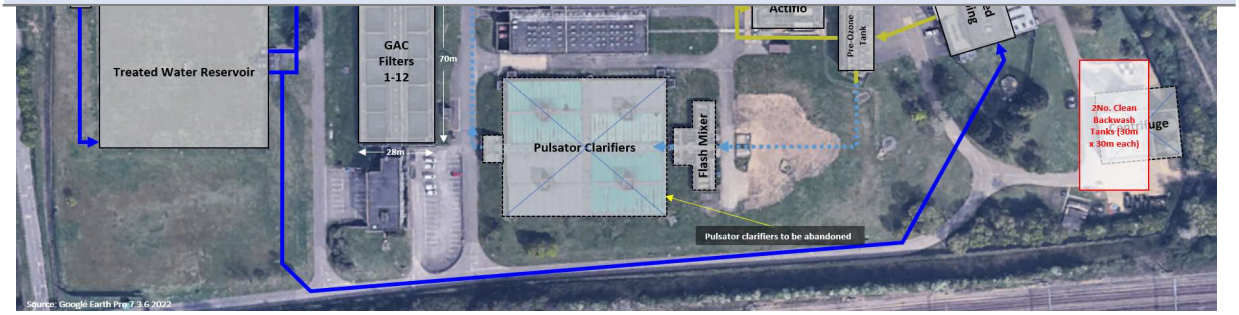

### 1.2c Actiflo + RGF Site Layout - Location 1



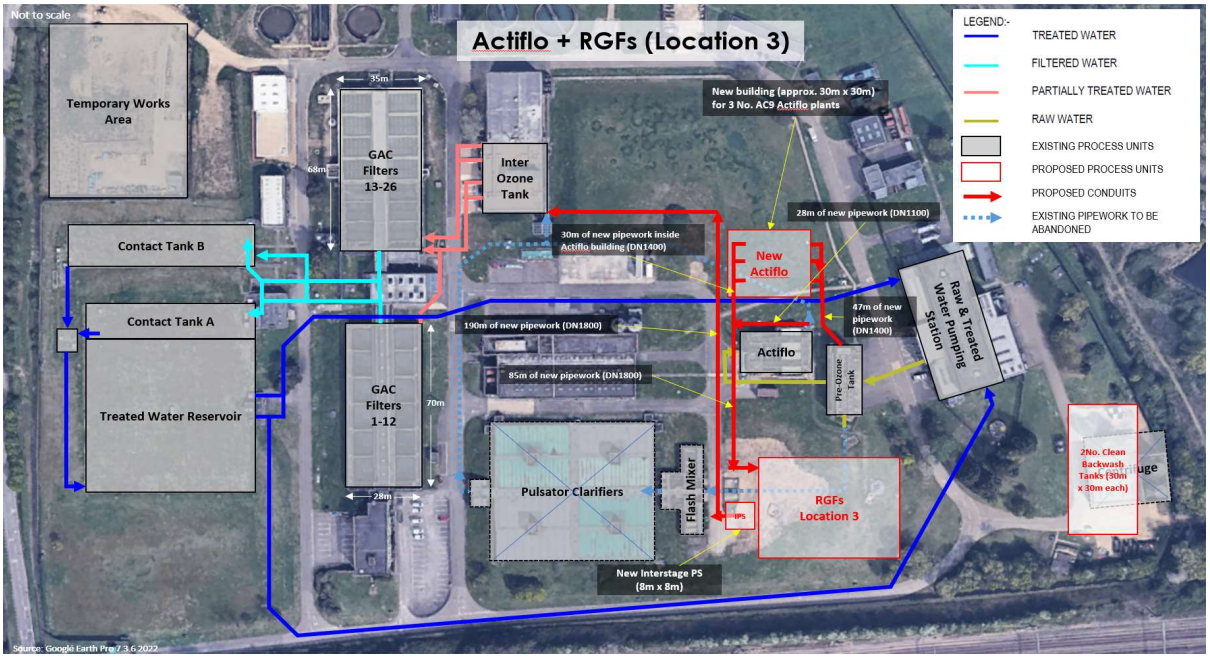

### 1.2d Actiflo + RGF Site Layout - Location 2



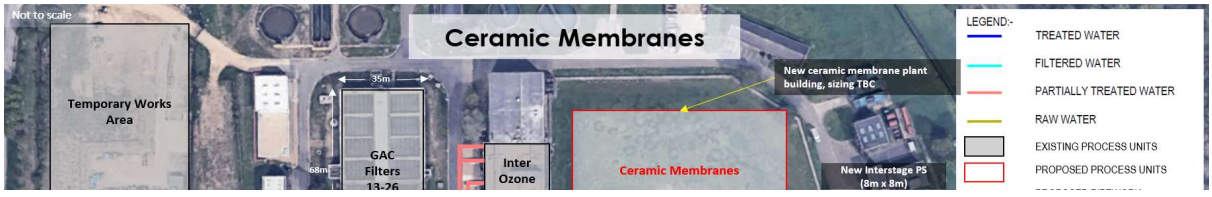
| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Iver WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |



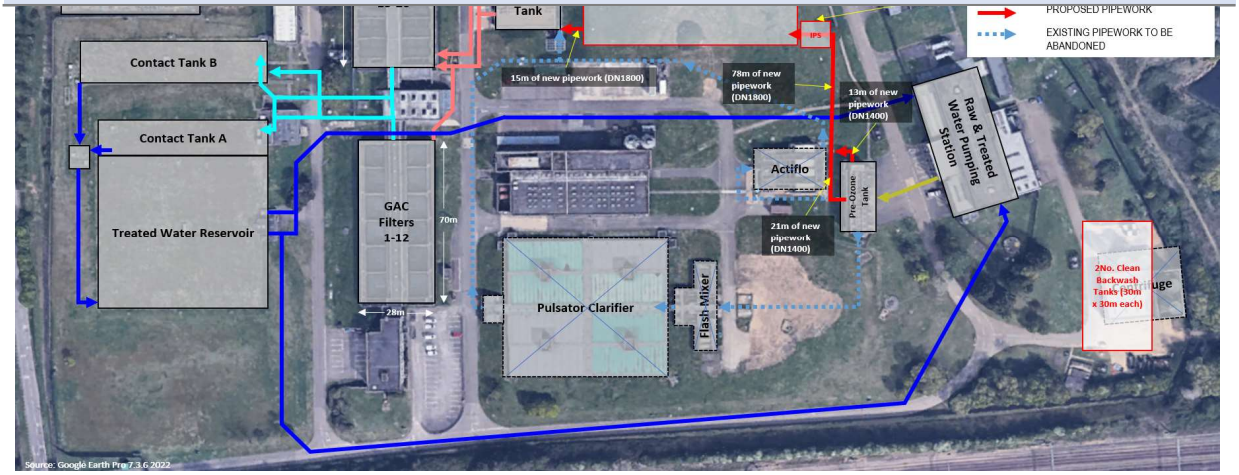

### 1.2e Actiflo + RGF Site Layout - Location 3



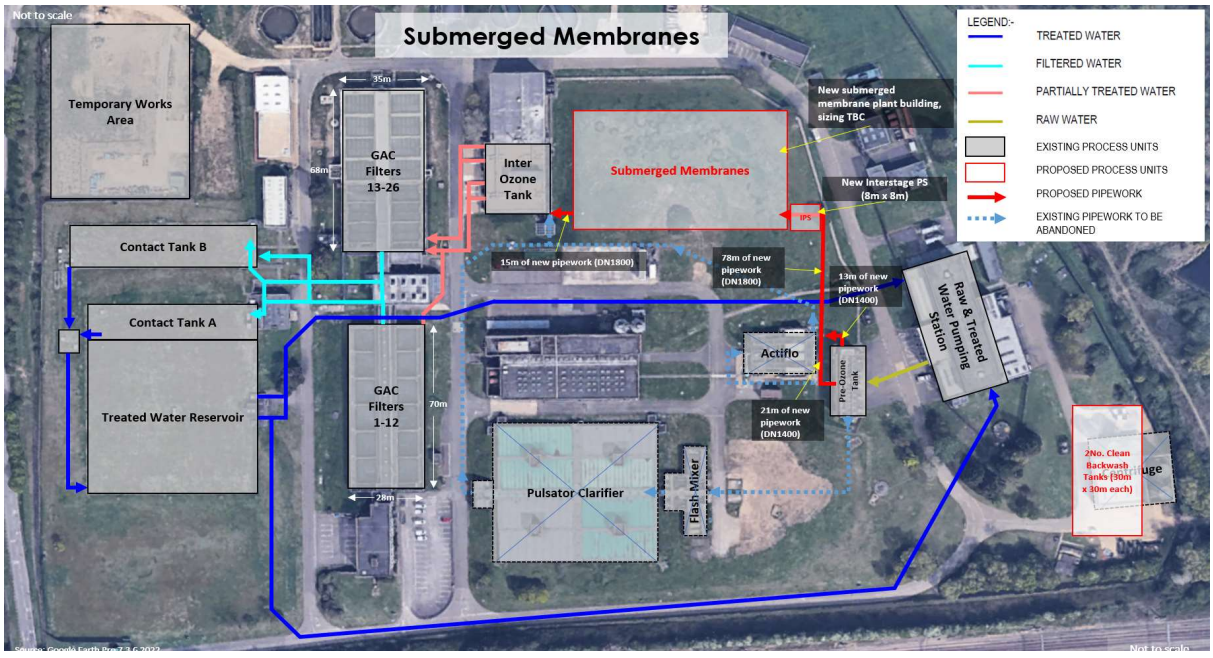

### 1.2f Ceramic Membranes Site Layout



| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Iver WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |




### 1.2g Submerged Membranes Site Layout



# Feasibility Estimate

| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Iver WTW | | |
| **Client:** | Stantec/Affinity Water | | |
| **Cost base date:** | Q2 2023 | **Completed by:** | AW |
| **Issue Nr:** | 1.3 | **Checked by:** | PA |

# Feasibility Estimate

## Summary

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| | | | |
|---|---|---|---|
| **Project Ref:** | *** | | |
| **Project Name:** | Iver WTW | | |
| **Client:** | Stantec/Affinity Water | **Completed by:** | AW |
| **Cost base date:** | Q2 2023 | **Checked by:** | PA |
| **Issue Nr:** | 1.3 | | |

## 2 Summary

### 2.1 CAPEX

| | Option 1 Existing Assets + RGF's [Location 1] | Option 2 Existing Assets + RGF's [Location 2] | Option 3 Actiflo + RGF's [Location 1] | Option 4 Actiflo + RGF's [Location 2] | Option 5 Actiflo + RGF's [Location 3] | Option 6 Ceramic Membranes | Option 7 Submerged Membranes |
|---|---|---|---|---|---|---|---|
| Direct Works Costs | £ 24,562,453.86 | £ 25,457,563.39 | £ 36,306,464.59 | £ 36,152,707.58 | £ 36,756,023.45 | £ 68,364,100.19 | £ 36,752,738.69 |
| Indirect Costs | £ 10,224,831.76 | £ 10,597,446.98 | £ 15,113,615.86 | £ 15,049,610.05 | £ 15,300,757.73 | £ 28,458,533.77 | £ 15,299,390.35 |
| **Construction Costs** | **£ 34,787,285.61** | **£ 36,055,010.37** | **£ 51,420,080.45** | **£ 51,202,317.63** | **£ 52,056,781.18** | **£ 96,822,633.95** | **£ 52,052,129.04** |
| Client On-costs | £ 5,226,789.66 | £ 5,417,265.31 | £ 7,725,867.09 | £ 7,693,148.22 | £ 7,821,531.37 | £ 14,547,600.75 | £ 7,820,832.39 |
| **Project Cost** | **£ 40,014,075.28** | **£ 41,472,275.68** | **£ 59,145,947.54** | **£ 58,895,465.86** | **£ 59,878,312.56** | **£ 111,370,234.70** | **£ 59,872,961.43** |

### 2.2 OPEX

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Total Annual Opex | £ 2,569,926.50 | £ 2,569,926.50 | £ 3,571,235.13 | £ 3,571,235.13 | £ 3,571,235.13 | £ 2,031,292.19 | £ 2,680,268.99 |
| Total 30 Year Opex | £ 77,097,794.95 | £ 77,097,794.95 | £ 107,137,053.93 | £ 107,137,053.93 | £ 107,137,053.93 | £ 60,938,765.60 | £ 160,816,139.42 |

### 2.3 NPV

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NPV over 30 years | £ 93,184,036.63 | £ 95,166,950.65 | £ 137,711,618.31 | £ 137,436,963.22 | £ 138,419,809.92 | £ 194,990,735.31 | £ 207,493,278.59 |

### 2.4 Carbon

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Embodied Carbon (tonnes) | 15,761.74 | 16,379.61 | 21,429.99 | 21,285.17 | 21,720.94 | 20,190.01 | 11,261.28 |
| Annual Operational Carbon (tonnes) | 1,449.21 | 1,449.21 | 2,663.76 | 2,663.76 | 2,663.76 | 1,928.11 | 4,349.59 |

## 3.1 - Existing Assets + RGF's [Location 1]

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **New Interstage Pump Station** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height x 11m width x 6m length (clear internal) | 1 | 66 | m2 | | £ 199,619.17 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure incl. excavation | 4m depth x 10m width x 6m length | 1 | 240 | m3 | | £ 479,420.11 | Dry/Wet Well Structure |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | 4 No. variable speed Canister Type Pumps | 4 No. Pumps D/A/A/S; Total flow 239 Ml/d. Total head 3.5 m (assume 3m static); Based on Xylem selection - canister mounted units; Each pump 922 l/s @ 4.6 m | 3 | 75 | kW | | £ 746,407.69 | Interprocess Pumping |
| 2 | MCC with VSDs | 10m (in RGF building electrical room) | 1 | 330 | kW | | £ 299,733.83 | MCC |
| 3 | HVAC | | | | | | £ - | Incl. in Building Model |
| 4 | Building Services | | | | | | £ - | Incl. in Building Model |
| 5 | | | | | | | £ - | |
| **RGF's - Location 1** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ - | Assumed to be RGF Structure |
| 3 | RGF's | 18 No. Cells; Each Cell 10m x 9m; Single Bed Type; | 1 | 1620 | m2 | | £ 16,149,161.35 | Rapid Gravity Filters |
| 4 | Clean washwater tank | Volume: 3300 m3 | 1 | 3300 | m3 | | £ 583,928.51 | Concrete Tank; Open Top; Water Storage |
| 5 | Dirty washwater tank | Volume: 1000m3 | 1 | 1000 | m3 | | £ 354,156.24 | Concrete Tank; Open Top; Washwater Recovery |
| 6 | Dirty washwater delivery pipe (pumped) | 200m length, 300mm diameter | 200 | 300 | mm | | £ 106,292.30 | Interprocess Pipework; Below Ground |
| 7 | | | | | | | £ - | |
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | BACKWASH PUMPS | 3 No. D/A/S; Duty 5619 m3/h @ 3.5m HD | 3 | 45 | kW | | £ 536,491.28 | Interprocess Pumping |
| 2 | AIR SCOUR BLOWERS | 2 No. D/S; Duty 8428 Nm3/hr @ 600mBar | 2 | 90 | kW | | £ 110,188.85 | Air Blower |
| 3 | FILTER OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 4 | FILTER INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 5 | CLEAN BACKWASH INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 6 | DIRTY BACKWASH OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 7 | AIR SCOUR INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 8 | 18 No. RGF LCPs | | | | | | £ - | Incl. in RGF Model |
| 9 | HVAC | | | | | | £ - | Incl. in Building Model |
| 10 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 11 | Building services | | | | | | £ - | Incl. in Building Model |
| 12 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Access Roads, Drainage & Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 200m x 3.5m width | 1 | 700 | m2 | | £ 71,570.87 | Site Roads; All Types |
| 2 | Road drainage | 200m length | 1 | 200 | m | | £ 47,856.01 | Drainage |
| 3 | Delivery Pipework (to RGFs) DN1600 Fusion Bonded Epoxy Steel | 40m length 1.8m diameter 1m cover | 40 | 1800 | mm | | £ 110,737.98 | Interprocess Pipework; Below Ground |
| 4 | Delivery Pipework (to RGFs) DN1000 Fusion Bonded Epoxy Steel | 10m length, DN 1000, buried | 10 | 1000 | mm | | £ 15,753.89 | Interprocess Pipework; Below Ground |
| 5 | Delivery Pipework (to Inter-ozone) DN1600 Fusion Bonded Epoxy Steel | 30m length 1.8m diameter 1m cover | 30 | 1800 | mm | | £ 83,053.48 | Interprocess Pipework; Below Ground |
| 6 | Overflow pipework (from UV inlet channel) | 10m length 1.8m diameter 1m cover in hardstanding (to PS wet well) | 10 | 1800 | mm | | £ 27,684.49 | Interprocess Pipework; Below Ground |

# Feasibility Estimate
## Detailed Cost Breakdown
**Iver WTW**

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### 3.1 - Existing Assets + RGF's [Location 1]
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | £ - | |
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical & ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | RMU - 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | | | | | | £ 100,000.00 | Allow |
| 2 | Cabling (3.3kV) | 200m | 1 | 200 | m | | £ 95,997.25 | HV Cabling (m) |
| 3 | Cabling (LV) | 200m | 1 | 200 | m | | £ 41,644.75 | General - LV Cabling with Ducts and Drawpits (m) |
| 4 | 400V | 1200m | 1 | 1200 | m | | £ 116,296.83 | General - LV Cabling with Ducts and Drawpits (m) |
| 5 | Comms | 200m | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 6 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 7 | PLC network extension and network node box | Break into existing network in adjacent GAC building. | | | | | £ 50,000.00 | Allow |
| 8 | SCADA integration/configuration | | 1 | 1 | No. | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 9 | DNO charges (amendment to authorised supply capacity) | Allow £50k - Load based on Drive List Please advise if different | 1 | 1000.0 | kVA | | £ 381,941.04 | New Power Supply to Site |
| 10 | ERACS study | allow 15k | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 11 | MCC (Design and installation) | Max. Installed kW of MCC - Taken from Drive List - Please advise if different | 1 | 376.6 | kW | | £ 251,819.95 | Motor Control Centre (MCC); Based on Load Schedule |
| 12 | Starters | Incl. in MCC above | | | | | £ - | Incl. in MCC |
| 13 | Pontential for standby generator? | 1 No. 2MVA @ 3.3kV standby generator with LCP and acoustic enclosure | 1 | 2000 | kVA | | £ 498,893.28 | Emergency Power Generation |
| 14 | Electrical Installation | Typical cost - Incl. in Models | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 24,562,453.86** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 42% | £ 10,224,831.76 | |

| | |
|---|---|
| **Construction Cost** | **£ 34,787,285.61** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 15% | £ 5,226,789.66 | |

# Feasibility Estimate

## Detailed Cost Breakdown

**Iver WTW**

### 3.1 - Existing Assets + RGF's [Location 1]

*Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| **Project Cost** | | | | | | | **£ 40,014,075.28** | |

# Feasibility Estimate
## Detailed OPEX Breakdown - Annual Operating Costs
**Iver WTW**

### 4.1 - Option 1 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 484.95 | Modelled Approach |
| Interstage Pumps | Add | Consumption | 225 | 16 | 1314000 | £ 0.350 | £ 459,900.00 | Assume 16hr/day @ Full Inst. Rate |
| RGF - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 14,910.53 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Consumption | | | 0 | £ 0.35 | £ 85,899.77 | Modelled Approach |
| Clean washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 16,662.86 | Modelled Approach |
| Dirty washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 11,290.52 | Modelled Approach |
| BACKWASH PUMPS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| AIR SCOUR BLOWERS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 683,970.7** | |
| **Annual Power Carbon** | | | | | | | **1359733.752 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | Manual | | £ 1,762.29 | Modelled Approach |
| Interstage Pumps | Add | Manual | | £ 5,767.04 | Modelled Approach |
| RGF - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Manual | | £ 63,150.79 | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 4,126.68 | Modelled Approach |
| Dirty washwater tank | Add | Manual | | £ 2,796.18 | Modelled Approach |
| BACKWASH PUMPS | Add | Modelled | £ 18,539.64 | | |
| AIR SCOUR BLOWERS | Add | Modelled | £ 3,807.82 | | |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **158,010.35** | |
| **Annual Maintenance Carbon** | | | | **73095.587 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 58.3 | 1250 | 26613 | £ 181.99 | £ 66,426.35 | Pre-chlorination |
| Sulphuric Acid 96% | Add | | 22.1 | 1840 | 14856 | £ 71.32 | £ 26,031.80 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 210.6 | 1200 | 92260 | £ 740.10 | £ 270,136.50 | Clarification |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 173.9 | 998 | 63342 | £ 43.73 | £ 15,961.45 | Clarification |
| Sulphuric Acid 96% | Add | | 24.1 | 1840 | 16172 | £ 77.61 | £ 28,327.65 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 216.8 | 1200 | 94937 | £ 761.59 | £ 277,980.35 | Clarification |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 189.2 | 998 | 68930 | £ 47.59 | £ 17,370.35 | Clarification |
| Sulphuric Acid 96% | Add | | 56.1 | 1840 | 37650 | £ 180.71 | £ 65,959.15 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 169.9 | 1200 | 74412 | £ 596.92 | £ 217,875.80 | Clarification |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 148.3 | 998 | 54027 | £ 37.30 | £ 13,614.50 | Clarification |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 118.9 | 1250 | 54234 | £ 370.89 | £ 135,374.85 | Disinfection |
| Orthophosphoric Acid | Add | | 333.4 | 1052 | 128022 | £ 443.85 | £ 162,005.25 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 43.2 | 1280 | 20192 | £ 205.79 | £ 75,113.35 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 36.8 | 1500 | 20121 | £ 198.46 | £ 72,437.90 | Final Water Conditioning |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 39.1 | 998 | 14252 | £ 9.84 | £ 3,591.60 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 2042.0 | 998 | 743907 | £ 513.60 | £ 187,464.00 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,635,670.9** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | | | £ 63.93 | Modelled Approach |
| Interstage Pumps | Add | | | £ 73.31 | Modelled Approach |
| RGF - Operational Building | Add | | | £ 1,965.56 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | | | £ 47,405.98 | Modelled Approach |
| Clean washwater tank | Add | | | £ 4,380.85 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 2,968.40 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual People Costs** | | | | **£ 56,858.03** | |
| | | | | | |
| **Annual People Carbon** | | | | **0 CO2 kg** | |

#### *Other*

### 4.1 - Option 1 Detailed OPEX Breakdown

| *Item* | *Add / omit* | *Qty* | *rate* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | | | £ 839.71 | Modelled Approach |
| RGF - Operational Building | Add | | | £ 25,818.11 | Modelled Approach |
| Clean washwater tank | Add | | | £ 4,450.98 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,015.92 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 644.80 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual Other Costs** | | | | **£ 35,416.57** | |
| **Annual Other Carbon** | | | | **16383.705 CO** | |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **2,569,926.50** |
| **Total Annual Carbon** | | **1449213.044 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Iver WTW**

### *30 Year OPEX intervention*

Costs at estimate base date

| Yr | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | £ - |
| 1 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 2 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 3 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 4 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 5 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 6 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 7 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 8 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 9 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 10 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 11 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 12 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 13 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 14 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 15 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 16 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 17 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 18 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 19 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 20 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 21 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 22 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 23 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 24 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 25 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 26 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 27 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 28 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 29 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 30 | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 77,097,794.95** |

# Feasibility Estimate

## Net Present Value

**Iver WTW**

### 5.1 NPV Option 1

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| Yr | Capital Investment | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | |
| CAPEX Yr1 | £ 10,003,519 | | | | | | | | £ 10,003,519 |
| CAPEX Yr2 | £ 18,006,334 | | | | | | | | £ 18,006,334 |
| CAPEX Yr3 | £ 12,004,223 | | | | | | | | £ 12,004,223 |
| 1 | £ - | £ 664,565 | £ 153,527 | £ 1,589,264 | £ 55,245 | £ - | £ - | £ 34,412 | £ 2,497,014 |
| 2 | £ - | £ 645,711 | £ 149,172 | £ 1,544,174 | £ 53,677 | £ - | £ - | £ 33,435 | £ 2,426,170 |
| 3 | £ - | £ 627,391 | £ 144,939 | £ 1,500,364 | £ 52,155 | £ - | £ - | £ 32,487 | £ 2,357,335 |
| 4 | £ - | £ 609,591 | £ 140,827 | £ 1,457,796 | £ 50,675 | £ - | £ - | £ 31,565 | £ 2,290,454 |
| 5 | £ - | £ 592,296 | £ 136,832 | £ 1,416,436 | £ 49,237 | £ - | £ - | £ 30,670 | £ 2,225,470 |
| 6 | £ - | £ 575,491 | £ 132,950 | £ 1,376,250 | £ 47,840 | £ - | £ - | £ 29,799 | £ 2,162,330 |
| 7 | £ - | £ 559,164 | £ 129,178 | £ 1,337,203 | £ 46,483 | £ - | £ - | £ 28,954 | £ 2,100,982 |
| 8 | £ - | £ 543,299 | £ 125,513 | £ 1,299,265 | £ 45,164 | £ - | £ - | £ 28,132 | £ 2,041,374 |
| 9 | £ - | £ 527,885 | £ 121,952 | £ 1,262,403 | £ 43,883 | £ - | £ - | £ 27,334 | £ 1,983,457 |
| 10 | £ - | £ 512,908 | £ 118,492 | £ 1,226,586 | £ 42,638 | £ - | £ - | £ 26,559 | £ 1,927,183 |
| 11 | £ - | £ 498,356 | £ 115,130 | £ 1,191,786 | £ 41,428 | £ - | £ - | £ 25,805 | £ 1,872,506 |
| 12 | £ - | £ 484,217 | £ 111,863 | £ 1,157,973 | £ 40,253 | £ - | £ - | £ 25,073 | £ 1,819,380 |
| 13 | £ - | £ 470,479 | £ 108,690 | £ 1,125,120 | £ 39,111 | £ - | £ - | £ 24,362 | £ 1,767,761 |
| 14 | £ - | £ 457,131 | £ 105,606 | £ 1,093,199 | £ 38,001 | £ - | £ - | £ 23,671 | £ 1,717,607 |
| 15 | £ - | £ 444,161 | £ 102,610 | £ 1,062,183 | £ 36,923 | £ - | £ - | £ 22,999 | £ 1,668,876 |
| 16 | £ - | £ 431,560 | £ 99,699 | £ 1,032,047 | £ 35,875 | £ - | £ - | £ 22,347 | £ 1,621,527 |
| 17 | £ - | £ 419,316 | £ 96,870 | £ 1,002,766 | £ 34,857 | £ - | £ - | £ 21,713 | £ 1,575,522 |
| 18 | £ - | £ 407,419 | £ 94,122 | £ 974,316 | £ 33,868 | £ - | £ - | £ 21,097 | £ 1,530,822 |
| 19 | £ - | £ 395,860 | £ 91,451 | £ 946,673 | £ 32,908 | £ - | £ - | £ 20,498 | £ 1,487,390 |
| 20 | £ 2,273,358 | £ 384,629 | £ 88,857 | £ 919,815 | £ 31,974 | £ - | £ - | £ 19,916 | £ 3,718,548 |
| 21 | £ - | £ 373,716 | £ 86,336 | £ 893,718 | £ 31,067 | £ - | £ - | £ 19,351 | £ 1,404,188 |
| 22 | £ - | £ 363,113 | £ 83,886 | £ 868,362 | £ 30,185 | £ - | £ - | £ 18,802 | £ 1,364,349 |
| 23 | £ - | £ 352,811 | £ 81,506 | £ 843,725 | £ 29,329 | £ - | £ - | £ 18,269 | £ 1,325,641 |
| 24 | £ - | £ 342,802 | £ 79,194 | £ 819,787 | £ 28,497 | £ - | £ - | £ 17,751 | £ 1,288,030 |
| 25 | £ - | £ 333,076 | £ 76,947 | £ 796,529 | £ 27,688 | £ - | £ - | £ 17,247 | £ 1,251,487 |
| 26 | £ - | £ 323,626 | £ 74,764 | £ 773,930 | £ 26,903 | £ - | £ - | £ 16,758 | £ 1,215,980 |
| 27 | £ - | £ 314,444 | £ 72,643 | £ 751,972 | £ 26,140 | £ - | £ - | £ 16,282 | £ 1,181,481 |
| 28 | £ - | £ 305,523 | £ 70,582 | £ 730,638 | £ 25,398 | £ - | £ - | £ 15,820 | £ 1,147,960 |
| 29 | £ - | £ 296,855 | £ 68,579 | £ 709,908 | £ 24,677 | £ - | £ - | £ 15,371 | £ 1,115,391 |
| 30 | £ - | £ 288,432 | £ 66,633 | £ 689,767 | £ 23,977 | £ - | £ - | £ 14,935 | £ 1,083,746 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 93,184,036.63** |

## 3.2 - Existing Assets + RGF's [Location 2]

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **New Interstage Pump Station** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height x 11m width x 6m length (clear internal) | 1 | 66 | m2 | | £ 199,619.17 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure incl. excavation | 4m depth x 10m width x 6m length | 1 | 240 | m3 | | £ 479,420.11 | Dry/Wet Well Structure |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | 4 No. variable speed Canister Type Pumps | 4 No. Pumps D/A/A/S; Total flow 239 Ml/d. Total head 3.5 m (assume 3m static); Based on Xylem selection - canister mounted units; Each pump 922 l/s @ 4.6 m | 3 | 75 | kW | | £ 820,279.92 | Interprocess Pumping |
| 2 | MCC with VSDs | 10m (in RGF building electrical room) | 1 | 330 | kW | | £ 299,733.83 | MCC |
| 3 | HVAC | | | | | | £ - | Incl. in Building Model |
| 4 | Building Services | | | | | | £ - | Incl. in Building Model |
| 5 | | | | | | | £ - | |
| **RGF's - Location 2** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ - | Assumed to be RGF Structure |
| 3 | RGF's | 18 No. Cells; Each Cell 10m x 9m; Single Bed Type; | 1 | 1620 | m2 | | £ 16,149,161.35 | Rapid Gravity Filters |
| 4 | Clean washwater tank | Volume: 3300 m3 | 1 | 3300 | m3 | | £ 583,928.51 | Concrete Tank; Open Top; Water Storage |
| 5 | Dirty washwater tank | Volume: 1000m3 | 1 | 1000 | m3 | | £ 354,156.24 | Concrete Tank; Open Top; Washwater Recovery |
| 6 | Dirty washwater delivery pipe (pumped) | 200m length, 300mm diameter | 200 | 300 | mm | | £ 106,292.30 | Interprocess Pipework; Below Ground |
| 7 | | | | | | | £ - | |
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | BACKWASH PUMPS | 3 No. D/A/S; Duty 5619 m3/h @ 3.5m HD | 3 | 45 | kW | | £ 536,491.28 | Interprocess Pumping |
| 2 | AIR SCOUR BLOWERS | 2 No. D/S; Duty 8428 Nm3/hr @ 600mBar | 2 | 90 | kW | | £ 110,188.85 | Air Blower |
| 3 | FILTER OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 4 | FILTER INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 5 | CLEAN BACKWASH INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 6 | DIRTY BACKWASH OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 7 | AIR SCOUR INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 8 | 18 No. RGF LCPs | | | | | | £ - | Incl. in RGF Model |
| 9 | HVAC | | | | | | £ - | Incl. in Building Model |
| 10 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 11 | Building services | | | | | | £ - | Incl. in Building Model |
| 12 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Access Roads, Drainage & Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 200m x 3.5m width | 1 | 700 | m2 | | £ 71,570.87 | Site Roads; All Types |
| 2 | Road drainage | 200m length | 1 | 200 | m | | £ 47,856.01 | Drainage |
| 3 | Delivery Pipework (to RGFs) DN1100 Fusion Bonded Epoxy Steel | 35m length 1.1m diameter 1m cover | 35 | 1100 | mm | | £ 60,358.26 | Interprocess Pipework; Below Ground |
| 4 | Delivery Pipework (to RGFs) DN1600 Fusion Bonded Epoxy Steel | 190 m length, DN 1600, buried | 190 | 1600 | mm | | £ 469,335.04 | Interprocess Pipework; Below Ground |
| 5 | Delivery Pipework (to Inter-ozone) DN1600 Fusion Bonded Epoxy Steel | 181m length 1.8m diameter 1m cover | 181 | 1800 | mm | | £ 501,089.36 | Interprocess Pipework; Below Ground |
| 6 | Overflow pipework (from UV inlet channel) | 10m length 1.8m diameter 1m cover in hardstanding (to PS wet well) | 10 | 1800 | mm | | £ 27,684.49 | Interprocess Pipework; Below Ground |
| 7 | | | | | | | £ - | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Iver WTW**

aquaconsultants
water · environment · energy

### 3.2 - Existing Assets + RGF's [Location 2]
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical & ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | RMU - 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | | | | | | £ 100,000.00 | Allow |
| 2 | Cabling (3.3kV) | 200m | 1 | 200 | m | | £ 95,997.25 | HV Cabling (m) |
| 3 | Cabling (LV) | 200m | 1 | 200 | m | | £ 41,644.75 | General - LV Cabling with Ducts and Drawpits (m) |
| 4 | 400V | 1200m | 1 | 1200 | m | | £ 116,296.83 | General - LV Cabling with Ducts and Drawpits (m) |
| 5 | Comms | 200m | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 6 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 7 | PLC network extension and network node box | Break into existing network in adjacent GAC building. | | | | | £ 50,000.00 | Allow |
| 8 | SCADA integration/configuration | | 1 | 1 | No. | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 9 | DNO charges (amendment to authorised supply capacity) | Allow £50k - Load based on Drive List Please advise if different | 1 | 1000.0 | kVA | | £ 381,941.04 | New Power Supply to Site |
| 10 | ERACS study | allow 15k | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 11 | MCC (Design and installation) | Max. Installed kW of MCC - Taken from Drive List - Please advise if different | 1 | 376.6 | kW | | £ 251,819.95 | Motor Control Centre (MCC); Based on Load Schedule |
| 12 | Starters | Incl. in MCC above | | | | | £ - | Incl. in MCC |
| 13 | Pontential for standby generator? | 1 No. 2MVA @ 3.3kV standby generator with LCP and acoustic enclosure | 1 | 2000 | kVA | | £ 498,893.28 | Emergency Power Generation |
| 14 | Electrical Installation | Typical cost | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 25,457,563.39** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 42% | £ 10,597,446.98 | |

| | |
|---|---|
| **Construction Cost** | **£ 36,055,010.37** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 15% | £ 5,417,265.31 | |

| | |
|---|---|
| **Project Cost** | **£ 41,472,275.68** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.2 - Option 2 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 484.95 | Modelled Approach |
| Interstage Pumps | Add | Consumption | 225 | 16 | 1314000 | £ 0.350 | £ 459,900.00 | Assume 16hr/day @ Full Inst. Rate |
| RGF - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 14,910.53 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Consumption | | | 0 | £ 0.35 | £ 85,899.77 | Modelled Approach |
| Clean washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 16,662.86 | Modelled Approach |
| Dirty washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 11,290.52 | Modelled Approach |
| BACKWASH PUMPS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| AIR SCOUR BLOWERS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 683,970.7** | |
| **Annual Power Carbon** | | | | | | | **1359733.752 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | Manual | | £ 1,762.29 | Modelled Approach |
| Interstage Pumps | Add | Manual | | £ 5,767.04 | Modelled Approach |
| RGF - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Manual | | £ 63,150.79 | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 4,126.68 | Modelled Approach |
| Dirty washwater tank | Add | Manual | | £ 2,796.18 | Modelled Approach |
| BACKWASH PUMPS | Add | Modelled | £ 18,539.64 | | |
| AIR SCOUR BLOWERS | Add | Modelled | £ 3,807.82 | | |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **158,010.35** | |
| **Annual Maintenance Carbon** | | | | **73095.587 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/tonne)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 58.3 | 1250 | 26613 | £ 181.99 | £ 66,426.35 | Pre-chlorination |
| Sulphuric Acid 96% | Add | | 22.1 | 1840 | 14856 | £ 71.32 | £ 26,031.80 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 210.6 | 1200 | 92260 | £ 740.10 | £ 270,136.50 | Clarification |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 173.9 | 998 | 63342 | £ 43.73 | £ 15,961.45 | Clarification |
| Sulphuric Acid 96% | Add | | 24.1 | 1840 | 16172 | £ 77.61 | £ 28,327.65 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 216.8 | 1200 | 94937 | £ 761.59 | £ 277,980.35 | Clarification |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 189.2 | 998 | 68930 | £ 47.59 | £ 17,370.35 | Clarification |
| Sulphuric Acid 96% | Add | | 56.1 | 1840 | 37650 | £ 180.71 | £ 65,959.15 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 169.9 | 1200 | 74412 | £ 596.92 | £ 217,875.80 | Clarification |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 148.3 | 998 | 54027 | £ 37.30 | £ 13,614.50 | Clarification |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 118.9 | 1250 | 54234 | £ 370.89 | £ 135,374.85 | Disinfection |
| Orthophosphoric Acid | Add | | 333.4 | 1052 | 128022 | £ 443.85 | £ 162,005.25 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 43.2 | 1280 | 20192 | £ 205.79 | £ 75,113.35 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 36.8 | 1500 | 20121 | £ 198.46 | £ 72,437.90 | Final Water Conditioning |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 39.1 | 998 | 14252 | £ 9.84 | £ 3,591.60 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 2042.0 | 998 | 743907 | £ 513.60 | £ 187,464.00 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,635,670.9** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | | | £ 63.93 | Modelled Approach |
| Interstage Pumps | Add | | | £ 73.31 | Modelled Approach |
| RGF - Operational Building | Add | | | £ 1,965.56 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | | | £ 47,405.98 | Modelled Approach |
| Clean washwater tank | Add | | | £ 4,380.85 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 2,968.40 | Modelled Approach |
| | | | | | |
| **Annual People Costs** | | | | **£ 56,858.03** | |
| **Annual People Carbon** | | | | **0 CO2 kg** | |

#### *Other*

| *Item* | *Add / omit* | *Qty* | *rate* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | | | £ 839.71 | Modelled Approach |
| RGF - Operational Building | Add | | | £ 25,818.11 | Modelled Approach |
| Clean washwater tank | Add | | | £ 4,450.98 | Modelled Approach |
| Dirty washwater tank | Add | | | £ 3,015.92 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 647.05 | Modelled Approach |

| | | | | | | |
|---|---|---|---|---|---|---|
| Switchgear kiosk | Add | | | £ | 644.80 | Modelled Approach |
| | | | | | | |
| **Annual Other Costs** | | | | **£** | **35,416.57** | |
| **Annual Other Carbon** | | | | | **16383.705 CO** | |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **2,569,926.50** |
| **Total Annual Carbon** | | **1449213.044 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Iver WTW**

aquaconsultants
water · environment · energy

### *30 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *2* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *3* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *4* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *5* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *6* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *7* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *8* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *9* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *10* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *11* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *12* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *13* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *14* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *15* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *16* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *17* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *18* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *19* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *20* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *21* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *22* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *23* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *24* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *25* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *26* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *27* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *28* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *29* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *30* | £ 683,971 | £ 158,010 | £ 1,635,671 | £ 56,858 | £ - | £ - | £ 35,417 | £ 2,569,926 |
| *31* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *32* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *33* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *34* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *35* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *36* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *37* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *38* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *39* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *40* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 77,097,794.95** |

# Feasibility Estimate

## Net Present Value

**Iver WTW**

aquaconsultants
water · environment · energy

### 5.2 NPV Option 2

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| Yr | Capital Investment | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | |
| CAPEX Yr1 | £ 10,368,069 | | | | | | | | £ 10,368,069 |
| CAPEX Yr2 | £ 18,662,524 | | | | | | | | £ 18,662,524 |
| CAPEX Yr3 | £ 12,441,683 | | | | | | | | £ 12,441,683 |
| 1 | £ - | £ 664,565 | £ 153,527 | £ 1,589,264 | £ 55,245 | £ - | £ - | £ 34,412 | £ 2,497,014 |
| 2 | £ - | £ 645,711 | £ 149,172 | £ 1,544,174 | £ 53,677 | £ - | £ - | £ 33,435 | £ 2,426,170 |
| 3 | £ - | £ 627,391 | £ 144,939 | £ 1,500,364 | £ 52,155 | £ - | £ - | £ 32,487 | £ 2,357,335 |
| 4 | £ - | £ 609,591 | £ 140,827 | £ 1,457,796 | £ 50,675 | £ - | £ - | £ 31,565 | £ 2,290,454 |
| 5 | £ - | £ 592,296 | £ 136,832 | £ 1,416,436 | £ 49,237 | £ - | £ - | £ 30,670 | £ 2,225,470 |
| 6 | £ - | £ 575,491 | £ 132,950 | £ 1,376,250 | £ 47,840 | £ - | £ - | £ 29,799 | £ 2,162,330 |
| 7 | £ - | £ 559,164 | £ 129,178 | £ 1,337,203 | £ 46,483 | £ - | £ - | £ 28,954 | £ 2,100,982 |
| 8 | £ - | £ 543,299 | £ 125,513 | £ 1,299,265 | £ 45,164 | £ - | £ - | £ 28,132 | £ 2,041,374 |
| 9 | £ - | £ 527,885 | £ 121,952 | £ 1,262,403 | £ 43,883 | £ - | £ - | £ 27,334 | £ 1,983,457 |
| 10 | £ - | £ 512,908 | £ 118,492 | £ 1,226,586 | £ 42,638 | £ - | £ - | £ 26,559 | £ 1,927,183 |
| 11 | £ - | £ 498,356 | £ 115,130 | £ 1,191,786 | £ 41,428 | £ - | £ - | £ 25,805 | £ 1,872,506 |
| 12 | £ - | £ 484,217 | £ 111,863 | £ 1,157,973 | £ 40,253 | £ - | £ - | £ 25,073 | £ 1,819,380 |
| 13 | £ - | £ 470,479 | £ 108,690 | £ 1,125,120 | £ 39,111 | £ - | £ - | £ 24,362 | £ 1,767,761 |
| 14 | £ - | £ 457,131 | £ 105,606 | £ 1,093,199 | £ 38,001 | £ - | £ - | £ 23,671 | £ 1,717,607 |
| 15 | £ - | £ 444,161 | £ 102,610 | £ 1,062,183 | £ 36,923 | £ - | £ - | £ 22,999 | £ 1,668,876 |
| 16 | £ - | £ 431,560 | £ 99,699 | £ 1,032,047 | £ 35,875 | £ - | £ - | £ 22,347 | £ 1,621,527 |
| 17 | £ - | £ 419,316 | £ 96,870 | £ 1,002,766 | £ 34,857 | £ - | £ - | £ 21,713 | £ 1,575,522 |
| 18 | £ - | £ 407,419 | £ 94,122 | £ 974,316 | £ 33,868 | £ - | £ - | £ 21,097 | £ 1,530,822 |
| 19 | £ - | £ 395,860 | £ 91,451 | £ 946,673 | £ 32,908 | £ - | £ - | £ 20,498 | £ 1,487,390 |
| 20 | £ 2,798,071 | £ 384,629 | £ 88,857 | £ 919,815 | £ 31,974 | £ - | £ - | £ 19,916 | £ 4,243,262 |
| 21 | £ - | £ 373,716 | £ 86,336 | £ 893,718 | £ 31,067 | £ - | £ - | £ 19,351 | £ 1,404,188 |
| 22 | £ - | £ 363,113 | £ 83,886 | £ 868,362 | £ 30,185 | £ - | £ - | £ 18,802 | £ 1,364,349 |
| 23 | £ - | £ 352,811 | £ 81,506 | £ 843,725 | £ 29,329 | £ - | £ - | £ 18,269 | £ 1,325,641 |
| 24 | £ - | £ 342,802 | £ 79,194 | £ 819,787 | £ 28,497 | £ - | £ - | £ 17,751 | £ 1,288,030 |
| 25 | £ - | £ 333,076 | £ 76,947 | £ 796,529 | £ 27,688 | £ - | £ - | £ 17,247 | £ 1,251,487 |
| 26 | £ - | £ 323,626 | £ 74,764 | £ 773,930 | £ 26,903 | £ - | £ - | £ 16,758 | £ 1,215,980 |
| 27 | £ - | £ 314,444 | £ 72,643 | £ 751,972 | £ 26,140 | £ - | £ - | £ 16,282 | £ 1,181,481 |
| 28 | £ - | £ 305,523 | £ 70,582 | £ 730,638 | £ 25,398 | £ - | £ - | £ 15,820 | £ 1,147,960 |
| 29 | £ - | £ 296,855 | £ 68,579 | £ 709,908 | £ 24,677 | £ - | £ - | £ 15,371 | £ 1,115,391 |
| 30 | £ - | £ 288,432 | £ 66,633 | £ 689,767 | £ 23,977 | £ - | £ - | £ 14,935 | £ 1,083,746 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 95,166,950.65** |

## 3.3 - Actiflo + RGF's [Location 1]

***Direct Works***

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **New Actiflo Plant** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ 399,150.63 | Concrete Open Top Tank; Used to cost for 4m DP Substructure<br>Allow 40% of cost to be offset against tank costs in Actiflo scope which it is assumed will form the majority of the basement area. |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | Interconnecting Pipework - Inlet to AC9 Streams | Above ground pipework feeding each of the 3 No. streams | 30 | 1400 | mm | | £ 183,972.46 | Interprocess Pipework; Above Ground |
| 6 | Coagulation Tank | Rapid Mixer' tank - Length 5.0 m, Width 6.30 m, Depth 6.0 m; | 3 | 189 | m3 | | £ 510,426.02 | Concrete Tank - All Types |
| 7 | Flocculation Tank | Floc tank - Length 6.0 m, Width 9.0 m, Depth 6.0 m; | 3 | 324 | m3 | | £ 802,169.89 | Concrete Tank - All Types |
| 8 | Settler Tank | Actiflo Settler Tank - Length 9.0m, Width 9.0m Depth 6.0m; | 3 | 486 | m3 | | £ 1,152,262.53 | Concrete Tank - All Types |
| 9 | Interconnecting Pipework - Outlet from AC9 Streams | Below ground gravity DN1400 ; Ductile Iron; | 125 | 1400 | mm | | £ 301,447.64 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |
| 11 | | | | | | | £ - | |
| 12 | | | | | | | £ - | |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Ballasted Coagulation System | 3x Actiflo turbo AC9 streams; Coagulation and flocculation mixers c/w supports; Lamellas, Sludge Recirc Pumps & Pipework; Hydrocyclones; Control and Instrumentation etc<br><br>Generally there are exclusions on Actiflo scopes (incl. installation, interconnecting pipework etc) - Can you provide the budget quote for review. | 1 | 1 | No | | £ 3,200,000.00 | Actiflo Package; Quote from Veolia |
| 2 | Chemical Dosing - PAC | Dose Rate 12144.83 kg/d; Flow to be treated - 176.35 MLD | 1 | 176.35 | MLD | | £ 883,672.08 | Chemical Dosing; PAC Dosing |
| 3 | Chemical Dosing - Ferric | Identified on scope sheet but not on Dose rates spreadsheet. | | | | | £ - | |
| 4 | Chemical Dosing - Polymer | Dose Rate 44.09 kg/d; Flow to be treated - 176.35 MLD | 1 | 176.35 | MLD | | £ 377,887.05 | Chemical Dosing; Polyelectrolyte |
| 5 | Chemical Dosing - Sulphuric Acid | Dose Rate 2068.43 kg/d; Flow to be treated - 176.35 MLD | 1 | 176.35 | MLD | | £ 705,412.52 | Chemical Dosing; pH Adjustment |
| 6 | HVAC | | | | | | £ - | Incl. in Building Model |
| 7 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 8 | Building services | | | | | | £ - | Incl. in Building Model |
| 9 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 10 | Ballast material | Assume first fill of Storage silo | 1 | 15 | tonnes | | £ 15,000.00 | Based on £1,000/Tonne |
| 11 | LCP and Electrical Installation | All motor starters and VSD's, together with all site cabling, containment, Isolators and Junction Boxes. - Based on 7.5% of TSR Price | 1 | | sum | | £ 240,000.00 | Based on 7.5% of Actiflo Quote |
| 12 | Power, Control & Signal Cabling | Excluded from Evoqua scope - Based on 2.5% of TSR Scope | 1 | | sum | | £ 80,000.00 | Based on 2.5% of Actiflo Quote |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **New Interstage Pump Station** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height x 11m width x 6m length (clear internal) | 1 | 66 | m2 | | £ 199,619.17 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure incl. excavation | 4m depth x 10m width x 6m length | 1 | 240 | m3 | | £ 479,420.11 | Dry/Wet Well Structure |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | 4 No. variable speed Canister Type Pumps | 4 No. Pumps D/A/A/S; Total flow 239 Ml/d. Total head 3.5 m (assume 3m static); Based on Xylem selection - canister mounted units; Each pump 922 l/s @ 4.6 m | 3 | 75 | kW | | £ 820,279.92 | Interprocess Pumping |
| 2 | MCC with VSDs | 10m (in RGF building electrical room) | 1 | 330 | kW | | £ 299,733.83 | MCC |
| 3 | HVAC | | | | | | £ - | Incl. in Building Model |

## 3.3 - Actiflo + RGF's [Location 1]

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| 4 | Building Services | | | | | | £ - | Incl. in Building Model |
| 5 | | | | | | | £ - | |
| **RGF's - Location 1** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ - | Assumed to be RGF Structure |
| 3 | RGF's | 18 No. Cells; Each Cell 10m x 9m; Single Bed Type; | 1 | 1620 | m2 | | £ 16,149,161.35 | Rapid Gravity Filters |
| 4 | Clean washwater tank | Volume: 700m3 | 1 | 700 | m3 | | £ 311,874.66 | Concrete Tank; Open Top; Water Storage |
| 5 | Dirty washwater tank | Volume: 1200m3 | 1 | 1200 | m3 | | £ 379,526.77 | Concrete Tank; Open Top; Washwater Recovery |
| 6 | Dirty washwater delivery pipe (pumped) | 220m length, 300mm diameter | 220 | 300 | mm | | £ 116,921.53 | Interprocess Pipework; Below Ground |
| 7 | | | | | | | £ - | |
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | BACKWASH PUMPS | 3 No. D/A/S; Duty 5619 m3/h @ 3.5m HD | 3 | 45 | kW | | £ 536,491.28 | Interprocess Pumping |
| 2 | AIR SCOUR BLOWERS | 2 No. D/S; Duty 8428 Nm3/hr @ 600mBar | 2 | 90 | kW | | £ 110,188.85 | Air Blower |
| 3 | FILTER OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 4 | FILTER INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 5 | CLEAN BACKWASH INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 6 | DIRTY BACKWASH OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 7 | AIR SCOUR INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 8 | 18 No. RGF LCPs | | | | | | £ - | Incl. in RGF Model |
| 9 | HVAC | | | | | | £ - | Incl. in Building Model |
| 10 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 11 | Building services | | | | | | £ - | Incl. in Building Model |
| 12 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Access Roads, Drainage & Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 200m x 3.5m width | 1 | 700 | m2 | | £ 28,339.91 | Site Roads; All Types |
| 2 | Road drainage | 200m length | 1 | 200 | m | | £ 47,856.01 | Drainage |
| 3 | Delivery to Actiflo | 2.5m length, 0.9m diameter. | 2.5 | 900 | mm | | £ 3,565.64 | Interprocess Pipework; Below Ground |
| 4 | Delivery to Actiflo | 47m length, 1.4m diameter | 47 | 1400 | mm | | £ 102,080.21 | Interprocess Pipework; Below Ground |
| 5 | Delivery Pipework (to RGFs) DN1800 Fusion Bonded Epoxy Steel | 121m length 1.8m diameter 1m cover | 121 | 1800 | mm | | £ 334,982.39 | Interprocess Pipework; Below Ground |
| 6 | Delivery Pipework (to RGFs) DN1000 Fusion Bonded Epoxy Steel | 30m length, DN 1400, buried | 30 | 1400 | mm | | £ 65,157.58 | Interprocess Pipework; Below Ground |
| 7 | Delivery Pipework (to Inter-ozone) DN1600 Fusion Bonded Epoxy Steel | 20m length 1.6m diameter 1m cover | 20 | 1600 | mm | | £ 49,403.69 | Interprocess Pipework; Below Ground |
| 8 | Overflow pipework (from UV inlet channel) | 10m length 1.6m diameter 1m cover in hardstanding (to PS wet well) | 10 | 1600 | mm | | £ 24,701.84 | Interprocess Pipework; Below Ground |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical & ICA** | | | | | | | | |
| **Civil** | | | | | | | | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Iver WTW**

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### 3.3 - Actiflo + RGF's [Location 1]
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | RMU - 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | | | | | | £ 100,000.00 | Allow |
| 2 | Cabling (3.3kV) | 200m | 1 | 200 | m | | £ 95,997.25 | HV Cabling (m) |
| 3 | Cabling (LV) | 200m | 1 | 200 | m | | £ 41,644.75 | General - LV Cabling with Ducts and Drawpits (m) |
| 4 | 400V | 1200m | 1 | 1200 | m | | £ 116,296.83 | General - LV Cabling with Ducts and Drawpits (m) |
| 5 | Comms | 200m | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 6 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 7 | PLC network extension and network node box | Break into existing network in adjacent GAC building. | | | | | £ 50,000.00 | Allow |
| 8 | SCADA integration/configuration | | 1 | 1 | No. | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 9 | DNO charges (amendment to authorised supply capacity) | Allow £50k - Load based on Drive List Please advise if different | 1 | 1000.0 | kVA | | £ 381,941.04 | New Power Supply to Site |
| 10 | ERACS study | allow 15k | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 11 | MCC (Design and installation) | Max. Installed kW of MCC - Taken from Drive List - Please advise if different | 1 | 376.6 | kW | | £ 251,819.95 | Motor Control Centre (MCC); Based on Load Schedule |
| 12 | Starters | Incl. in MCC above | | | | | £ - | Incl. in MCC |
| 13 | Pontential for standby generator? | 1 No. 2MVA @ 3.3kV standby generator with LCP and acoustic enclosure | 1 | 2000 | kVA | | £ 498,893.28 | Emergency Power Generation |
| 14 | Electrical Installation | Typical cost | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 36,306,464.59** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 42% | £ 15,113,615.86 | |

| | |
|---|---|
| **Construction Cost** | **£ 51,420,080.45** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 15% | £ 7,725,867.09 | |

| | |
|---|---|
| **Project Cost** | **£ 59,145,947.54** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.3 - Option 3 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 14,910.53 | Modelled Approach |
| Actiflo - Coagulation Mixer 1 | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Actiflo - Coagulation Mixer 2 | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Actiflo - Flocculation Mixer | Add | Consumption | 63.36 | 24 | 555034 | £ 0.35 | £ 194,261.76 | From Veolia Info. |
| Actiflo - Scraper | Add | Consumption | 5.19 | 24 | 45464 | £ 0.35 | £ 15,912.54 | From Veolia Info. |
| Actiflo - Recycle Pump (Duty) | Add | Consumption | 63.36 | 24 | 555034 | £ 0.35 | £ 194,261.76 | From Veolia Info. |
| Chemical Dosing - PAC | Add | Consumption | | | 0 | £ 0.35 | £ 47,491.71 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Consumption | | | 0 | £ 0.35 | £ 10,822.60 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 13,064.33 | Modelled Approach |
| Interstage PS - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 484.95 | Modelled Approach |
| Interstage Pumps | Add | Consumption | 225 | 16 | 1314000 | £ 0.350 | £ 459,900.00 | Assume 16hr/day @ Full Inst. Rate |
| RGF - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 14,910.53 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Consumption | | | 0 | £ 0.35 | £ 85,899.77 | Modelled Approach |
| Clean washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,051.15 | Modelled Approach |
| Dirty washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 11,981.93 | Modelled Approach |
| BACKWASH PUMPS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| AIR SCOUR BLOWERS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| | | | | | | | | |
| Pulsators | Omit | Consumption | 92 | 24 | 805920 | £ 0.35 | -£ 282,072.00 | No loads detailed in latest electrical load schedule |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 1,210,473.2** | |
| **Annual Power Carbon** | | | | | | | **2406420.786 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| Chemical Dosing - PAC | Add | Manual | | £ 265,698.38 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Manual | | £ 3,038.36 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Manual | | £ 17,161.24 | Modelled Approach |
| Interstage PS - Operational Building | Add | Manual | | £ 1,762.29 | Modelled Approach |
| Interstage Pumps | Add | Manual | | £ 5,767.04 | Modelled Approach |
| RGF - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Manual | | £ 63,150.79 | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Dirty washwater tank | Add | Manual | | £ 2,967.41 | Modelled Approach |
| BACKWASH PUMPS | Add | Modelled | £ 18,539.64 | | |
| AIR SCOUR BLOWERS | Add | Modelled | £ 3,807.82 | | |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **496,626.48** | |
| **Annual Maintenance Carbon** | | | | **229739.409 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 59.1 | 1250 | 26960 | £ 184.36 | £ 67,291.40 | Pre-chlorination |
| Sulphuric Acid 96% | Add | | 46.8 | 1840 | 31431 | £ 150.88 | £ 55,071.20 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 421.4 | 1200 | 184556 | £ 1,480.50 | £ 540,382.50 | Clarification |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 367.8 | 998 | 134003 | £ 92.52 | £ 33,769.80 | Clarification |
| Sulphuric Acid 96% | Add | | 56.8 | 1840 | 38140 | £ 183.07 | £ 66,820.55 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 172.1 | 1200 | 75384 | £ 604.71 | £ 220,719.15 | Clarification Actiflo |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 150.2 | 998 | 54733 | £ 37.79 | £ 13,793.35 | Clarification Actiflo |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 118.9 | 1250 | 54234 | £ 370.89 | £ 135,374.85 | Disinfection |
| Orthophosphoric Acid | Add | | 333.4 | 1052 | 128022 | £ 443.85 | £ 162,005.25 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 43.2 | 1280 | 20192 | £ 205.79 | £ 75,113.35 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 36.8 | 1500 | 20121 | £ 198.46 | £ 72,437.90 | Final Water Conditioning |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 45.8 | 998 | 16685 | £ 11.52 | £ 4,204.80 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 2040.9 | 998 | 743502 | £ 513.32 | £ 187,361.80 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,634,345.9** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | | | £ 1,965.56 | Modelled Approach |
| Chemical Dosing - PAC | Add | | | £ 98,128.99 | Modelled Approach |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.3 - Option 3 Detailed OPEX Breakdown

| | | | | | | |
|---|---|---|---|---|---|---|
| Chemical Dosing - Polymer | Add | | | £ | 1,151.56 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | | | £ | 13,588.64 | Modelled Approach |
| Interstage PS - Operational Building | Add | | | £ | 63.93 | Modelled Approach |
| Interstage Pumps | Add | | | £ | 73.31 | Modelled Approach |
| RGF - Operational Building | Add | | | £ | 1,965.56 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | | | £ | 47,405.98 | Modelled Approach |
| Clean washwater tank | Add | | | £ | 2,642.56 | Modelled Approach |
| Dirty washwater tank | Add | | | £ | 3,150.18 | Modelled Approach |
| | | | | | | |
| | | | | | | |
| **Annual People Costs** | | | | **£** | **170,136.27** | |
| **Annual People Carbon** | | | | | **0 CO2 kg** | |

***Other***

| *Item* | *Add / omit* | *Qty* | *rate* | | Annual Total | *Comments* |
|---|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | | | £ | 25,818.11 | Modelled Approach |
| Interstage PS - Operational Building | Add | | | £ | 839.71 | Modelled Approach |
| RGF - Operational Building | Add | | | £ | 25,818.11 | Modelled Approach |
| Clean washwater tank | Add | | | £ | 2,684.86 | Modelled Approach |
| Dirty washwater tank | Add | | | £ | 3,200.61 | Modelled Approach |
| Transformer Kiosk | Add | | | £ | 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ | 644.80 | Modelled Approach |
| | | | | | | |
| **Annual Other Costs** | | | | **£** | **59,653.25** | |
| **Annual Other Carbon** | | | | | **27595.593 CO** | |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **3,571,235.13** |
| **Total Annual Carbon** | | **2663755.789 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Iver WTW**

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### *30 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *2* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *3* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *4* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *5* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *6* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *7* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *8* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *9* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *10* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *11* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *12* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *13* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *14* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *15* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *16* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *17* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *18* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *19* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *20* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *21* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *22* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *23* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *24* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *25* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *26* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *27* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *28* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *29* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *30* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *31* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *32* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *33* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *34* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *35* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *36* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *37* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *38* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *39* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *40* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 107,137,053.93** |

# Feasibility Estimate

## Net Present Value

**Iver WTW**

aquaconsultants
water · environment · energy

### 5.3 NPV Option 3

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| Yr | Capital Investment | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | |
| CAPEX Yr1 | £ 14,786,487 | | | | | | | | £ 14,786,487 |
| CAPEX Yr2 | £ 26,615,676 | | | | | | | | £ 26,615,676 |
| CAPEX Yr3 | £ 17,743,784 | | | | | | | | £ 17,743,784 |
| 1 | £ - | £ 1,176,130 | £ 482,536 | £ 1,587,977 | £ 165,309 | £ - | £ - | £ 57,961 | £ 3,469,914 |
| 2 | £ - | £ 1,142,762 | £ 468,846 | £ 1,542,924 | £ 160,619 | £ - | £ - | £ 56,316 | £ 3,371,467 |
| 3 | £ - | £ 1,110,340 | £ 455,544 | £ 1,499,148 | £ 156,062 | £ - | £ - | £ 54,719 | £ 3,275,813 |
| 4 | £ - | £ 1,078,838 | £ 442,620 | £ 1,456,615 | £ 151,634 | £ - | £ - | £ 53,166 | £ 3,182,873 |
| 5 | £ - | £ 1,048,229 | £ 430,062 | £ 1,415,289 | £ 147,332 | £ - | £ - | £ 51,658 | £ 3,092,570 |
| 6 | £ - | £ 1,018,489 | £ 417,860 | £ 1,375,135 | £ 143,152 | £ - | £ - | £ 50,192 | £ 3,004,829 |
| 7 | £ - | £ 989,593 | £ 406,005 | £ 1,336,120 | £ 139,091 | £ - | £ - | £ 48,768 | £ 2,919,577 |
| 8 | £ - | £ 961,517 | £ 394,486 | £ 1,298,212 | £ 135,145 | £ - | £ - | £ 47,384 | £ 2,836,745 |
| 9 | £ - | £ 934,237 | £ 383,294 | £ 1,261,380 | £ 131,310 | £ - | £ - | £ 46,040 | £ 2,756,262 |
| 10 | £ - | £ 907,732 | £ 372,419 | £ 1,225,593 | £ 127,585 | £ - | £ - | £ 44,734 | £ 2,678,062 |
| 11 | £ - | £ 881,978 | £ 361,853 | £ 1,190,821 | £ 123,965 | £ - | £ - | £ 43,465 | £ 2,602,081 |
| 12 | £ - | £ 856,955 | £ 351,587 | £ 1,157,035 | £ 120,448 | £ - | £ - | £ 42,232 | £ 2,528,256 |
| 13 | £ - | £ 832,642 | £ 341,612 | £ 1,124,209 | £ 117,031 | £ - | £ - | £ 41,033 | £ 2,456,526 |
| 14 | £ - | £ 809,018 | £ 331,920 | £ 1,092,313 | £ 113,710 | £ - | £ - | £ 39,869 | £ 2,386,830 |
| 15 | £ - | £ 786,065 | £ 322,503 | £ 1,061,322 | £ 110,484 | £ - | £ - | £ 38,738 | £ 2,319,112 |
| 16 | £ - | £ 763,763 | £ 313,353 | £ 1,031,211 | £ 107,350 | £ - | £ - | £ 37,639 | £ 2,253,316 |
| 17 | £ - | £ 742,094 | £ 304,462 | £ 1,001,954 | £ 104,304 | £ - | £ - | £ 36,571 | £ 2,189,385 |
| 18 | £ - | £ 721,040 | £ 295,824 | £ 973,527 | £ 101,345 | £ - | £ - | £ 35,534 | £ 2,127,269 |
| 19 | £ - | £ 700,583 | £ 287,431 | £ 945,906 | £ 98,469 | £ - | £ - | £ 34,525 | £ 2,066,915 |
| 20 | £ 7,838,458 | £ 680,706 | £ 279,276 | £ 919,070 | £ 95,676 | £ - | £ - | £ 33,546 | £ 9,846,731 |
| 21 | £ - | £ 661,393 | £ 271,353 | £ 892,994 | £ 92,961 | £ - | £ - | £ 32,594 | £ 1,951,296 |
| 22 | £ - | £ 642,629 | £ 263,654 | £ 867,659 | £ 90,324 | £ - | £ - | £ 31,669 | £ 1,895,935 |
| 23 | £ - | £ 624,396 | £ 256,174 | £ 843,042 | £ 87,761 | £ - | £ - | £ 30,771 | £ 1,842,144 |
| 24 | £ - | £ 606,681 | £ 248,906 | £ 819,123 | £ 85,271 | £ - | £ - | £ 29,898 | £ 1,789,879 |
| 25 | £ - | £ 589,469 | £ 241,844 | £ 795,884 | £ 82,852 | £ - | £ - | £ 29,050 | £ 1,739,098 |
| 26 | £ - | £ 572,745 | £ 234,983 | £ 773,303 | £ 80,501 | £ - | £ - | £ 28,225 | £ 1,689,757 |
| 27 | £ - | £ 556,495 | £ 228,316 | £ 751,363 | £ 78,217 | £ - | £ - | £ 27,425 | £ 1,641,816 |
| 28 | £ - | £ 540,706 | £ 221,838 | £ 730,046 | £ 75,998 | £ - | £ - | £ 26,647 | £ 1,595,235 |
| 29 | £ - | £ 525,366 | £ 215,544 | £ 709,333 | £ 73,842 | £ - | £ - | £ 25,891 | £ 1,549,976 |
| 30 | £ - | £ 510,460 | £ 209,429 | £ 689,209 | £ 71,747 | £ - | £ - | £ 25,156 | £ 1,506,001 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 137,711,618.31** |

## 3.4 - Actiflo + RGF's [Location 2]

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **New Actiflo Plant** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ 399,150.63 | Concrete Open Top Tank; Used to cost for 4m DP Substructure<br>Allow 40% of cost to be offset against tank costs in Actiflo scope which it is assumed will form the majority of the basement area. |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | Interconnecting Pipework - Inlet to AC9 Streams | Above ground pipework feeding each of the 3 No. streams | 30 | 1400 | mm | | £ 183,972.46 | Interprocess Pipework; Above Ground |
| 6 | Coagulation Tank | Rapid Mixer' tank - Length 5.0 m, Width 6.30 m, Depth 6.0 m; | 3 | 189 | m3 | | £ 510,426.02 | Concrete Tank - All Types |
| 7 | Flocculation Tank | Floc tank - Length 6.0 m, Width 9.0 m, Depth 6.0 m; | 3 | 324 | m3 | | £ 802,169.89 | Concrete Tank - All Types |
| 8 | Settler Tank | Actiflo Settler Tank - Length 9.0m, Width 9.0m Depth 6.0m; | 3 | 486 | m3 | | £ 1,152,262.53 | Concrete Tank - All Types |
| 9 | Interconnecting Pipework - Outlet from AC9 Streams | Below ground gravity DN1400 ; Ductile Iron; | 125 | 1400 | mm | | £ 301,447.64 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |
| 11 | | | | | | | £ - | |
| 12 | | | | | | | £ - | |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Ballasted Coagulation System | 3x Actiflo turbo AC9 streams; Coagulation and flocculation mixers c/w supports; Lamellas, Sludge Recirc Pumps & Pipework; Hydrocyclones; Control and Instrumentation etc<br><br>Generally there are exclusions on Actiflo scopes (incl. installation, interconnecting pipework etc) - Can you provide the budget quote for review. | 1 | 1 | No | | £ 3,200,000.00 | Actiflo Package; Quote from Veolia |
| 2 | Chemical Dosing - PAC | Dose Rate 12144.83 kg/d; Flow to be treated - 176.35 MLD | 1 | 176.35 | MLD | | £ 883,672.08 | Chemical Dosing; PAC Dosing |
| 3 | Chemical Dosing - Ferric | Identified on scope sheet but not on Dose rates spreadsheet. | | | | | £ - | 0 |
| 4 | Chemical Dosing - Polymer | Dose Rate 44.09 kg/d; Flow to be treated - 176.35 MLD | 1 | 176.35 | MLD | | £ 377,887.05 | Chemical Dosing; Polyelectrolyte |
| 5 | Chemical Dosing - Sulphuric Acid | Dose Rate 2068.43 kg/d; Flow to be treated - 176.35 MLD | 1 | 176.35 | MLD | | £ 705,412.52 | Chemical Dosing; pH Adjustment |
| 6 | HVAC | | | | | | £ - | Incl. in Building Model |
| 7 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 8 | Building services | | | | | | £ - | Incl. in Building Model |
| 9 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 10 | Ballast material | Assume first fill of Storage silo | 1 | 15 | tonnes | | £ 15,000.00 | Based on £1,000/Tonne |
| 11 | LCP and Electrical Installation | All motor starters and VSD's, together with all site cabling, containment, Isolators and Junction Boxes. - Based on 7.5% of TSR Price | 1 | | sum | | £ 240,000.00 | Based on 7.5% of Actiflo Quote |
| 12 | Power, Control & Signal Cabling | Excluded from Evoqua scope - Based on 2.5% of TSR Scope | 1 | | sum | | £ 80,000.00 | Based on 2.5% of Actiflo Quote |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **RGF's - Location 2** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ - | Assumed to be RGF Structure |
| 3 | RGF's | 18 No. Cells; Each Cell 10m x 9m; Single Bed Type; | 1 | 1620 | m2 | | £ 16,149,161.35 | Rapid Gravity Filters |
| 4 | Clean washwater tank | Volume: 700m3 | 1 | 700 | m3 | | £ 311,874.66 | Concrete Tank; Open Top; Water Storage |
| 5 | Dirty washwater tank | Volume: 1200m3 | 1 | 1200 | m3 | | £ 379,526.77 | Concrete Tank; Open Top; Washwater Recovery |
| 6 | Dirty washwater delivery pipe (pumped) | 220m length, 300mm diameter | 220 | 300 | mm | | £ 116,921.53 | Interprocess Pipework; Below Ground |
| 7 | | | | | | | £ - | |
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |

## 3.4 - Actiflo + RGF's [Location 2]

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| **MEICA** | | | | | | | | |
| 1 | BACKWASH PUMPS | 3 No. D/A/S; Duty 5619 m3/h @ 3.5m HD | 3 | 45 | kW | | £ 536,491.28 | Interprocess Pumping |
| 2 | AIR SCOUR BLOWERS | 2 No. D/S; Duty 8428 Nm3/hr @ 600mBar | 2 | 90 | kW | | £ 110,188.85 | Air Blower |
| 3 | FILTER OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 4 | FILTER INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 5 | CLEAN BACKWASH INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 6 | DIRTY BACKWASH OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 7 | AIR SCOUR INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 8 | 18 No. RGF LCPs | | | | | | £ - | Incl. in RGF Model |
| 9 | HVAC | | | | | | £ - | Incl. in Building Model |
| 10 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 11 | Building services | | | | | | £ - | Incl. in Building Model |
| 12 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **New Interstage Pump Station** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height x 11m width x 6m length (clear internal) | 1 | 66 | m2 | | £ 199,619.17 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure incl. excavation | 4m depth x 10m width x 6m length | 1 | 240 | m3 | | £ 479,420.11 | Dry/Wet Well Structure |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | 4 No. variable speed Canister Type Pumps | 4 No. Pumps D/A/A/S; Total flow 239 Ml/d. Total head 3.5 m (assume 3m static); Based on Xylem selection - canister mounted units; Each pump 922 l/s @ 4.6 m | 3 | 75 | kW | | £ 820,279.92 | Interprocess Pumping |
| 2 | MCC with VSDs | 10m (in RGF building electrical room) | 1 | 330 | kW | | £ 299,733.83 | MCC |
| 3 | HVAC | | | | | | £ - | Incl. in Building Model |
| 4 | Building Services | | | | | | £ - | Incl. in Building Model |
| 5 | | | | | | | £ - | |
| **Access Roads, Drainage & Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 200m x 3.5m width | 1 | 700 | m2 | | £ 71,570.87 | Site Roads; All Types |
| 2 | Road drainage | 200m length | 1 | 200 | m | | £ 47,856.01 | Drainage |
| 3 | landscaping | 4000m2 (10m width around works to be made good on completion) | 1 | 4000 | m2 | | £ 35,758.39 | Interprocess Pipework; Below Ground |
| 4 | Delivery to Actiflo | 47m length, 1.4m diameter | 47 | 1400 | mm | | £ 102,080.21 | Interprocess Pipework; Below Ground |
| 5 | Delivery inside Actiflo buidling | 22m length, 0.9m diameter | 22 | 900 | mm | | £ 31,377.65 | Interprocess Pipework; Below Ground |
| 6 | Delivery Pipework (to RGFs) DN1400 Fusion Bonded Epoxy Steel | 52m length 1.4m diameter 1m cover | 52 | 1400 | mm | | £ 112,939.81 | Interprocess Pipework; Below Ground |
| 7 | TO RGFs | 7m, 1.8m diameter | 7 | 1800 | mm | | £ 19,379.15 | Interprocess Pipework; Below Ground |
| 8 | Delivery Pipework (to Inter-ozone) DN1800 Fusion Bonded Epoxy Steel | 30m length 1.8m diameter 1m cover | 30 | 1800 | mm | | £ 83,053.48 | Interprocess Pipework; Below Ground |
| 9 | Overflow pipework (from UV inlet channel) | 10m length 1.6m diameter 1m cover in hardstanding (to PS wet well) | 10 | 1600 | mm | | £ 24,701.84 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical & ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |

# Feasibility Estimate
## Detailed Cost Breakdown
**Iver WTW**

aquaconsultants
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### 3.4 - Actiflo + RGF's [Location 2]
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | RMU - 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | | | | | | £ 100,000.00 | Allow |
| 2 | Cabling (3.3kV) | 200m | 1 | 200 | m | | £ 95,997.25 | HV Cabling (m) |
| 3 | Cabling (LV) | 200m | 1 | 200 | m | | £ 41,644.75 | General - LV Cabling with Ducts and Drawpits (m) |
| 4 | 400V | 1200m | 1 | 1200 | m | | £ 116,296.83 | General - LV Cabling with Ducts and Drawpits (m) |
| 5 | Comms | 200m | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 6 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 7 | PLC network extension and network node box | Break into existing network in adjacent GAC building. | | | | | £ 50,000.00 | Allow |
| 8 | SCADA integration/configuration | | 1 | 1 | No. | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 9 | DNO charges (amendment to authorised supply capacity) | Allow £50k - Load based on Drive List Please advise if different | 1 | 1000.0 | kVA | | £ 381,941.04 | New Power Supply to Site |
| 10 | ERACS study | allow 15k | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 11 | MCC (Design and installation) | Max. Installed kW of MCC - Taken from Drive List - Please advise if different | 1 | 301.0 | kW | | £ 225,432.80 | Motor Control Centre (MCC); Based on Load Schedule |
| 12 | Starters | Incl. in MCC above | | | | | £ - | Incl. in MCC |
| 13 | Pontential for standby generator? | 1 No. 2MVA @ 3.3kV standby generator with LCP and acoustic enclosure | 1 | 2000 | kVA | | £ 498,893.28 | Emergency Power Generation |
| 14 | Electrical Installation | Typical cost | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 36,152,707.58** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 42% | £ 15,049,610.05 | |

| | |
|---|---|
| **Construction Cost** | **£ 51,202,317.63** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 15% | £ 7,693,148.22 | |

| | |
|---|---|
| **Project Cost** | **£ 58,895,465.86** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.4 - Option 4 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 14,910.53 | Modelled Approach |
| Actiflo - Coagulation Mixer 1 | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Actiflo - Coagulation Mixer 2 | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Actiflo - Flocculation Mixer | Add | Consumption | 63.36 | 24 | 555034 | £ 0.35 | £ 194,261.76 | From Veolia Info. |
| Actiflo - Scraper | Add | Consumption | 5.19 | 24 | 45464 | £ 0.35 | £ 15,912.54 | From Veolia Info. |
| Actiflo - Recycle Pump (Duty) | Add | Consumption | 63.36 | 24 | 555034 | £ 0.35 | £ 194,261.76 | From Veolia Info. |
| Chemical Dosing - PAC | Add | Consumption | | | 0 | £ 0.35 | £ 47,491.71 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Consumption | | | 0 | £ 0.35 | £ 10,822.60 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 13,064.33 | Modelled Approach |
| Interstage PS - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 484.95 | Modelled Approach |
| Interstage Pumps | Add | Consumption | 225 | 16 | 1314000 | £ 0.350 | £ 459,900.00 | Assume 16hr/day @ Full Inst. Rate |
| RGF - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 14,910.53 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Consumption | | | 0 | £ 0.35 | £ 85,899.77 | Modelled Approach |
| Clean washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,051.15 | Modelled Approach |
| Dirty washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 11,981.93 | Modelled Approach |
| BACKWASH PUMPS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| AIR SCOUR BLOWERS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| | | | | | | | | |
| Pulsators | Omit | Consumption | 92 | 24 | 805920 | £ 0.35 | -£ 282,072.00 | No loads detailed in latest electrical load schedule |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 1,210,473.2** | |
| **Annual Power Carbon** | | | | | | | **2406420.786 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| Chemical Dosing - PAC | Add | Manual | | £ 265,698.38 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Manual | | £ 3,038.36 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Manual | | £ 17,161.24 | Modelled Approach |
| Interstage PS - Operational Building | Add | Manual | | £ 1,762.29 | Modelled Approach |
| Interstage Pumps | Add | Manual | | £ 5,767.04 | Modelled Approach |
| RGF - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Manual | | £ 63,150.79 | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Dirty washwater tank | Add | Manual | | £ 2,967.41 | Modelled Approach |
| BACKWASH PUMPS | Add | Modelled | £ 18,539.64 | | |
| AIR SCOUR BLOWERS | Add | Modelled | £ 3,807.82 | | |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **496,626.48** | |
| **Annual Maintenance Carbon** | | | | **229739.409 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 59.1 | 1250 | 26960 | £ 184.36 | £ 67,291.40 | Pre-chlorination |
| Sulphuric Acid 96% | Add | | 46.8 | 1840 | 31431 | £ 150.88 | £ 55,071.20 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 421.4 | 1200 | 184556 | £ 1,480.50 | £ 540,382.50 | Clarification |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 367.8 | 998 | 134003 | £ 92.52 | £ 33,769.80 | Clarification |
| Sulphuric Acid 96% | Add | | 56.8 | 1840 | 38140 | £ 183.07 | £ 66,820.55 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 172.1 | 1200 | 75384 | £ 604.71 | £ 220,719.15 | Clarification Actiflo |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 150.2 | 998 | 54733 | £ 37.79 | £ 13,793.35 | Clarification Actiflo |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 118.9 | 1250 | 54234 | £ 370.89 | £ 135,374.85 | Disinfection |
| Orthophosphoric Acid | Add | | 333.4 | 1052 | 128022 | £ 443.85 | £ 162,005.25 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 43.2 | 1280 | 20192 | £ 205.79 | £ 75,113.35 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 36.8 | 1500 | 20121 | £ 198.46 | £ 72,437.90 | Final Water Conditioning |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 45.8 | 998 | 16685 | £ 11.52 | £ 4,204.80 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 2040.9 | 998 | 743502 | £ 513.32 | £ 187,361.80 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,634,345.9** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | | | £ 1,965.56 | Modelled Approach |
| Chemical Dosing - PAC | Add | | | £ 98,128.99 | Modelled Approach |
| Chemical Dosing - Polymer | Add | | | £ 1,151.56 | Modelled Approach |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.4 - Option 4 Detailed OPEX Breakdown

| | | | | | | |
|---|---|---|---|---|---|---|
| Chemical Dosing - Sulphuric Acid | Add | | | £ | 13,588.64 | Modelled Approach |
| Interstage PS - Operational Building | Add | | | £ | 63.93 | Modelled Approach |
| Interstage Pumps | Add | | | £ | 73.31 | Modelled Approach |
| RGF - Operational Building | Add | | | £ | 1,965.56 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | | | £ | 47,405.98 | Modelled Approach |
| Clean washwater tank | Add | | | £ | 2,642.56 | Modelled Approach |
| Dirty washwater tank | Add | | | £ | 3,150.18 | Modelled Approach |
| | | | | | | |
| **Annual People Costs** | | | | **£** | **170,136.27** | |
| **Annual People Carbon** | | | | | **0 CO2 kg** | |

### *Other*

| *Item* | *Add / omit* | *Qty* | *rate* | | Annual Total | *Comments* |
|---|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | | | £ | 25,818.11 | Modelled Approach |
| Interstage PS - Operational Building | Add | | | £ | 839.71 | Modelled Approach |
| RGF - Operational Building | Add | | | £ | 25,818.11 | Modelled Approach |
| Clean washwater tank | Add | | | £ | 2,684.86 | Modelled Approach |
| Dirty washwater tank | Add | | | £ | 3,200.61 | Modelled Approach |
| Transformer Kiosk | Add | | | £ | 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ | 644.80 | Modelled Approach |
| | | | | | | |
| **Annual Other Costs** | | | | **£** | **59,653.25** | |
| **Annual Other Carbon** | | | | | **27595.593 CO** | |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **3,571,235.13** |
| **Total Annual Carbon** | | **2663755.789 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Iver WTW**

aquaconsultants
water · environment · energy

### *30 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *2* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *3* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *4* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *5* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *6* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *7* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *8* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *9* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *10* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *11* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *12* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *13* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *14* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *15* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *16* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *17* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *18* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *19* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *20* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *21* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *22* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *23* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *24* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *25* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *26* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *27* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *28* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *29* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *30* | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| *31* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *32* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *33* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *34* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *35* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *36* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *37* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *38* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *39* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *40* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 107,137,053.93** |

# Feasibility Estimate

## Net Present Value

**Iver WTW**

aquaconsultants
water · environment · energy

### 5.4 NPV Option 4

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| Yr | Capital Investment | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | |
| CAPEX Yr1 | £ 14,723,866 | | | | | | | | £ 14,723,866 |
| CAPEX Yr2 | £ 26,502,960 | | | | | | | | £ 26,502,960 |
| CAPEX Yr3 | £ 17,668,640 | | | | | | | | £ 17,668,640 |
| 1 | £ - | £ 1,176,130 | £ 482,536 | £ 1,587,977 | £ 165,309 | £ - | £ - | £ 57,961 | £ 3,469,914 |
| 2 | £ - | £ 1,142,762 | £ 468,846 | £ 1,542,924 | £ 160,619 | £ - | £ - | £ 56,316 | £ 3,371,467 |
| 3 | £ - | £ 1,110,340 | £ 455,544 | £ 1,499,148 | £ 156,062 | £ - | £ - | £ 54,719 | £ 3,275,813 |
| 4 | £ - | £ 1,078,838 | £ 442,620 | £ 1,456,615 | £ 151,634 | £ - | £ - | £ 53,166 | £ 3,182,873 |
| 5 | £ - | £ 1,048,229 | £ 430,062 | £ 1,415,289 | £ 147,332 | £ - | £ - | £ 51,658 | £ 3,092,570 |
| 6 | £ - | £ 1,018,489 | £ 417,860 | £ 1,375,135 | £ 143,152 | £ - | £ - | £ 50,192 | £ 3,004,829 |
| 7 | £ - | £ 989,593 | £ 406,005 | £ 1,336,120 | £ 139,091 | £ - | £ - | £ 48,768 | £ 2,919,577 |
| 8 | £ - | £ 961,517 | £ 394,486 | £ 1,298,212 | £ 135,145 | £ - | £ - | £ 47,384 | £ 2,836,745 |
| 9 | £ - | £ 934,237 | £ 383,294 | £ 1,261,380 | £ 131,310 | £ - | £ - | £ 46,040 | £ 2,756,262 |
| 10 | £ - | £ 907,732 | £ 372,419 | £ 1,225,593 | £ 127,585 | £ - | £ - | £ 44,734 | £ 2,678,062 |
| 11 | £ - | £ 881,978 | £ 361,853 | £ 1,190,821 | £ 123,965 | £ - | £ - | £ 43,465 | £ 2,602,081 |
| 12 | £ - | £ 856,955 | £ 351,587 | £ 1,157,035 | £ 120,448 | £ - | £ - | £ 42,232 | £ 2,528,256 |
| 13 | £ - | £ 832,642 | £ 341,612 | £ 1,124,209 | £ 117,031 | £ - | £ - | £ 41,033 | £ 2,456,526 |
| 14 | £ - | £ 809,018 | £ 331,920 | £ 1,092,313 | £ 113,710 | £ - | £ - | £ 39,869 | £ 2,386,830 |
| 15 | £ - | £ 786,065 | £ 322,503 | £ 1,061,322 | £ 110,484 | £ - | £ - | £ 38,738 | £ 2,319,112 |
| 16 | £ - | £ 763,763 | £ 313,353 | £ 1,031,211 | £ 107,350 | £ - | £ - | £ 37,639 | £ 2,253,316 |
| 17 | £ - | £ 742,094 | £ 304,462 | £ 1,001,954 | £ 104,304 | £ - | £ - | £ 36,571 | £ 2,189,385 |
| 18 | £ - | £ 721,040 | £ 295,824 | £ 973,527 | £ 101,345 | £ - | £ - | £ 35,534 | £ 2,127,269 |
| 19 | £ - | £ 700,583 | £ 287,431 | £ 945,906 | £ 98,469 | £ - | £ - | £ 34,525 | £ 2,066,915 |
| 20 | £ 7,814,284 | £ 680,706 | £ 279,276 | £ 919,070 | £ 95,676 | £ - | £ - | £ 33,546 | £ 9,822,558 |
| 21 | £ - | £ 661,393 | £ 271,353 | £ 892,994 | £ 92,961 | £ - | £ - | £ 32,594 | £ 1,951,296 |
| 22 | £ - | £ 642,629 | £ 263,654 | £ 867,659 | £ 90,324 | £ - | £ - | £ 31,669 | £ 1,895,935 |
| 23 | £ - | £ 624,396 | £ 256,174 | £ 843,042 | £ 87,761 | £ - | £ - | £ 30,771 | £ 1,842,144 |
| 24 | £ - | £ 606,681 | £ 248,906 | £ 819,123 | £ 85,271 | £ - | £ - | £ 29,898 | £ 1,789,879 |
| 25 | £ - | £ 589,469 | £ 241,844 | £ 795,884 | £ 82,852 | £ - | £ - | £ 29,050 | £ 1,739,098 |
| 26 | £ - | £ 572,745 | £ 234,983 | £ 773,303 | £ 80,501 | £ - | £ - | £ 28,225 | £ 1,689,757 |
| 27 | £ - | £ 556,495 | £ 228,316 | £ 751,363 | £ 78,217 | £ - | £ - | £ 27,425 | £ 1,641,816 |
| 28 | £ - | £ 540,706 | £ 221,838 | £ 730,046 | £ 75,998 | £ - | £ - | £ 26,647 | £ 1,595,235 |
| 29 | £ - | £ 525,366 | £ 215,544 | £ 709,333 | £ 73,842 | £ - | £ - | £ 25,891 | £ 1,549,976 |
| 30 | £ - | £ 510,460 | £ 209,429 | £ 689,209 | £ 71,747 | £ - | £ - | £ 25,156 | £ 1,506,001 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 137,436,963.22** |

## 3.5 - Actiflo + RGF's [Location 3]

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| **New Actiflo Plant** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ 399,150.63 | Concrete Open Top Tank; Used to cost for 4m DP Substructure<br>Allow 40% of cost to be offset against tank costs in Actiflo scope which it is assumed will form the majority of the basement area. |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | Interconnecting Pipework - Inlet to AC9 Streams | Above ground pipework feeding each of the 3 No. streams | 30 | 1400 | mm | | £ 183,972.46 | Interprocess Pipework; Above Ground |
| 6 | Coagulation Tank | Rapid Mixer' tank - Length 5.0 m, Width 6.30 m, Depth 6.0 m; | 3 | 189 | m3 | | £ 510,426.02 | Concrete Tank - All Types |
| 7 | Flocculation Tank | Floc tank - Length 6.0 m, Width 9.0 m, Depth 6.0 m; | 3 | 324 | m3 | | £ 802,169.89 | Concrete Tank - All Types |
| 8 | Settler Tank | Actiflo Settler Tank - Length 9.0m, Width 9.0m Depth 6.0m; | 3 | 486 | m3 | | £ 1,152,262.53 | Concrete Tank - All Types |
| 9 | Interconnecting Pipework - Outlet from AC9 Streams | Below ground gravity DN1400 ; Ductile Iron; | 125 | 1400 | mm | | £ 301,447.64 | Interprocess Pipework; Below Ground |
| 10 | | | | | | | £ - | |
| 11 | | | | | | | £ - | |
| 12 | | | | | | | £ - | |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Ballasted Coagulation System | 3x Actiflo turbo AC9 streams; Coagulation and flocculation mixers c/w supports; Lamellas, Sludge Recirc Pumps & Pipework; Hydrocyclones; Control and Instrumentation etc<br><br>Generally there are exclusions on Actiflo scopes (incl. installation, interconnecting pipework etc) - Can you provide the budget quote for review. | 1 | 1 | No | | £ 3,200,000.00 | Actiflo Package; Quote from Veolia |
| 2 | Chemical Dosing - PAC | Dose Rate 12144.83 kg/d; Flow to be treated - 176.35 MLD | 1 | 176.35 | MLD | | £ 883,672.08 | Chemical Dosing; PAC Dosing |
| 3 | Chemical Dosing - Ferric | Identified on scope sheet but not on Dose rates spreadsheet. | | | | | £ - | |
| 4 | Chemical Dosing - Polymer | Dose Rate 44.09 kg/d; Flow to be treated - 176.35 MLD | 1 | 176.35 | MLD | | £ 377,887.05 | Chemical Dosing; Polyelectrolyte |
| 5 | Chemical Dosing - Sulphuric Acid | Dose Rate 2068.43 kg/d; Flow to be treated - 176.35 MLD | 1 | 176.35 | MLD | | £ 705,412.52 | Chemical Dosing; pH Adjustment |
| 6 | HVAC | | | | | | £ - | Incl. in Building Model |
| 7 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 8 | Building services | | | | | | £ - | Incl. in Building Model |
| 9 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 10 | Ballast material | Assume first fill of Storage silo | 1 | 15 | tonnes | | £ 15,000.00 | Based on £1,000/Tonne |
| 11 | LCP and Electrical Installation | All motor starters and VSD's, together with all site cabling, containment, Isolators and Junction Boxes. - Based on 7.5% of TSR Price | 1 | | sum | | £ 240,000.00 | Based on 7.5% of Actiflo Quote |
| 12 | Power, Control & Signal Cabling | Excluded from Evoqua scope - Based on 2.5% of TSR Scope | 1 | | sum | | £ 80,000.00 | Based on 2.5% of Actiflo Quote |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **RGF's - Location 3** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height 35m width 70m length | 1 | 2450 | m2 | | £ 2,755,361.24 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure | 4m depth x 35m width x 70m length (3m depth excavation required). Spoil to be removed offsite | 1 | 9800 | m3 | | £ - | Assumed to be RGF Structure |
| 3 | RGF's | 18 No. Cells; Each Cell 10m x 9m; Single Bed Type; | 1 | 1620 | m2 | | £ 16,149,161.35 | Rapid Gravity Filters |
| 4 | Clean washwater tank | Volume: 700m3 | 1 | 700 | m3 | | £ 311,874.66 | Concrete Tank; Open Top; Water Storage |
| 5 | Dirty washwater tank | Volume: 1200m3 | 1 | 1200 | m3 | | £ 379,526.77 | Concrete Tank; Open Top; Washwater Recovery |
| 6 | Dirty washwater delivery pipe (pumped) | 220m length, 300mm diameter | 220 | 300 | mm | | £ 116,921.53 | Interprocess Pipework; Below Ground |
| 7 | | | | | | | £ - | |
| 8 | | | | | | | £ - | |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |

## 3.5 - Actiflo + RGF's [Location 3]

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| 1 | BACKWASH PUMPS | 3 No. D/A/S; Duty 5619 m3/h @ 3.5m HD | 3 | 45 | kW | | £ 536,491.28 | Interprocess Pumping |
| 2 | AIR SCOUR BLOWERS | 2 No. D/S; Duty 8428 Nm3/hr @ 600mBar | 2 | 90 | kW | | £ 110,188.85 | Air Blower |
| 3 | FILTER OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 4 | FILTER INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 5 | CLEAN BACKWASH INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 6 | DIRTY BACKWASH OUTLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 7 | AIR SCOUR INLET VALVE | 1 No. per filter | | | | | £ - | Incl. in RGF Model |
| 8 | 18 No. RGF LCPs | | | | | | £ - | Incl. in RGF Model |
| 9 | HVAC | | | | | | £ - | Incl. in Building Model |
| 10 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 11 | Building services | | | | | | £ - | Incl. in Building Model |
| 12 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models |
| 13 | | | | | | | £ - | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **New Interstage Pump Station** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height x 11m width x 6m length (clear internal) | 1 | 66 | m2 | | £ 199,619.17 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure incl. excavation | 4m depth x 10m width x 6m length | 1 | 240 | m3 | | £ 479,420.11 | Dry/Wet Well Structure |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | 4 No. variable speed Canister Type Pumps | 4 No. Pumps D/A/A/S; Total flow 239 Ml/d. Total head 3.5 m (assume 3m static); Based on Xylem selection - canister mounted units; Each pump 922 l/s @ 4.6 m | 3 | 75 | kW | | £ 820,279.92 | Interprocess Pumping |
| 2 | MCC with VSDs | 10m (in RGF building electrical room) | 1 | 330 | kW | | £ 299,733.83 | MCC |
| 3 | HVAC | | | | | | £ - | Incl. in Building Model |
| 4 | Building Services | | | | | | £ - | Incl. in Building Model |
| 5 | | | | | | | £ - | |
| **Access Roads, Drainage & Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 200m x 3.5m width | 1 | 700 | m2 | | £ 71,570.87 | Site Roads; All Types |
| 2 | Road drainage | 200m length | 1 | 200 | m | | £ 47,856.01 | Drainage |
| 3 | landscaping | 4000m2 (10m width around works to be made good on completion) | 1 | 4000 | m2 | | £ 35,758.39 | Interprocess Pipework; Below Ground |
| 4 | To Actiflo | 47m, DN1400 | 47 | 1400 | mm | | £ 102,080.21 | Interprocess Pipework; Below Ground |
| 5 | To RGFs | 28m DN1100 | 28 | 1100 | mm | | £ 48,286.61 | Interprocess Pipework; Below Ground |
| 6 | Internal | 30m, DN1400 | 30 | 1400 | mm | | £ 65,157.58 | Interprocess Pipework; Below Ground |
| 7 | To RGFs | 85m DN1800 | 85 | 1800 | mm | | £ 235,318.21 | Interprocess Pipework; Below Ground |
| 8 | To Interozone | 190m DN1800 | 190 | 1800 | mm | | £ 526,005.40 | Interprocess Pipework; Below Ground |
| 9 | | | | | | | £ - | |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical & ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear kiosk base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Iver WTW**

aquaconsultants
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### 3.5 - Actiflo + RGF's [Location 3]
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| **MEICA** | | | | | | | | |
| 1 | RMU - 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | | | | | | £ 100,000.00 | Allow |
| 2 | Cabling (3.3kV) | 200m | 1 | 200 | m | | £ 95,997.25 | HV Cabling (m) |
| 3 | Cabling (LV) | 200m | 1 | 200 | m | | £ 41,644.75 | General - LV Cabling with Ducts and Drawpits (m) |
| 4 | 400V | 1200m | 1 | 1200 | m | | £ 116,296.83 | General - LV Cabling with Ducts and Drawpits (m) |
| 5 | Comms | 200m | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 6 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 7 | PLC network extension and network node box | Break into existing network in adjacent GAC building. | | | | | £ 50,000.00 | Allow |
| 8 | SCADA integration/configuration | | 1 | 1 | No. | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 9 | DNO charges (amendment to authorised supply capacity) | Allow £50k - Load based on Drive List Please advise if different | 1 | 1000.0 | kVA | | £ 381,941.04 | New Power Supply to Site |
| 10 | ERACS study | allow 15k | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 11 | MCC (Design and installation) | Max. Installed kW of MCC - Taken from Drive List - Please advise if different | 1 | 301.0 | kW | | £ 225,432.80 | Motor Control Centre (MCC); Based on Load Schedule |
| 12 | Starters | Incl. in MCC above | | | | | £ - | Incl. in MCC |
| 13 | Pontential for standby generator? | 1 No. 2MVA @ 3.3kV standby generator with LCP and acoustic enclosure | 1 | 2000 | kVA | | £ 498,893.28 | Emergency Power Generation |
| 14 | Electrical Installation | Typical cost | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 36,756,023.45** | |

*Indirect Costs*

| | | | | |
|---|---|---|---|---|
| Contractor Indirect Costs inc. risk | 42% | £ | 15,300,757.73 | |

| | | | |
|---|---|---|---|
| **Construction Cost** | **£** | **52,056,781.18** | |

*Project On-costs*

| | | | | |
|---|---|---|---|---|
| Project Overheads | 15% | £ | 7,821,531.37 | |

| | | | |
|---|---|---|---|
| **Project Cost** | **£** | **59,878,312.56** | |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.5 - Option 5 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 14,910.53 | Modelled Approach |
| Actiflo - Coagulation Mixer 1 | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Actiflo - Coagulation Mixer 2 | Add | Consumption | 52.80 | 24 | 462528 | £ 0.35 | £ 161,884.80 | From Veolia Info. |
| Actiflo - Flocculation Mixer | Add | Consumption | 63.36 | 24 | 555034 | £ 0.35 | £ 194,261.76 | From Veolia Info. |
| Actiflo - Scraper | Add | Consumption | 5.19 | 24 | 45464 | £ 0.35 | £ 15,912.54 | From Veolia Info. |
| Actiflo - Recycle Pump (Duty) | Add | Consumption | 63.36 | 24 | 555034 | £ 0.35 | £ 194,261.76 | From Veolia Info. |
| Chemical Dosing - PAC | Add | Consumption | | | 0 | £ 0.35 | £ 47,491.71 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Consumption | | | 0 | £ 0.35 | £ 10,822.60 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 13,064.33 | Modelled Approach |
| Interstage PS - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 484.95 | Modelled Approach |
| Interstage Pumps | Add | Consumption | 225 | 16 | 1314000 | £ 0.350 | £ 459,900.00 | Assume 16hr/day @ Full Inst. Rate |
| RGF - Operational Building | Add | Consumption | | | 0 | £ 0.350 | £ 14,910.53 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Consumption | | | 0 | £ 0.35 | £ 85,899.77 | Modelled Approach |
| Clean washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 10,051.15 | Modelled Approach |
| Dirty washwater tank | Add | Consumption | | | 0 | £ 0.35 | £ 11,981.93 | Modelled Approach |
| BACKWASH PUMPS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| AIR SCOUR BLOWERS | Add | Consumption | 90 | 4 | 131400 | £ 0.35 | £ 45,990.00 | |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| | | | | | | | | |
| Pulsators | Omit | Consumption | 92 | 24 | 805920 | £ 0.35 | -£ 282,072.00 | No loads detailed in latest electrical load schedule |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 1,210,473.2** | |
| **Annual Power Carbon** | | | | | | | **2406420.786 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| Chemical Dosing - PAC | Add | Manual | | £ 265,698.38 | Modelled Approach |
| Chemical Dosing - Polymer | Add | Manual | | £ 3,038.36 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | Manual | | £ 17,161.24 | Modelled Approach |
| Interstage PS - Operational Building | Add | Manual | | £ 1,762.29 | Modelled Approach |
| Interstage Pumps | Add | Manual | | £ 5,767.04 | Modelled Approach |
| RGF - Operational Building | Add | Manual | | £ 54,184.36 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | Manual | | £ 63,150.79 | Modelled Approach |
| Clean washwater tank | Add | Manual | | £ 2,489.24 | Modelled Approach |
| Dirty washwater tank | Add | Manual | | £ 2,967.41 | Modelled Approach |
| BACKWASH PUMPS | Add | Modelled | £ 18,539.64 | | |
| AIR SCOUR BLOWERS | Add | Modelled | £ 3,807.82 | | |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **496,626.48** | |
| **Annual Maintenance Carbon** | | | | **229739.409 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 59.1 | 1250 | 26960 | £ 184.36 | £ 67,291.40 | Pre-chlorination |
| Sulphuric Acid 96% | Add | | 46.8 | 1840 | 31431 | £ 150.88 | £ 55,071.20 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 421.4 | 1200 | 184556 | £ 1,480.50 | £ 540,382.50 | Clarification |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 367.8 | 998 | 134003 | £ 92.52 | £ 33,769.80 | Clarification |
| Sulphuric Acid 96% | Add | | 56.8 | 1840 | 38140 | £ 183.07 | £ 66,820.55 | pH Control |
| Polyaluminium Chloride (PACl) 10% | Add | | 172.1 | 1200 | 75384 | £ 604.71 | £ 220,719.15 | Clarification Actiflo |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 150.2 | 998 | 54733 | £ 37.79 | £ 13,793.35 | Clarification Actiflo |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 118.9 | 1250 | 54234 | £ 370.89 | £ 135,374.85 | Disinfection |
| Orthophosphoric Acid | Add | | 333.4 | 1052 | 128022 | £ 443.85 | £ 162,005.25 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 43.2 | 1280 | 20192 | £ 205.79 | £ 75,113.35 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 36.8 | 1500 | 20121 | £ 198.46 | £ 72,437.90 | Final Water Conditioning |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 45.8 | 998 | 16685 | £ 11.52 | £ 4,204.80 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 2040.9 | 998 | 743502 | £ 513.32 | £ 187,361.80 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 1,634,345.9** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | | | £ 1,965.56 | Modelled Approach |
| Chemical Dosing - PAC | Add | | | £ 98,128.99 | Modelled Approach |
| Chemical Dosing - Polymer | Add | | | £ 1,151.56 | Modelled Approach |
| Chemical Dosing - Sulphuric Acid | Add | | | £ 13,588.64 | Modelled Approach |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.5 - Option 5 Detailed OPEX Breakdown

| | | | | | | |
|---|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | | | £ | 63.93 | Modelled Approach |
| Interstage Pumps | Add | | | £ | 73.31 | Modelled Approach |
| RGF - Operational Building | Add | | | £ | 1,965.56 | Modelled Approach |
| RGF - Rapid Gravity Filters | Add | | | £ | 47,405.98 | Modelled Approach |
| Clean washwater tank | Add | | | £ | 2,642.56 | Modelled Approach |
| Dirty washwater tank | Add | | | £ | 3,150.18 | Modelled Approach |
| | | | | | | |
| **Annual People Costs** | | | | **£** | **170,136.27** | |
| **Annual People Carbon** | | | | | **0 CO2 kg** | |

***Other***

| *Item* | *Add / omit* | *Qty* | *rate* | | Annual Total | *Comments* |
|---|---|---|---|---|---|---|
| Actiflo - Operational Building | Add | | | £ | 25,818.11 | Modelled Approach |
| Interstage PS - Operational Building | Add | | | £ | 839.71 | Modelled Approach |
| RGF - Operational Building | Add | | | £ | 25,818.11 | Modelled Approach |
| Clean washwater tank | Add | | | £ | 2,684.86 | Modelled Approach |
| Dirty washwater tank | Add | | | £ | 3,200.61 | Modelled Approach |
| Transformer Kiosk | Add | | | £ | 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ | 644.80 | Modelled Approach |
| | | | | | | |
| **Annual Other Costs** | | | | **£** | **59,653.25** | |
| **Annual Other Carbon** | | | | | **27595.593 CO** | |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **3,571,235.13** |
| **Total Annual Carbon** | | **2663755.789 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Iver WTW**

### *30 Year OPEX intervention*

Costs at estimate base date

| Yr | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | £ - |
| 1 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 2 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 3 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 4 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 5 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 6 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 7 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 8 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 9 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 10 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 11 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 12 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 13 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 14 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 15 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 16 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 17 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 18 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 19 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 20 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 21 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 22 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 23 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 24 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 25 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 26 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 27 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 28 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 29 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 30 | £ 1,210,473 | £ 496,626 | £ 1,634,346 | £ 170,136 | £ - | £ - | £ 59,653 | £ 3,571,235 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 107,137,053.93** |

# Feasibility Estimate

## Net Present Value

**Iver WTW**

aquaconsultants
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### 5.5 NPV Option 5

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| Yr | Capital Investment | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | |
| CAPEX Yr1 | £ 14,969,578 | | | | | | | | £ 14,969,578 |
| CAPEX Yr2 | £ 26,945,241 | | | | | | | | £ 26,945,241 |
| CAPEX Yr3 | £ 17,963,494 | | | | | | | | £ 17,963,494 |
| 1 | £ - | £ 1,176,130 | £ 482,536 | £ 1,587,977 | £ 165,309 | £ - | £ - | £ 57,961 | £ 3,469,914 |
| 2 | £ - | £ 1,142,762 | £ 468,846 | £ 1,542,924 | £ 160,619 | £ - | £ - | £ 56,316 | £ 3,371,467 |
| 3 | £ - | £ 1,110,340 | £ 455,544 | £ 1,499,148 | £ 156,062 | £ - | £ - | £ 54,719 | £ 3,275,813 |
| 4 | £ - | £ 1,078,838 | £ 442,620 | £ 1,456,615 | £ 151,634 | £ - | £ - | £ 53,166 | £ 3,182,873 |
| 5 | £ - | £ 1,048,229 | £ 430,062 | £ 1,415,289 | £ 147,332 | £ - | £ - | £ 51,658 | £ 3,092,570 |
| 6 | £ - | £ 1,018,489 | £ 417,860 | £ 1,375,135 | £ 143,152 | £ - | £ - | £ 50,192 | £ 3,004,829 |
| 7 | £ - | £ 989,593 | £ 406,005 | £ 1,336,120 | £ 139,091 | £ - | £ - | £ 48,768 | £ 2,919,577 |
| 8 | £ - | £ 961,517 | £ 394,486 | £ 1,298,212 | £ 135,145 | £ - | £ - | £ 47,384 | £ 2,836,745 |
| 9 | £ - | £ 934,237 | £ 383,294 | £ 1,261,380 | £ 131,310 | £ - | £ - | £ 46,040 | £ 2,756,262 |
| 10 | £ - | £ 907,732 | £ 372,419 | £ 1,225,593 | £ 127,585 | £ - | £ - | £ 44,734 | £ 2,678,062 |
| 11 | £ - | £ 881,978 | £ 361,853 | £ 1,190,821 | £ 123,965 | £ - | £ - | £ 43,465 | £ 2,602,081 |
| 12 | £ - | £ 856,955 | £ 351,587 | £ 1,157,035 | £ 120,448 | £ - | £ - | £ 42,232 | £ 2,528,256 |
| 13 | £ - | £ 832,642 | £ 341,612 | £ 1,124,209 | £ 117,031 | £ - | £ - | £ 41,033 | £ 2,456,526 |
| 14 | £ - | £ 809,018 | £ 331,920 | £ 1,092,313 | £ 113,710 | £ - | £ - | £ 39,869 | £ 2,386,830 |
| 15 | £ - | £ 786,065 | £ 322,503 | £ 1,061,322 | £ 110,484 | £ - | £ - | £ 38,738 | £ 2,319,112 |
| 16 | £ - | £ 763,763 | £ 313,353 | £ 1,031,211 | £ 107,350 | £ - | £ - | £ 37,639 | £ 2,253,316 |
| 17 | £ - | £ 742,094 | £ 304,462 | £ 1,001,954 | £ 104,304 | £ - | £ - | £ 36,571 | £ 2,189,385 |
| 18 | £ - | £ 721,040 | £ 295,824 | £ 973,527 | £ 101,345 | £ - | £ - | £ 35,534 | £ 2,127,269 |
| 19 | £ - | £ 700,583 | £ 287,431 | £ 945,906 | £ 98,469 | £ - | £ - | £ 34,525 | £ 2,066,915 |
| 20 | £ 7,814,284 | £ 680,706 | £ 279,276 | £ 919,070 | £ 95,676 | £ - | £ - | £ 33,546 | £ 9,822,558 |
| 21 | £ - | £ 661,393 | £ 271,353 | £ 892,994 | £ 92,961 | £ - | £ - | £ 32,594 | £ 1,951,296 |
| 22 | £ - | £ 642,629 | £ 263,654 | £ 867,659 | £ 90,324 | £ - | £ - | £ 31,669 | £ 1,895,935 |
| 23 | £ - | £ 624,396 | £ 256,174 | £ 843,042 | £ 87,761 | £ - | £ - | £ 30,771 | £ 1,842,144 |
| 24 | £ - | £ 606,681 | £ 248,906 | £ 819,123 | £ 85,271 | £ - | £ - | £ 29,898 | £ 1,789,879 |
| 25 | £ - | £ 589,469 | £ 241,844 | £ 795,884 | £ 82,852 | £ - | £ - | £ 29,050 | £ 1,739,098 |
| 26 | £ - | £ 572,745 | £ 234,983 | £ 773,303 | £ 80,501 | £ - | £ - | £ 28,225 | £ 1,689,757 |
| 27 | £ - | £ 556,495 | £ 228,316 | £ 751,363 | £ 78,217 | £ - | £ - | £ 27,425 | £ 1,641,816 |
| 28 | £ - | £ 540,706 | £ 221,838 | £ 730,046 | £ 75,998 | £ - | £ - | £ 26,647 | £ 1,595,235 |
| 29 | £ - | £ 525,366 | £ 215,544 | £ 709,333 | £ 73,842 | £ - | £ - | £ 25,891 | £ 1,549,976 |
| 30 | £ - | £ 510,460 | £ 209,429 | £ 689,209 | £ 71,747 | £ - | £ - | £ 25,156 | £ 1,506,001 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 138,419,809.92** |

## 3.6 - Ceramic Membranes

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **New Interstage Pump Station** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height x 11m width x 6m length (clear internal) | 1 | 66 | m2 | | £ 199,619.17 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure incl. excavation | 4m depth x 10m width x 6m length | 1 | 240 | m3 | | £ 479,420.11 | Dry/Wet Well Structure |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | 4 No. variable speed Canister Type Pumps | 4 No. Pumps D/A/A/S; Total flow 239 Ml/d. Total head 3.5 m (assume 3m static); Based on Xylem selection - canister mounted units; Each pump 922 l/s @ 4.6 m | 3 | 75 | kW | | £ 820,279.92 | Interprocess Pumping |
| 2 | MCC with VSDs | 10m (in RGF building electrical room) | 1 | 330 | kW | | £ 299,733.83 | MCC |
| 3 | HVAC | | | | | | £ - | Incl. in Building Model |
| 4 | Building Services | | | | | | £ - | Incl. in Building Model |
| 5 | | | | | | | £ - | |
| **Ceramic Membrane Building** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height x 23m length x 62m width | 1 | 1426 | m2 | | £ 1,859,817.19 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | 4.5m height 23m depth 62m width | 0 | 6417 | m3 | | £ - | Incl. in Operational Building |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | **Ceramic Membrane Package Plant** | Budget Q' from Nanostone; Dated 21st April 2023 | | | | | £ - | Ceramic Package; Budget Q' from Nanostone |
| 2 | | **Pre Capex 3 Design** | | | | | £ - | 0 |
| 3 | | Stage 1 | 1 | 1 | Sum | | £ 544,397.97 | 0 |
| 4 | | Stage 2 - HAZOP 1 Closeout | 1 | 1 | Sum | | £ 544,397.97 | 0 |
| 5 | | Stage 3 | 1 | 1 | Sum | | £ 544,397.97 | 0 |
| 6 | | Stage 4 - HAZOP 2 Closeout / Design Approval | 1 | 1 | Sum | | £ 544,397.97 | 0 |
| 7 | | **Electrical** | | | | | £ - | 0 |
| 8 | | Coagulation | 1 | 1 | Sum | | £ 151,234.97 | 0 |
| 9 | | Membrane | 1 | 1 | Sum | | £ 4,007,570.86 | 0 |
| 10 | | Backwash/CIP/CEBW | 1 | 1 | Sum | | £ 893,979.17 | 0 |
| 11 | | Chemical Waste/Balance of Plant | 1 | 1 | Sum | | £ 919,724.17 | 0 |
| 12 | | Instrumentation & Valves | 1 | 1 | Sum | | £ 1,903,670.87 | 0 |
| 13 | | **Mechanical** | | | | | £ - | 0 |
| 14 | *Feed Conditioning/Coagulation Tanks* | Feed Conditioning/Coagulation Tanks | 1 | 1 | Sum | | £ 1,971,698.33 | 0 |
| 15 | *Membrane Feed Pipework* | Membrane Feed Pipework | 1 | 1 | Sum | | £ 973,221.80 | 0 |
| 16 | *Membrane, Valve & Header Skids/Compressed Air System* | Membrane, Valve & Header Skids/Compressed Air System | 1 | 1 | Sum | | £ 31,564,367.20 | 0 |
| 17 | *Membrane Outlet Pipework* | Membrane Outlet Pipework | 1 | 1 | Sum | | £ 141,075.98 | 0 |
| 18 | *Membrane Backwash System* | Membrane Backwash System | 1 | 1 | Sum | | £ 1,648,451.29 | 0 |
| 19 | *CIP System & CEBW System/RO Plant* | CIP System & CEBW System/RO Plant | 1 | 1 | Sum | | £ 1,356,694.62 | 0 |
| 20 | | Neutralisation System & Dirty Backwash | 1 | 1 | Sum | | £ - | 0 |
| 21 | | | | | | | £ - | 0 |
| 22 | | Training & Commissioning | 1 | 1 | Sum | | £ 589,987.95 | 0 |
| 23 | | Module Unit Transport | 1 | 1 | Sum | | £ 991,179.75 | 0 |
| 24 | | Pressure Testing & Sterilisation | 1 | 1 | Sum | | £ 134,088.17 | 0 |
| 25 | | Standard O&M's | 1 | 1 | Sum | | £ 60,071.50 | 0 |
| 26 | | **On-Costs** | | | | | £ - | 0 |
| 27 | | Management Fee (15%) | 1 | 1 | Sum | | £ 7,422,691.27 | 0 |
| 28 | | MDP Generic Risk (1%) | 1 | 1 | Sum | | £ 494,846.08 | 0 |
| 29 | | **Additional Options Description** | | | | | £ - | 0 |
| 30 | | FDS, Software & Associated Commissioning (exc. Scada) | 1 | 1 | Sum | | £ 1,395,457.72 | 0 |
| 31 | | Management Fee (15%) | 1 | 1 | Sum | | £ 209,318.66 | 0 |

## 3.6 - Ceramic Membranes

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| 32 | | MDP Generic Risk (1%) | 1 | 1 | Sum | | £ 16,047.77 | 0 |
| 33 | | | | | | | £ - | 0 |
| 34 | | | | | | | £ - | 0 |
| 35 | Membrane MCC | 10m in building electrical room - See MCC below | | | | | £ - | See Overall MCC below |
| 36 | HVAC | | | | | | £ - | Incl. in Building Model |
| 37 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 38 | Building services | | | | | | £ - | Incl. in Building Model |
| 39 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models/RSE Quote |
| 40 | | | | | | | £ - | 0 |
| **Chemical Storage** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Chemicals Delivery Area | Assume 40m2 per Package | 2 | 40 | m2 | | £ 26,067.93 | Hardstanding Area |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Chemical storage - pH Control - Sulphuric Acid | Dose Rate 2764.2 kg/d; Flow to be treated - 235.67 MLD | 1 | 235.67 | MLD | | £ 771,709.61 | Chemical Dosing; pH Adjustment |
| 2 | Chemical storage - Coag. - Aluminium Sulphate | Dose Rate 341.93 kg/d; Flow to be treated - 235.67 MLD | 1 | 235.67 | MLD | | £ 787,228.60 | Chemical Dosing; Coagulant |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Access Roads, Drainage & Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 300m x 3.5m width | 1 | 750 | m2 | | £ 75,974.17 | Site Roads; All Types |
| 2 | Road drainage | 300m length | 1 | 300 | m | | £ 69,881.18 | Drainage |
| 3 | Membrane CIP waste pipe | From membrane CIP waste outlet | 300 | 200 | mm | | £ 114,698.69 | Interprocess Pipework; Below Ground |
| 4 | To membrane | 21m, DN1400 | 21 | 1400 | mm | | £ 45,610.31 | Interprocess Pipework; Below Ground |
| 5 | To membrane | 13m DN1400 | 13 | 1400 | mm | | £ 28,234.95 | Interprocess Pipework; Below Ground |
| 6 | To membrane | 78m, DN1800 | 78 | 1800 | mm | | £ 215,939.06 | Interprocess Pipework; Below Ground |
| 7 | To interozone from membrane | 15m, DN1800 | 15 | 1800 | mm | | £ 41,526.74 | Interprocess Pipework; Below Ground |
| 8 | Overflow pipework (from membrane inlet channel) | 10m length 1.6m diameter 1m cover in hardstanding (to PS wet well) | 10 | 1600 | mm | | £ 24,701.84 | Interprocess Pipework; Below Ground |
| 9 | Static mixer (DN 1600 for chlorine dosing) | | 1 | 1600 | mm | | £ 33,461.41 | Static Mixer |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical & ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Cabling (3.3kV) | 1600 | 1 | 1600 | m | | £ 528,294.60 | HV Cabling (m) |
| 2 | 400V | 800m | 1 | 800 | m | | £ 92,180.46 | General - LV Cabling with Ducts and Drawpits (m) |
| 3 | Comms | 200m | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 4 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 5 | PLC network extension and network node box | Break into existing network in adjacent GAC building. | | | | | £ 50,000.00 | Allow |
| 6 | SCADA integration/configuration | | 1 | 1 | No. | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |

# Feasibility Estimate
## Detailed Cost Breakdown
**Iver WTW**

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### 3.6 - Ceramic Membranes
*Direct Works*

| Item | Scope | Description | Qty | U | UoM | Rate | Total | Additional Comments |
|---|---|---|---|---|---|---|---|---|
| 7 | DNO charges (amendment to authorised supply capacity) | Allow £50k - Load based on Drive List Please advise if different | 1 | 5000.0 | kVA | | £ 900,605.04 | New Power Supply to Site |
| 8 | ERACS study | allow 15k | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 9 | RMU - 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | A non extendible RMU is approx £15k so extendible will be more than than perhaps £25k | | | | | £ 100,000.00 | Allow |
| 10 | Instrumentation | Level, pressure, flow instrumentation etc | | | | | £ - | |
| 11 | PLC and integration with membrane MCC | Including control software and modification to existing site control for plant shutdown and interfacing etc | | | | | £ - | |
| 12 | HMI | | | | | | £ - | |
| 13 | MCC | No scope item for MCC to serve new scope items (except IPS) | 1 | 2800 | kW | | £ 1,286,966.44 | |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Future RGF feed** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Switchgear base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 2 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | RMU - 1 No. (extendable with 2 No. transformer feeders ar | A non extendible RMU is approx £15k so extendible will be more than than perhaps £25k | 1 | 1 | No. | | £ 100,000.00 | Allow |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 68,364,100.19** | |

*Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 42% | £ 28,458,533.77 | |

| | |
|---|---|
| **Construction Cost** | **£ 96,822,633.95** |

*Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 15% | £ 14,547,600.75 | |

| | |
|---|---|
| **Project Cost** | **£ 111,370,234.70** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.6 - Option 6 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 484.95 | Modelled Approach |
| Interstage Pumps | Add | Consumption | 225 | 16 | 1314000 | £ 0.35 | £ 459,900.00 | Assume 16hr/day @ Full Inst. Rate |
| Ceramic Membrane - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 8,714.31 | Modelled Approach |
| Ceramic Membrane Package Plant | Add | Consumption | | | 0 | £ 0.35 | £ - | No Info. |
| | Add | Consumption | | | | £ 0.35 | | |
| Feed Pumps | Add | Consumption | | | 0 | £ 0.35 | £ - | Assumed to be ISP |
| BW Pumps | Add | Consumption | 180.00 | 8 | 525600 | £ 0.35 | £ 183,960.00 | INDICATIVE - Membrane CIP |
| Coagulant Dosing Pump | Add | Consumption | 0.25 | 24 | 2190 | £ 0.35 | £ 766.50 | INDICATIVE - Membrane CIP |
| Coagulant Dispersion Pump | Add | Consumption | 1.10 | 24 | 9636 | £ 0.35 | £ 3,372.60 | INDICATIVE - Membrane CIP |
| | Add | Consumption | | | | £ 0.35 | | INDICATIVE - Membrane CIP |
| Sodium Hypo Dosing Pump | Add | Consumption | 0.25 | 8 | 730 | £ 0.35 | £ 255.50 | INDICATIVE - Membrane CIP |
| Caustic Dosing Pump | Add | Consumption | 0.15 | 8 | 438 | £ 0.35 | £ 153.30 | INDICATIVE - Membrane CIP |
| Sulphuric Acid Dosing Pump | Add | Consumption | 0.15 | 8 | 438 | £ 0.35 | £ 153.30 | INDICATIVE - Membrane CIP |
| Neutralisation Circulation Pump | Add | Consumption | 16.00 | 8 | 46720 | £ 0.35 | £ 16,352.00 | INDICATIVE - Membrane CIP |
| CIP Pump | Add | Consumption | 6.00 | 8 | 17520 | £ 0.35 | £ 6,132.00 | INDICATIVE - Membrane CIP |
| Air Compressors | Add | Consumption | 5.50 | 8 | 16060 | £ 0.35 | £ 5,621.00 | INDICATIVE - Membrane CIP |
| | Add | Consumption | | | | £ 0.35 | | |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | Consumption | | | 0 | £ 0.35 | £ 15,023.98 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | Consumption | | | 0 | £ 0.35 | £ 10,023.51 | Modelled Approach |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| | | | | | | | | |
| Pulsators & Actiflo Removed | Omit | Consumption | 160 | 24 | 1401600 | £ 0.35 | -£ 490,560.00 | |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 224,613.6** | |
| **Annual Power Carbon** | | | | | | | **1481753.048 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | Manual | | £ 1,762.29 | Modelled Approach |
| Interstage Pumps | Add | Manual | | £ 5,767.04 | Modelled Approach |
| **Ceramic Membrane Package Plant** | | | | | |
| Feed Conditioning/Coagulation Tanks | Add | Modelled | £ 48,109.44 | | |
| Membrane Feed Pipework | Add | Modelled | £ 23,746.61 | | |
| Membrane, Valve & Header Skids/Compressed A | Add | Modelled | £ 770,170.56 | | |
| Membrane Outlet Pipework | Add | Modelled | £ 3,442.25 | | |
| Membrane Backwash System | Add | Modelled | £ 40,222.21 | | |
| CIP System & CEBW System/RO Plant | Add | Modelled | £ 33,103.35 | | |
| | | | | | |
| | | | | | |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | Manual | | £ 15,910.65 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | Manual | | £ 4,887.07 | Modelled Approach |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| | | | | | |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **952,931.41** | |
| **Annual Maintenance Carbon** | | | | **440826.073 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 56.1 | 1250 | 25600 | £ 175.07 | £ 63,900.55 | Pre-chlorination |
| Sulphuric Acid 96% | Add | | 62.6 | 1840 | 42042 | £ 150.88 | £ 55,071.20 | pH Control |
| Aluminium Sulphate 8% Solution | Add | | 10.8 | 2710 | 10673 | £ 152.42 | £ 55,631.98 | Coagulation - Ceramic Membranes |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 118.6 | 1250 | 54093 | £ 369.90 | £ 135,013.50 | Disinfection |
| Orthophosphoric Acid | Add | | 332.6 | 1052 | 127680 | £ 442.67 | £ 161,574.55 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 43.1 | 1280 | 20136 | £ 205.24 | £ 74,912.60 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 36.7 | 1500 | 20066 | £ 197.94 | £ 72,248.10 | Final Water Conditioning |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 19.5 | 998 | 7111 | £ 4.91 | £ 1,792.15 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 1835.6 | 998 | 668717 | £ 461.69 | £ 168,516.85 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 788,661.5** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | | | £ 63.93 | Modelled Approach |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.6 - Option 6 Detailed OPEX Breakdown

| | | | | | | |
|---|---|---|---|---|---|---|
| Interstage Pumps | Add | | | £ | 73.31 | Modelled Approach |
| Ceramic Membrane - Operational Building | Add | | | £ | 699.41 | Modelled Approach |
| Ceramic Membrane Package Plant | Add | | | | | No Info. |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | | | £ | 15,626.93 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | | | £ | 29,299.58 | Modelled Approach |
| Transformer Kiosk | Add | | | £ | 2,458.81 | Modelled Approach |
| Switchgear kiosk | Add | | | £ | 2,450.23 | Modelled Approach |
| Switchgear kiosk | Add | | | £ | 2,450.23 | Modelled Approach |
| | | | | | | |
| | | | | | | |
| **Annual People Costs** | | | | **£** | **53,122.43** | |
| **Annual People Carbon** | | | | | **0 CO2 kg** | |

### *Other*

| *Item* | *Add / omit* | *Qty* | *rate* | | Annual Total | *Comments* |
|---|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | | | £ | 839.71 | Modelled Approach |
| Ceramic Membrane - Operational Building | Add | | | £ | 9,186.94 | Modelled Approach |
| Ceramic Membrane Package Plant | Add | | | | | No Info. |
| Transformer Kiosk | Add | | | £ | 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ | 644.80 | Modelled Approach |
| Switchgear kiosk | Add | | | £ | 644.80 | Modelled Approach |
| | | | | | | |
| | | | | | | |
| **Annual Other Costs** | | | | **£** | **11,963.30** | |
| **Annual Other Carbon** | | | | | **5534.223 CO2** | |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **2,031,292.19** |
| **Total Annual Carbon** | | **1928113.343 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 30 Year OPEX

**Iver WTW**

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### *30 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *2* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *3* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *4* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *5* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *6* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *7* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *8* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *9* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *10* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *11* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *12* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *13* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *14* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *15* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *16* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *17* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *18* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *19* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *20* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *21* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *22* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *23* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *24* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *25* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *26* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *27* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *28* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *29* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *30* | £ 224,614 | £ 952,931 | £ 788,661 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,031,292 |
| *31* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *32* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *33* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *34* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *35* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *36* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *37* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *38* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *39* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| *40* | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total 30 Year Opex** | | | | | | | | **£ 60,938,765.60** |

# Feasibility Estimate

## Net Present Value

**Iver WTW**

aquaconsultants
water · environment · energy

### 5.6 NPV Option 6

***Based on 30 Year OPEX intervention***

No replacement included on the 30 year

| Yr | Capital Investment | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | |
| CAPEX Yr1 | £ 27,842,559 | | | | | | | | £ 27,842,559 |
| CAPEX Yr2 | £ 50,116,606 | | | | | | | | £ 50,116,606 |
| CAPEX Yr3 | £ 33,411,070 | | | | | | | | £ 33,411,070 |
| 1 | £ - | £ 218,241 | £ 925,895 | £ 766,286 | £ 51,615 | £ - | £ - | £ 11,624 | £ 1,973,661 |
| 2 | £ - | £ 212,049 | £ 899,626 | £ 744,545 | £ 50,151 | £ - | £ - | £ 11,294 | £ 1,917,665 |
| 3 | £ - | £ 206,033 | £ 874,102 | £ 723,421 | £ 48,728 | £ - | £ - | £ 10,974 | £ 1,863,258 |
| 4 | £ - | £ 200,187 | £ 849,303 | £ 702,897 | £ 47,346 | £ - | £ - | £ 10,662 | £ 1,810,395 |
| 5 | £ - | £ 194,508 | £ 825,207 | £ 682,954 | £ 46,002 | £ - | £ - | £ 10,360 | £ 1,759,031 |
| 6 | £ - | £ 188,989 | £ 801,794 | £ 663,578 | £ 44,697 | £ - | £ - | £ 10,066 | £ 1,709,125 |
| 7 | £ - | £ 183,627 | £ 779,046 | £ 644,751 | £ 43,429 | £ - | £ - | £ 9,780 | £ 1,660,634 |
| 8 | £ - | £ 178,418 | £ 756,943 | £ 626,459 | £ 42,197 | £ - | £ - | £ 9,503 | £ 1,613,519 |
| 9 | £ - | £ 173,356 | £ 735,468 | £ 608,685 | £ 41,000 | £ - | £ - | £ 9,233 | £ 1,567,741 |
| 10 | £ - | £ 168,437 | £ 714,601 | £ 591,416 | £ 39,836 | £ - | £ - | £ 8,971 | £ 1,523,262 |
| 11 | £ - | £ 163,658 | £ 694,327 | £ 574,636 | £ 38,706 | £ - | £ - | £ 8,717 | £ 1,480,045 |
| 12 | £ - | £ 159,015 | £ 674,628 | £ 558,333 | £ 37,608 | £ - | £ - | £ 8,469 | £ 1,438,054 |
| 13 | £ - | £ 154,504 | £ 655,488 | £ 542,492 | £ 36,541 | £ - | £ - | £ 8,229 | £ 1,397,254 |
| 14 | £ - | £ 150,120 | £ 636,890 | £ 527,101 | £ 35,504 | £ - | £ - | £ 7,996 | £ 1,357,612 |
| 15 | £ - | £ 145,861 | £ 618,821 | £ 512,146 | £ 34,497 | £ - | £ - | £ 7,769 | £ 1,319,094 |
| 16 | £ - | £ 141,723 | £ 601,264 | £ 497,616 | £ 33,518 | £ - | £ - | £ 7,548 | £ 1,281,669 |
| 17 | £ - | £ 137,702 | £ 584,205 | £ 483,498 | £ 32,567 | £ - | £ - | £ 7,334 | £ 1,245,306 |
| 18 | £ - | £ 133,795 | £ 567,630 | £ 469,780 | £ 31,643 | £ - | £ - | £ 7,126 | £ 1,209,975 |
| 19 | £ - | £ 129,999 | £ 551,526 | £ 456,452 | £ 30,746 | £ - | £ - | £ 6,924 | £ 1,175,646 |
| 20 | £ 43,391,384 | £ 126,311 | £ 535,878 | £ 443,501 | £ 29,873 | £ - | £ - | £ 6,728 | £ 44,533,675 |
| 21 | £ - | £ 122,727 | £ 520,675 | £ 430,919 | £ 29,026 | £ - | £ - | £ 6,537 | £ 1,109,883 |
| 22 | £ - | £ 119,245 | £ 505,902 | £ 418,693 | £ 28,202 | £ - | £ - | £ 6,351 | £ 1,078,394 |
| 23 | £ - | £ 115,862 | £ 491,549 | £ 406,814 | £ 27,402 | £ - | £ - | £ 6,171 | £ 1,047,798 |
| 24 | £ - | £ 112,575 | £ 477,603 | £ 395,272 | £ 26,625 | £ - | £ - | £ 5,996 | £ 1,018,070 |
| 25 | £ - | £ 109,381 | £ 464,053 | £ 384,057 | £ 25,869 | £ - | £ - | £ 5,826 | £ 989,186 |
| 26 | £ - | £ 106,278 | £ 450,887 | £ 373,161 | £ 25,135 | £ - | £ - | £ 5,661 | £ 961,121 |
| 27 | £ - | £ 103,262 | £ 438,094 | £ 362,574 | £ 24,422 | £ - | £ - | £ 5,500 | £ 933,853 |
| 28 | £ - | £ 100,333 | £ 425,665 | £ 352,287 | £ 23,729 | £ - | £ - | £ 5,344 | £ 907,358 |
| 29 | £ - | £ 97,486 | £ 413,588 | £ 342,292 | £ 23,056 | £ - | £ - | £ 5,192 | £ 881,615 |
| 30 | £ - | £ 94,720 | £ 401,854 | £ 332,581 | £ 22,402 | £ - | £ - | £ 5,045 | £ 856,602 |
| 31 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 32 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 33 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 34 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 35 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 36 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 37 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 38 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 39 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| 40 | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - | £ - |
| **Total NPV based on 30 Year Opex** | | | | | | | | | **£ 194,990,735.31** |

## 3.7 - Submerged Membranes

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **New Interstage Pump Station** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height x 11m width x 6m length (clear internal) | 1 | 66 | m2 | | £ 199,619.17 | Operational Building; Portal Frame/Cladding |
| 2 | Concrete Substructure incl. excavation | 4m depth x 10m width x 6m length | 1 | 240 | m3 | | £ 479,420.11 | Dry/Wet Well Structure |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | 4 No. variable speed Canister Type Pumps | 4 No. Pumps D/A/A/S; Total flow 239 Ml/d. Total head 3.5 m (assume 3m static); Based on Xylem selection - canister mounted units; Each pump 922 l/s @ 4.6 m | 3 | 75 | kW | | £ 820,279.92 | Interprocess Pumping |
| 2 | MCC with VSDs | 10m (in RGF building electrical room) | 1 | 330 | kW | | £ 299,733.83 | MCC |
| 3 | HVAC | | | | | | £ - | Incl. in Building Model |
| 4 | Building Services | | | | | | £ - | Incl. in Building Model |
| 5 | | | | | | | £ - | |
| **Submerged Membrane Building** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Steelwork and Panels Superstructure | 4m height x 23m length x 62m width | 1 | 1426 | m2 | | £ 1,859,817.19 | Operational Building; Incl. Base slab |
| 2 | Concrete Substructure | 4.5m height 23m depth 62m width | 0 | 6417 | m3 | | £ - | Incl. in Operational Building |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Submerged Membrane Package - Pre Treatment | Pre-treatment | 1 | 1 | Sum | | £ 3,066,373.00 | Hollow Fibre 'ZeeWeed' Ultrafiltration Proposal; Budget Q' from Veolia |
| 2 | Submerged Membrane Package - Primary Filtration | Primary Filtration | 1 | 1 | Sum | | £ 4,395,883.00 | Plant less cost of Membranes (Membrane cost below) |
| 3 | Submerged Membrane Package - Ancillary Equipment | Ancillary Equipment | 1 | 1 | Sum | | £ 2,566,373.00 | 0 |
| 4 | Submerged Membrane Package - Chemical Dosing | Chemical Dosing | 1 | 1 | Sum | | £ 1,960,915.00 | 0 |
| 5 | Submerged Membrane Package - Design Engineering | Design & Engineering | 1 | 1 | Sum | | £ 2,777,288.00 | 0 |
| 6 | Submerged Membrane Package - Membranes Replaceme | Membranes [for Yr1 Replacement] | 1 | 1 | Sum | | £ 3,437,105.00 | for Phased Replacement - First Train |
| 7 | Submerged Membrane Package - Membranes Replaceme | Membranes [for Yr2 Replacement] | 1 | 1 | Sum | | £ 3,437,105.00 | for Phased Replacement - Second Train |
| 8 | Submerged Membrane Package - Membranes Replaceme | Membranes [for Yr3 Replacement] | 1 | 1 | Sum | | £ 3,437,105.00 | for Phased Replacement - Third Train |
| 9 | Submerged Membrane Package - Membranes Replaceme | Membranes [for Yr4 Replacement] | 1 | 1 | Sum | | £ 3,437,105.00 | for Phased Replacement - Fourth Train |
| 10 | Membrane MCC | 10m in building electrical room - **Incl. in Veolia Scope for UF Plant** | | | | | £ - | Incl. in Submerged Membrane Package |
| 11 | HVAC | | | | | | £ - | Incl. in Building Model |
| 12 | drainage sump pumps | | | | | | £ - | Incl. in Building Model |
| 13 | Building services | | | | | | £ - | Incl. in Building Model |
| 14 | Access steelwork | | | | | | £ - | Incl. in Building/Process Unit Models/RSE Quote |
| 15 | | | | | | | £ - | 0 |
| **Chemical Storage** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | chemicals delivery area | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Chemical storage (caustic, sulphuric and citric) | Assumed to be included in Veolia scope - Incl. CIP chemical systems | | | | | £ - | Incl. in Submerged Membrane Package |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Access Roads, Drainage & Pipework** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Access road | 300m x 3.5m width | 1 | 1050 | m2 | | £ 102,393.95 | Site Roads; All Types |

## 3.7 - Submerged Membranes

### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| 2 | Road drainage | 300m length | 1 | 300 | m | | £ 69,881.18 | Drainage |
| 3 | Membrane CIP waste pipe | From membrane CIP waste outlet | 300 | 200 | mm | | £ 114,698.69 | Interprocess Pipework; Below Ground |
| 4 | To membrane | 21m, DN1400 | 21 | 1400 | mm | | £ 45,610.31 | Interprocess Pipework; Below Ground |
| 5 | To membrane | 13m DN1400 | 13 | 1400 | mm | | £ 28,234.95 | Interprocess Pipework; Below Ground |
| 6 | To membrane | 78m, DN1800 | 78 | 1800 | mm | | £ 215,939.06 | Interprocess Pipework; Below Ground |
| 7 | To interozone from membrane | 15m, DN1800 | 15 | 1800 | mm | | £ 41,526.74 | Interprocess Pipework; Below Ground |
| 8 | Overflow pipework (from membrane inlet channel) | 10m length 1.6m diameter 1m cover in hardstanding (to PS wet well) | 10 | 1600 | mm | | £ 24,701.84 | Interprocess Pipework; Below Ground |
| 9 | Static mixer (DN 1600 for chlorine dosing) | | 1 | 1600 | mm | | £ 33,461.41 | Static Mixer |
| 10 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Electrical & ICA** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Transformer substation base | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 8 | m3 | | £ 24,764.89 | Concrete Slab |
| 2 | Transformer Kiosk | 4 x 4 x 3m high kiosk on base with open mesh over sump x 2No. (complete with building services). | 2 | 48 | m3 | | £ 88,792.87 | Operational Building; Kiosk |
| 3 | Switchgear base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 4 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Cabling (3.3kV) | 1600 | 1 | 1600 | m | | £ 528,294.60 | HV Cabling (m) |
| 2 | 400V | 800m | 1 | 800 | m | | £ 92,180.46 | General - LV Cabling with Ducts and Drawpits (m) |
| 3 | Comms | 200m | 1 | 200 | m | | £ 38,816.70 | Site Cabling - ICA Cabling with ducts, drawpits & containment (m) |
| 4 | Transformer x 2 No. (3.3kV - 400V) 500 kVA | Allow £50k for purchase, extra for installation. | 2 | 500 | kVA | | £ 94,148.68 | Transformer |
| 5 | PLC network extension and network node box | Break into existing network in adjacent GAC building. | | | | | £ 50,000.00 | Allow |
| 6 | SCADA integration/configuration | | 1 | 1 | No. | | £ 61,184.86 | SCADA Software and Hardware Modifications only (nr) |
| 7 | DNO charges (amendment to authorised supply capacity) | Allow £50k - Load based on Drive List Please advise if different | 1 | 5000.0 | kVA | | £ 900,605.04 | New Power Supply to Site |
| 8 | ERACS study | allow 15k | | | | | £ - | Surveys/Design Incl. in On-Cost |
| 9 | RMU - 1 No. (extendable with 2 No. transformer feeders and 2 No. 3.3 kV switches) | A non extendible RMU is approx £15k so extendible will be more than than perhaps £25k | | | | | £ 100,000.00 | Allow |
| 10 | Instrumentation | Level, pressure, flow instrumentation etc | | | | | £ - | |
| 11 | PLC and integration with UV reactor LCPs | Including control software and modification to existing site control for plant shutdown and interfacing etc | | | | | £ - | |
| 12 | HMI | | | | | | £ - | |
| 13 | MCC | No scope item for MCC to serve new scope items (except IPS) | 1 | 2800 | kW | | £ 1,286,966.44 | Motor Control Centre (MCC) |
| 14 | | | | | | | £ - | |
| 15 | | | | | | | £ - | |
| **Generator** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | | | | | | | £ - | |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | Standby Generator | 2MVA @ 3.3kV with controls (and acoustic enclosure) | 1 | 2000 | kVA | | £ 454,942.87 | Emergency Power Generation |
| 2 | | ABB Unigear generator incomer switch 3.3kV (c/w shut-down and installation) | | | | | £ - | |
| 3 | | ABB Unigear feeder switches 3.3kV, 2 No. (c/w shut-down and installation) swichboards A & B | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |

# Feasibility Estimate
## Detailed Cost Breakdown
**Iver WTW**

### 3.7 - Submerged Membranes
#### *Direct Works*

| *Item* | *Scope* | *Description* | *Qty* | *U* | *UoM* | *Rate* | *Total* | *Additional Comments* |
|---|---|---|---|---|---|---|---|---|
| **Future RGF feed** | | | | | | | | |
| **Civil** | | | | | | | | |
| 1 | Switchgear base | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 2.7 | m3 | | £ 7,407.47 | Concrete Slab |
| 2 | Switchgear kiosk | 3 x3 x 3m high kiosk on base (complete with building services). | 1 | 27 | m3 | | £ 33,327.99 | Operational Building; Kiosk |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **MEICA** | | | | | | | | |
| 1 | RMU - 1 No. (extendable with 2 No. transformer feeders at | A non extendible RMU is approx £15k so extendible will be more than than perhaps £25k | 1 | 1 | No. | | £ 100,000.00 | Allow |
| 2 | | | | | | | £ - | |
| 3 | | | | | | | £ - | |
| 4 | | | | | | | £ - | |
| 5 | | | | | | | £ - | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Area of Site/Process/Plant Description** | | | | | | | | |
| **Direct Works Total** | | | | | | | **£ 36,752,738.69** | |

#### *Indirect Costs*

| | | | |
|---|---|---|---|
| Contractor Indirect Costs inc. risk | 42% | £ 15,299,390.35 | |

| | | |
|---|---|---|
| **Construction Cost** | **£** | **52,052,129.04** |

#### *Project On-costs*

| | | | |
|---|---|---|---|
| Project Overheads | 15% | £ 7,820,832.39 | |

| | | |
|---|---|---|
| **Project Cost** | **£** | **59,872,961.43** |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.7 - Option 7 Detailed OPEX Breakdown

#### *Power*

| *Asset description* | *Add / omit* | Consumption / generation | *Required kW* | *Hours running per day* | Annual Power Consumption | Cost per kWh | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 484.95 | Modelled Approach |
| Interstage Pumps | Add | Consumption | 225 | 16 | 1314000 | £ 0.35 | £ 459,900.00 | Assume 16hr/day @ Full Inst. Rate |
| Submerged Membrane - Operational Building | Add | Consumption | | | 0 | £ 0.35 | £ 8,714.31 | Modelled Approach |
| Submerged Membrane Package Plant | Add | Consumption | | | 0 | £ 0.35 | £ 1,000,000.00 | Allow based on Ceramic Membrane |
| Transformer Kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,423.52 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| Switchgear kiosk | Add | Consumption | | | 0 | £ 0.35 | £ 1,418.55 | Modelled Approach |
| | | | | | | | | |
| Pulsators & Actiflo Removed | Omit | Consumption | 160 | 24 | 1401600 | £ 0.35 | -£ 490,560.00 | |
| | | | | | | | | |
| **Annual Power Costs** | | | | | | | **£ 982,799.9** | |
| **Annual Power Carbon** | | | | | | | **3904272.721 CO2 kg** | |

#### *Maintenance*

| *Asset description* | *Add / omit* | *Calculation type* | Modelled Annual Total | Calculated Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | Manual | | £ 1,762.29 | Modelled Approach |
| Interstage Pumps | Add | Manual | | £ 5,767.04 | Modelled Approach |
| Submerged Membrane - Operational Building | Add | Manual | | £ 19,280.59 | Modelled Approach |
| Submerged Membrane Package - Pre Treatment | Add | Modelled | £ 229,475.64 | | Modelled Approach |
| Submerged Membrane Package - Primary Filtratio | Add | Modelled | £ 328,971.08 | | Modelled Approach |
| Submerged Membrane Package - Ancillary Equipr | Add | Modelled | £ 192,057.55 | | Modelled Approach |
| Submerged Membrane Package - Chemical Dosin | Add | Modelled | £ 146,747.38 | | Modelled Approach |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | Manual | | £ 15,910.65 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | Manual | | £ 4,887.07 | Modelled Approach |
| Transformer Kiosk | Add | Manual | | £ 1,941.16 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| Switchgear kiosk | Add | Manual | | £ 1,934.39 | Modelled Approach |
| | | | | | |
| **Annual Maintenance Costs** | | | **£** | **950,669.23** | |
| **Annual Maintenance Carbon** | | | | **439779.586 CO2 kg** | |

#### *Chemicals*

| *Chemicals* | *Add / omit* | Flow rate (m3/day) | Dose rate (l/hr) | *Weight (kg/m3)* | *Consumption / year (kg)* | *Cost (£/d)* | Annual Total | *Comments* |
|---|---|---|---|---|---|---|---|---|
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 57.4 | 1250 | 26207 | £ 179.22 | £ 65,415.30 | Pre-chlorination |
| Sodium Hypochlorite 14-15% PUMPOVER | Add | | 118.9 | 1250 | 54230 | £ 370.85 | £ 135,360.25 | Disinfection |
| Orthophosphoric Acid | Add | | 333.4 | 1052 | 128007 | £ 443.81 | £ 161,990.65 | Final Water Conditioning |
| Sodium Bisulphite 20% | Add | | 43.2 | 1280 | 20188 | £ 205.77 | £ 75,106.05 | Final Water Conditioning |
| Sodium Hydroxide [CAUSTIC SODA] 47% | Add | | 36.8 | 1500 | 20121 | £ 198.44 | £ 72,430.60 | Final Water Conditioning |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 31.2 | 998 | 11366 | £ 7.85 | £ 2,865.25 | Sludge Thickening |
| Polyelectrolyte (Flopam AN910 SEP) | Add | | 1835.9 | 998 | 668823 | £ 461.77 | £ 168,546.05 | Sludge Dewatering |
| | | | | | | | | |
| | | | | | | | | |
| **Annual Chemical Costs** | | | | | | | **£ 681,714.2** | |
| **Annual Chemical Carbon** | | | | | | | **0 CO2 kg** | |

#### *People*

| *Role* | *Add / omit* | *Hours per annum* | *Rate per hour* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | | | £ 63.93 | Modelled Approach |
| Interstage Pumps | Add | | | £ 73.31 | Modelled Approach |
| Submerged Membrane - Operational Building | Add | | | £ 699.41 | Modelled Approach |
| Submerged Membrane Package Plant | Add | | | | No Info. |
| Chemical Dosing - pH Control - Sulphuric Acid | Add | | | £ 15,626.93 | Modelled Approach |
| Chemical Dosing - Coag. - Aluminium Sulphate | Add | | | £ 29,299.58 | Modelled Approach |
| Transformer Kiosk | Add | | | £ 2,458.81 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 2,450.23 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 2,450.23 | Modelled Approach |
| | | | | | |
| **Annual People Costs** | | | | **£ 53,122.43** | |
| **Annual People Carbon** | | | | **0 CO2 kg** | |

#### *Other*

| *Item* | *Add / omit* | *Qty* | *rate* | Annual Total | *Comments* |
|---|---|---|---|---|---|
| Interstage PS - Operational Building | Add | | | £ 839.71 | Modelled Approach |
| Submerged Membrane - Operational Building | Add | | | £ 9,186.94 | Modelled Approach |
| Submerged Membrane Package Plant | Add | | | | No Info. |
| Transformer Kiosk | Add | | | £ 647.05 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 644.80 | Modelled Approach |
| Switchgear kiosk | Add | | | £ 644.80 | Modelled Approach |

# Feasibility Estimate

## Detailed OPEX Breakdown - Annual Operating Costs

**Iver WTW**

### 4.7 - Option 7 Detailed OPEX Breakdown

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| **Annual Other Costs** | | | | **£** | **11,963.30** |
| **Annual Other Carbon** | | | | | **5534.223 CO2** |

| | | |
|---|---|---|
| **Total Annual Opex** | **£** | **2,680,268.99** |
| **Total Annual Carbon** | | **4349586.53 CO2 kg** |

# Feasibility Estimate

## Detailed OPEX Breakdown - 60 Year OPEX

**Iver WTW**

aquaconsultants
water · environment · energy

### *60 Year OPEX intervention*

Costs at estimate base date

| *Yr* | *Power* | *Maintenance* | *Chemicals* | *People* | *Sludge* | *Business Rates* | *Other* | *Total* |
|---|---|---|---|---|---|---|---|---|
| *0* | | | | | | | | £ - |
| *1* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *2* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *3* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *4* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *5* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *6* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *7* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *8* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *9* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *10* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *11* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *12* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *13* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *14* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *15* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *16* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *17* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *18* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *19* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *20* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *21* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *22* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *23* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *24* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *25* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *26* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *27* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *28* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *29* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *30* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *31* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *32* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *33* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *34* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *35* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *36* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *37* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *38* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *39* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| *40* | £ 982,800 | £ 950,669 | £ 681,714 | £ 53,122 | £ - | £ - | £ 11,963 | £ 2,680,269 |
| **Total 60 Year Opex** | | | | | | | | **£ 160,816,139.42** |

# Feasibility Estimate

## Net Present Value

**Iver WTW**

aquaconsultants
water · environment · energy

### 5.7 NPV Option 7

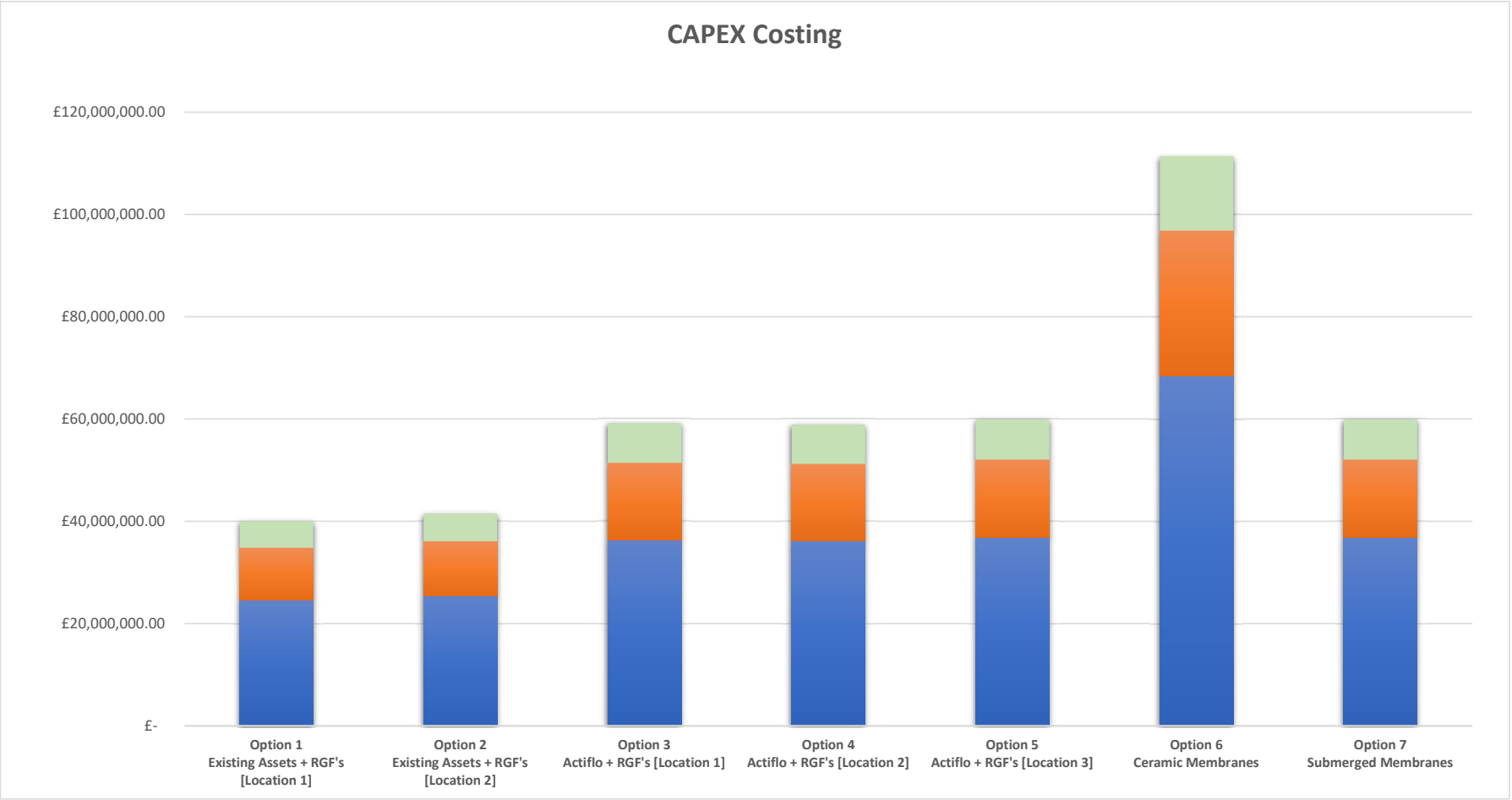
***Based on 60 Year OPEX intervention***

No replacement included on the 60 year

| Yr | Capital Investment | Power | Maintenance | Chemicals | People | Sludge | Business Rates | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | 2.9% | |
| CAPEX Yr1 | £ 14,968,240 | | | | | | | | £ 14,968,240 |
| CAPEX Yr2 | £ 26,942,833 | | | | | | | | £ 26,942,833 |
| CAPEX Yr3 | £ 17,961,888 | | | | | | | | £ 17,961,888 |
| 1 | £ - | £ 954,916 | £ 923,697 | £ 662,373 | £ 51,615 | £ - | £ - | £ 11,624 | £ 2,604,226 |
| 2 | £ - | £ 927,824 | £ 897,491 | £ 643,580 | £ 50,151 | £ - | £ - | £ 11,294 | £ 2,530,340 |
| 3 | £ - | £ 901,500 | £ 872,027 | £ 625,321 | £ 48,728 | £ - | £ - | £ 10,974 | £ 2,458,550 |
| 4 | £ - | £ 875,923 | £ 847,287 | £ 607,580 | £ 47,346 | £ - | £ - | £ 10,662 | £ 2,388,797 |
| 5 | £ - | £ 851,072 | £ 823,248 | £ 590,342 | £ 46,002 | £ - | £ - | £ 10,360 | £ 2,321,023 |
| 6 | £ - | £ 826,926 | £ 799,891 | £ 573,593 | £ 44,697 | £ - | £ - | £ 10,066 | £ 2,255,172 |
| 7 | £ - | £ 803,464 | £ 777,197 | £ 557,319 | £ 43,429 | £ - | £ - | £ 9,780 | £ 2,191,190 |
| 8 | £ - | £ 780,669 | £ 755,147 | £ 541,507 | £ 42,197 | £ - | £ - | £ 9,503 | £ 2,129,022 |
| 9 | £ 4,321,513 | £ 758,520 | £ 733,722 | £ 526,144 | £ 41,000 | £ - | £ - | £ 9,233 | £ 6,390,132 |
| 10 | £ 4,198,905 | £ 737,000 | £ 712,905 | £ 511,216 | £ 39,836 | £ - | £ - | £ 8,971 | £ 6,208,834 |
| 11 | £ 4,079,776 | £ 716,090 | £ 692,679 | £ 496,712 | £ 38,706 | £ - | £ - | £ 8,717 | £ 6,032,679 |
| 12 | £ 3,964,026 | £ 695,773 | £ 673,026 | £ 482,620 | £ 37,608 | £ - | £ - | £ 8,469 | £ 5,861,523 |
| 13 | £ - | £ 676,033 | £ 653,932 | £ 468,927 | £ 36,541 | £ - | £ - | £ 8,229 | £ 1,843,662 |
| 14 | £ - | £ 656,853 | £ 635,379 | £ 455,623 | £ 35,504 | £ - | £ - | £ 7,996 | £ 1,791,354 |
| 15 | £ - | £ 638,217 | £ 617,352 | £ 442,696 | £ 34,497 | £ - | £ - | £ 7,769 | £ 1,740,531 |
| 16 | £ - | £ 620,110 | £ 599,837 | £ 430,136 | £ 33,518 | £ - | £ - | £ 7,548 | £ 1,691,149 |
| 17 | £ - | £ 602,516 | £ 582,818 | £ 417,932 | £ 32,567 | £ - | £ - | £ 7,334 | £ 1,643,169 |
| 18 | £ 3,335,323 | £ 585,422 | £ 566,283 | £ 406,075 | £ 31,643 | £ - | £ - | £ 7,126 | £ 4,931,872 |
| 19 | £ - | £ 568,813 | £ 550,217 | £ 394,554 | £ 30,746 | £ - | £ - | £ 6,924 | £ 1,551,253 |
| 20 | £ 17,210,937 | £ 552,675 | £ 534,606 | £ 383,360 | £ 29,873 | £ - | £ - | £ 6,728 | £ 18,718,179 |
| 21 | £ - | £ 536,994 | £ 519,438 | £ 372,483 | £ 29,026 | £ - | £ - | £ 6,537 | £ 1,464,479 |
| 22 | £ 2,972,615 | £ 521,759 | £ 504,701 | £ 361,916 | £ 28,202 | £ - | £ - | £ 6,351 | £ 4,395,545 |
| 23 | £ - | £ 506,956 | £ 490,382 | £ 351,647 | £ 27,402 | £ - | £ - | £ 6,171 | £ 1,382,558 |
| 24 | £ 2,806,333 | £ 492,573 | £ 476,469 | £ 341,671 | £ 26,625 | £ - | £ - | £ 5,996 | £ 4,149,666 |
| 25 | £ - | £ 478,598 | £ 462,951 | £ 331,977 | £ 25,869 | £ - | £ - | £ 5,826 | £ 1,305,221 |
| 26 | £ - | £ 465,019 | £ 449,816 | £ 322,558 | £ 25,135 | £ - | £ - | £ 5,661 | £ 1,268,190 |
| 27 | £ 2,574,185 | £ 451,826 | £ 437,054 | £ 313,407 | £ 24,422 | £ - | £ - | £ 5,500 | £ 3,806,395 |
| 28 | £ - | £ 439,007 | £ 424,654 | £ 304,515 | £ 23,729 | £ - | £ - | £ 5,344 | £ 1,197,249 |
| 29 | £ - | £ 426,552 | £ 412,606 | £ 295,875 | £ 23,056 | £ - | £ - | £ 5,192 | £ 1,163,282 |
| 30 | £ 2,361,242 | £ 414,450 | £ 400,900 | £ 287,481 | £ 22,402 | £ - | £ - | £ 5,045 | £ 3,491,519 |
| 31 | £ - | £ 402,691 | £ 389,526 | £ 279,325 | £ 21,766 | £ - | £ - | £ 4,902 | £ 1,098,210 |
| 32 | £ - | £ 391,266 | £ 378,474 | £ 271,400 | £ 21,149 | £ - | £ - | £ 4,763 | £ 1,067,052 |
| 33 | £ 2,165,914 | £ 380,165 | £ 367,737 | £ 263,700 | £ 20,549 | £ - | £ - | £ 4,628 | £ 3,202,692 |
| 34 | £ - | £ 369,379 | £ 357,303 | £ 256,218 | £ 19,966 | £ - | £ - | £ 4,496 | £ 1,007,363 |
| 35 | £ - | £ 358,900 | £ 347,166 | £ 248,949 | £ 19,399 | £ - | £ - | £ 4,369 | £ 978,782 |
| 36 | £ 3,973,487 | £ 348,717 | £ 337,316 | £ 241,886 | £ 18,849 | £ - | £ - | £ 4,245 | £ 4,924,500 |
| 37 | £ - | £ 338,823 | £ 327,746 | £ 235,023 | £ 18,314 | £ - | £ - | £ 4,124 | £ 924,031 |
| 38 | £ - | £ 329,210 | £ 318,448 | £ 228,355 | £ 17,795 | £ - | £ - | £ 4,007 | £ 897,815 |
| 39 | £ - | £ 319,870 | £ 309,413 | £ 221,876 | £ 17,290 | £ - | £ - | £ 3,894 | £ 872,343 |
| 40 | £ 10,010,214 | £ 310,795 | £ 300,634 | £ 215,581 | £ 16,799 | £ - | £ - | £ 3,783 | £ 10,857,807 |
| 41 | £ - | £ 301,977 | £ 292,105 | £ 209,465 | £ 16,323 | £ - | £ - | £ 3,676 | £ 823,545 |
| 42 | £ - | £ 293,410 | £ 283,817 | £ 203,522 | £ 15,859 | £ - | £ - | £ 3,572 | £ 800,180 |
| 43 | £ - | £ 285,085 | £ 275,765 | £ 197,748 | £ 15,409 | £ - | £ - | £ 3,470 | £ 777,478 |
| 44 | £ 1,578,133 | £ 276,997 | £ 267,941 | £ 192,137 | £ 14,972 | £ - | £ - | £ 3,372 | £ 2,333,553 |
| 45 | £ 1,533,359 | £ 269,138 | £ 260,339 | £ 186,686 | £ 14,547 | £ - | £ - | £ 3,276 | £ 2,267,346 |
| 46 | £ - | £ 261,502 | £ 252,953 | £ 181,390 | £ 14,135 | £ - | £ - | £ 3,183 | £ 713,163 |
| 47 | £ - | £ 254,083 | £ 245,776 | £ 176,243 | £ 13,734 | £ - | £ - | £ 3,093 | £ 692,929 |
| 48 | £ 1,406,515 | £ 246,874 | £ 238,803 | £ 171,243 | £ 13,344 | £ - | £ - | £ 3,005 | £ 2,079,785 |
| 49 | £ - | £ 239,870 | £ 232,028 | £ 166,385 | £ 12,965 | £ - | £ - | £ 2,920 | £ 654,168 |
| 50 | £ 1,327,838 | £ 233,065 | £ 225,445 | £ 161,664 | £ 12,598 | £ - | £ - | £ 2,837 | £ 1,963,446 |
| 51 | £ - | £ 226,452 | £ 219,049 | £ 157,077 | £ 12,240 | £ - | £ - | £ 2,757 | £ 617,575 |
| 52 | £ - | £ 220,027 | £ 212,834 | £ 152,621 | £ 11,893 | £ - | £ - | £ 2,678 | £ 600,053 |
| 53 | £ - | £ 213,785 | £ 206,796 | £ 148,291 | £ 11,556 | £ - | £ - | £ 2,602 | £ 583,029 |
| 54 | £ 1,183,439 | £ 207,719 | £ 200,928 | £ 144,084 | £ 11,228 | £ - | £ - | £ 2,529 | £ 1,749,926 |
| 55 | £ 1,149,863 | £ 201,826 | £ 195,228 | £ 139,996 | £ 10,909 | £ - | £ - | £ 2,457 | £ 1,700,278 |
| 56 | £ - | £ 196,100 | £ 189,689 | £ 136,024 | £ 10,600 | £ - | £ - | £ 2,387 | £ 534,799 |
| 57 | £ - | £ 190,536 | £ 184,307 | £ 132,165 | £ 10,299 | £ - | £ - | £ 2,319 | £ 519,626 |
| 58 | £ - | £ 185,131 | £ 179,078 | £ 128,415 | £ 10,007 | £ - | £ - | £ 2,254 | £ 504,884 |
| 59 | £ - | £ 179,878 | £ 173,997 | £ 124,772 | £ 9,723 | £ - | £ - | £ 2,190 | £ 490,559 |
| 60 | £ - | £ 174,775 | £ 169,061 | £ 121,232 | £ 9,447 | £ - | £ - | £ 2,127 | £ 476,641 |
| **Total NPV based on 60 Year Opex** | | | | | | | | | **£ 207,493,278.59** |

## 6 Overview

### *CAPEX Breakdown*



## 7 Assumptions and Comments

*The following assumptions have been made in the development of the estimate:*

1) Estimate is based on the scope as derived during various correspondence between Aquaconsultants and Stantec last dated 26th April 2023 and comments received 2nd May 2023
2) No allowance has been made for works to existing processes that are not part of the scope activities.
3) NPV allowances; (Includes 15% Oncost allowance)
4) Discount Rate for NPV - 2.92% / year
5) Design Life - Pipework - 80 years
6) Design Life - Civils - 60 years
7) Design Life - Kiosks - 40 years
8) Design Life - M&E - 20 years
9) No OPEX figures have been made available for the Ceramic Membrane Package Plant option however, we have been able to incorporate some OPEX costs by extrapolating from historic information. There is however a significant risk to this and this should be taken into consideration when evaluating the whole life cost.
10) A Risk allowance of 5.0% has been included.
11) A Design allowance of 11.3% has been included.
12) An allowance of 14.49 % has been included for Affinity Water's own project oncosts.
13)
14)