

# SRN37 Bioresources Industrial Emissions Directive Enhancement Business Case

2<sup>nd</sup> October 2023  
Version 1.0



from  
**Southern  
Water** 

# Contents

Contents	2
Glossary	3
Executive Summary	4
1. Introduction and Background	6
1.1. Introduction	6
1.2. Background information	6
2. Needs Case for Enhancement	8
2.1. Overall Investment Drivers – why are we doing this work?	8
2.2. Evidence to support the proposed intervention	9
2.3. What is the outcome that we want to achieve?	12
3. Best Option for Customers	14
4. Cost Efficiency	19
5. Alternative Delivery	26
6. Customer Protection	26
7. Conclusion	28
References	30
Appendix	30
Appendix 1 – Strategic Steering Group Meeting: Implementation of the Industrial Emissions Directive for Biological Treatments of Sewage Sludge (April 2019)	31
Appendix 2 - Official IED Letter from EA to SWS (July 2019)	33
Appendix 5 - EA/Water UK Waste & Recycling Network Meeting Minutes (June 2021)	37
Appendix 6 - Assessment for PR14 of the Potential Impacts and Requirements of the Industrial Emissions Directive upon Sludge Treatment Centres	40
Appendix 7 - Industrial Emissions Directive Supporting Document	42

## List of Tables and Figures

Table 1: Summary of Enhancement Case	4
Table 2: Links to Data Table Lines	7
Table 3: Options to Meet Identified Need	14
Table 4: Whole Life Cost Analysis	16
Table 5: High-level costing of solutions (Direct cost)	19
Table 6 High level comparison of unit rates (direct costs)	21
Table 7 Opportunity Costing	23
Table 8: Total costs per category and relevant cost drivers	23
Table 9: Summary of uncertainty mechanism	25
Table 10: PCD Summary	26
Table 10: Summary of Key Commentary	29
Figure 1: IED Timeline	10
Figure 2: Aggregate one-off spend by anonymised company (Atkins, 2023)	20
Figure 3: Total one-off spend per site by anonymised company (Atkins, 2023)	21

## Glossary

Acronym	Term
AD	Anaerobic Digestion
AAD	Advanced Anaerobic Digestion
AMP	Asset Management Plan
BAT	Best Available Technique
BREF	Best Available Technique Reference Documents
CMA	Competition and Market Authorities
CHP	Combined Heat and Power plant
EA	Environment Agency
EPR	Environmental Permitting Regulations
EU	European Union
GHG	greenhouse gas emissions
IED	Industrial Emissions Directive
LEP	Local Enforcement Position
STC	Sludge Treatment Centre
UWWTD	Urban Wastewater Treatment Directive
WaSCs	Water and Sewerage Companies
WINEP	Water Industry National Environment Programme

## Executive Summary

The requirements of the Industrial Emissions Directive (IED) were transposed into the Environmental Permitting Regulations (EPR) in 2013. These regulations take an integrated approach to controlling pollution to air, water and land, and aim to prevent and reduce harmful emissions by ensuring industries operate under Best Available Techniques (BAT).

In 2019 the EA concluded that anaerobic digestion (AD) of sewage sludge is subject to the EPR under the European Union (EU) IED. At that time the Bioresources industry were required to comply with BAT as set out in the BREF (Best Available Technique Reference) document. This document sets out the requirements as generally being additional management systems and monitoring procedures for emissions to water and air. The Environment Agency's (EA) expectation was that this would be predominantly a paperwork exercise. The EU approach through BREF is based on a risk-based assessment pertaining to site specific needs and its impact on local receptors. The guidance is designed to allow flexibility to adapt as further improvements in BAT are developed. We were working to comply with BREF.

In September 2022, the Environment Agency published their guidance on 'Biological waste treatment: appropriate measures for permitted facilities', which set out additional standards that we are to work to and moved away from a risk-based approach to a more stringent view of BAT.

We have 16 sludge treatment centres (STCs) that fall above the threshold levels that require permit and investment in interventions to meet BAT. Some of the major capital work required (e.g., covering of sludge tanks) was submitted as part of the Bioresources Water Industry National Environment Programme (WINEP) as part of PR24 on the basis that they offer a reduction in greenhouse gas (GHG) emissions associated with storage, whilst also addressing IED requirements. This submission has since been rejected by the EA and therefore now forms our enhancement claim.

We fully support the intentions of the IED, as defined in the EPR, in so far as they apply to the biological treatment of sewage sludge. However, due to changes in guidance and the approach being taken by the EA in assessing permit applications, the scope and scale of the improvements required to comply with permit conditions has increased beyond what was previously communicated and hence significant investment is now required. For example, the costs to achieve compliance previously estimated at £10m (in 2013) have now increased to £138.4m TOTEX in AMP8.

This enhancement claim is necessary to successfully obtain permits and maintain compliance with BAT and requirements set in the Appropriate Measure document published (2022). This intervention is required because expectations from the EA regarding IED/Appropriate Measures compliance and subsequent scope have significantly increased since the last Price Review cycle. Therefore, the cost and burden of these changes could not be adequately estimated in our PR19 business plan. This investment is required due to legislation not previously applied to sewage sludge and therefore not allowed for in Ofwat's econometric models (unmodelled base costs). Therefore, we have put forward this additional cost as a separate Enhancement Case and the summary of findings are shown in Table 1 below.

**Table 1: Summary of Enhancement Case**

Summary of Enhancement Case	
Name of Enhancement Case	Bioresources Industrial Emissions Directive

<p>Summary of Case</p>	<ul style="list-style-type: none"> <li>• This enhancement case is to invest £138.4m (TOTEX in AMP8) in bringing 16 sites up to the required environmental standards and to meet the permit conditions to provide additional protection to the environment and allow on-going operation.</li> <li>• All sludge treatment centres are above a defined throughput threshold which require permitting under the Industrial Emissions Directive as transposed by the Environmental Permitting Regulations.</li> <li>• To comply with permit conditions, improvements need to be addressed to resolve gaps between the existing site arrangement and those defined as Best Available Technique.</li> <li>• The Environment Agency informed Water Companies of the need to comply with the new permitting requirements after our PR19 draft determination business plan submission, about 5months before final determination, with the scope and scale of the requirements increasing beyond what was originally anticipated.</li> <li>• These costs have not been modelled by Ofwat as this is a new requirement due to changing interpretation of existing legislation and as such is not taken account of in the current funding model.</li> <li>• In addition, further requirements introduced by the EA as part of the Appropriate Measures document (published in Sept 22) have increased the expected scope to get our sites to full compliance (see Section 2 below).</li> <li>• This enhancement case is critical in continuing to deliver our Bioresources strategy using anaerobic digestion and the recycling of biosolids to agricultural land</li> </ul>
<p>Expected Benefits</p>	<ul style="list-style-type: none"> <li>• The investment will address the risk of industrial emissions due to the biological treatment of sewage sludge at 16 sites - 11 sites are associated with compliance with Industrial Emissions Directive and an additional 5 sites are associated with works under Environment Agency Appropriate Measures guidance.</li> <li>• This includes: containment solutions (incl. containment walls &amp; impermeability of soils), covering of tanks, improvement of odour control units, improvement of inspections &amp; monitoring (incl. leak detection)</li> <li>• It will reduce the risk posed due to fugitive emissions to the atmosphere and from the risk of spillages to land and water due to loss of structural containment and spillages.</li> </ul>
<p>Associated Price Control</p>	<p>100% allocated to Bioresources</p>
<p>Enhancement TOTEX</p>	<p>£138.4m</p>
<p>Enhancement OPEX</p>	<p>£2.9m (in AMP8)</p>
<p>Enhancement CAPEX</p>	<p>£135.5m</p>
<p>Is this enhancement proposed for a direct procurement for customer (DPC)?</p>	<p>Elements of this programme are under consideration for alternative funding arrangements, in particular the work we are proposing at Ashford and Ham Hill in Kent.</p>

# 1. Introduction and Background

## 1.1. Introduction

The requirements of the Industrial Emissions Directive (IED) were transposed into the Environmental Permitting Regulations (EPR) in 2013. These regulations take an integrated approach to controlling pollution to air, water and land (mainly through physical containment solutions but also enhanced monitoring, upskilling of operatives and improvement of procedures). It aims to prevent and reduce harmful emissions by ensuring industries operate under Best Available Techniques (BAT).

Since 2014 sewage sludge anaerobic digestion (AD) facilities have been operated under a holding position put in place by the Environment Agency (EA), as such treatment was deemed by the Water Industry to be covered by the Urban Wastewater Treatment Directive (UWWTD) and as such, exempt from the IED. The EA took legal counsel on this exclusion and in 2019 concluded that sewage sludge is considered a waste, and therefore AD facilities must be operated under an 'Installation' Permit and follow BAT guidance. We support the intentions of the IED, as defined in the EPR, in so far as they apply to the biological treatment of sewage sludge.

We note Ofwat has deemed that "*The Industrial Emissions Directive (IED) is not a new obligation. We expect companies to meet existing obligations within the 2020-25 period.*" (Final Methodology - 13th December 2022)". However, this does not align with previous findings by the CMA in relation to appeals in respect of IED enhancement funding (see below). Due to changes in guidance and the approach being taken in assessing permit applications, the scope and scale of the improvements required to comply with permit conditions has changed beyond what was previously considered necessary at PR19 and further investment is required.

Additionally, as this investment is required to comply with changes to legislation, these costs will not be adequately covered in BOTEX allowances.

## 1.2. Background information

In April 2019 at an EA / Water Industry Strategic Steering Group meeting, the EA informed the sector of their intent to require permits for the biological treatment of sewage sludge above the relevant IED thresholds. This position was officially confirmed in writing in July 2019, and this took place after our draft PR19 Business Plans were submitted. Had this been included earlier in the PR19 process it would likely have been incorporated through funding routes such as the Water Industry National Environmental Programme (WINEP) due to the nature that this was a new regulatory driver.

Given the late notification, the industry – including Southern Water – was unable to fully assess the implications of complying with IED requirements and include adequate funding in their Business Plans. However, as IED was understood to be only an administrative exercise at the time, focused on improving specific procedures and developing operators skills, we only made a small provision (£500k) in our PR19 Business Plan for funds mainly to cover the permit application process. We also understood that some minor improvement conditions may apply and considered that these could be accommodated within the allowed capital maintenance programme; potentially some provision within digesters maintenance and inspection programme and some within routine replacement of existing assets. However, the full scope and scale of improvements required only became clear once we had commenced the permit application process for our anaerobic digestion activities. As an example - to date - the permitting process has increased in cost to c. £2.2m due to the need to undertake additional surveys (drainage and topographical) to design containment

solutions to meet requirements of CIRIA C736 and mobilisation of design/costing team in order to move forward with significant capital schemes.

Following final business plan approvals for PR19, two water companies included IED funding in their appeal of the final PR19 decision to the Competition and Market Authorities (CMA) and were successful, with the result that IED funding was included as an Enhancement Case (EC). The CMA<sup>1</sup> in awarding these allowances also concluded that the EA process for assessing IED requirements was not fully developed, and accurate evaluation of the requirements would be unlikely to have been possible earlier in the business planning process and unlikely to be possible until each site had been fully assessed and the permit application process underway.

Final EA guidance on Environment Agency 'Biological waste treatment: appropriate measures for permitted facilities' guidance (known as 'Appropriate Measures') was published late in 2022 and as a result the EA has started to visit sites and review our submissions for achieving compliance.

Given the challenges and uncertainties in applying BAT guidance to existing assets, the significantly increased scale of activity required to deliver the improvement conditions and the timescales for doing so, this investment will require delivery in AMP8. This investment is not regular capital maintenance nor growth and therefore not modelled in the BOTEX mechanism.

**Table 2: Links to Data Table Lines**

Links to data table lines		
Enhancement	Table	Line
Industrial Emissions Directive	Regulated Delivery: CWW3	Regulated Delivery (AMP7 & 8): CWW3.146 (CapEx): £117.99m CWW3.147 (OpEx) : £2.53m CWW3.148 (TOTEX): £120.52m
	Alternative Delivery: SUP12	Alternative Delivery: SUP12 (TOTEX): £17.83m

## 2. Needs Case for Enhancement

### 2.1. Overall Investment Drivers – why are we doing this work?

This enhancement investment is necessary to successfully obtain permits and attain compliance to operate our 16 sludge treatment facilities as the EA will not permit any plant which does not meet BAT<sup>2</sup>.

The Industrial Emissions Directive has been implemented in England and Wales by the Environmental Permitting (England and Wales) (Amendment) Regulations 2013 which requires an environmental permit to operate the following activities as an installation:

*‘Section 5.4 - Disposal, recovery or a mix of disposal and recovery of non-hazardous waste  
Part A1: b. Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving one or more of the following activities, and excluding activities covered by Council Directive 91/271/EEC— biological treatment;’*

As the treatment activity at our Sludge Treatment Centres (STCs) is anaerobic digestion (AD), the 100 tonnes per day capacity threshold applies whether the activity is disposal, recovery or a mix of recovery and disposal. The regulations imposed a deadline for all permit conditions to be completed by August 2022 which has since passed. Pending approval from the EA, we are proposing to focus during AMP7 on mitigating higher risk items such as emissions to air whilst moving more significant capital solutions (e.g. containment, permeability of grounds) – which we also consider lower risk items - to AMP8. This document includes all cost for IED (incl. relevant AMP7 solutions) – as described in Table 5.

The regulations require that all technical measures taken to prevent pollution from the permitted activities are based upon Best Available Technique - details of what constitutes indicative BAT are to be found within BAT Reference Documents (BREFs), produced by the European Commission. In England and Wales, the Environment Agency has produced a series of sector technical guidance documents based on the relevant BREF for that sector. Applications for an environmental permit to operate as an installation must demonstrate that the facility can comply with and operate to BAT.

BAT guidelines are often open to interpretation, especially for existing installations as they are predominantly focused on new facilities. For example, a strict interpretation of BAT could require the complete replacement of key assets (e.g., tanks if they were identified as a potential emission source). However, an equivalent level of protection can be afforded through a risk-based approach utilising enhanced inspection and improved monitoring.

This issue was identified by the EA when they informed the Water Industry of their intent in 2019: *“We recognise that many sludge treatment facilities were constructed prior to the current permitting requirements and their design may not be compatible with the best available techniques as described in the EU BAT reference documents. Where this is the case, risk assessments can be used to demonstrate that an equivalent level of environmental protection is being or can be achieved. Where additional measures are required, we will use improvement conditions within permits to allow time to achieve the BAT standard”<sup>3</sup>*

In September 2022, the EA published their guidance on ‘Biological waste treatment: appropriate measures for permitted facilities<sup>4</sup>’, which has added further uncertainty as this document appears to move away from a risk-based approach to a more stringent view of BAT. Recent discussions with local EA have clarified that most of the compliance work will need to focus on secondary and tertiary containment, covering of sludge

tanks, covering of cake storage facilities, abatement of CHP emissions and significant improvement of our inspection and monitoring capability.

## 2.2. Evidence to support the proposed intervention

This intervention is required because the expectations from the EA regarding IED requirements compliance and subsequent scope have significantly increased since the last Price Review. Therefore, cost and burden of these changes could not be adequately estimated and taken into account in the funding for PR19. The scale and timing of the investment is therefore appropriate. By way of background, initially, there was a challenge to the IED applying to sludge treatment due to exclusion clauses in the Urban Wastewater Treatment Directive (UWWTD). The EA deferred their decision of the applicability of IED to sludge treatment while legal counsel was sought. Given this deferral, no financial impact assessment or consultation of the impacts on the water industry were undertaken.

In February 2019, the EA informed the Water Industry that their operation was not excluded from the requirements of IED and formally notified us in July 2019 that AD sites would require permitting under EPR with full compliance by August 2022. At that stage compliance with the anticipated implementation of IED under EPR was expected by the EA to be predominantly a paperwork exercise. As a result, the scope, cost and burden of the now required changes were not representative of the costs submitted in the PR19 Business Plan.

The EA have countered that because the IED was transposed into law in 2011, water companies should have been preparing for IED, as the interim deferral statement was only in place while the legal review was undertaken. However, there was no clear timetable for this review and full definition/understanding of the requirement by either party nor were the potential changes in approach of application of BAT known at that time hence companies were unable to ascertain what and when to include the costings in their business plans.

Ofwat has stated in their PR24 methodology “*The Industrial Emissions Directive (IED) is not a new obligation. We expect companies to meet existing obligations within the 2020-25 period*”, this does not align with previous findings by the CMA in relation to appeals in respect of IED enhancement funding (see below).. As previously stated, we were unable to fully assess the required costs due to the late notification and changing guidance, especially considering the release of Appropriate Measures Guidance in 2022 which has further increased the requirement to meet permit compliance.

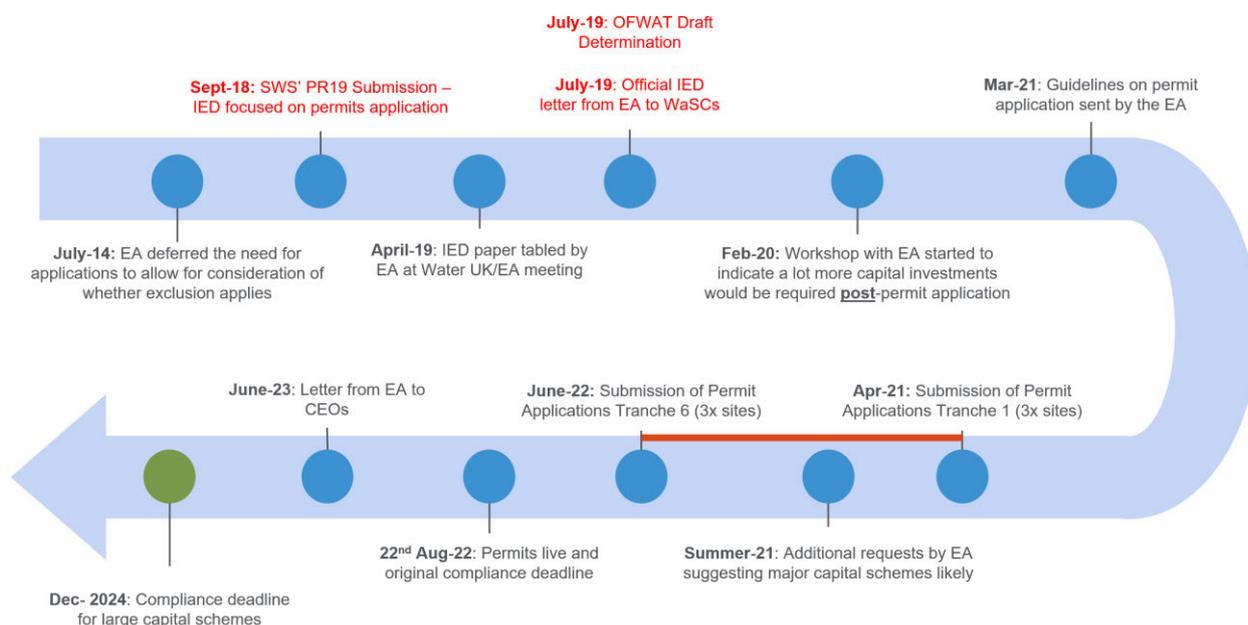
Furthermore, Ofwat has stated in their methodology around risk and return (Section 3.4, Page 23) “*we also recognise there are also situations where a 'bespoke uncertainty mechanism' could form part of an efficient and effective package of risk and return. For example, this could be the case where the costs for an item are uncertain at the time of the final determination and so have not been allowed for in the determination*”. It is our belief that at PR19 there was uncertainty around what investment would be needed for IED and therefore an allowance is now needed to address this.

The timeline in Figure 1: IED Timeline below further explains the historical complexity and uncertainties related to IED compliance:



Figure 1: IED Timeline

## IED - Timeline



- We submitted our Business Plans to Ofwat for PR19 in September 2018
- On 2<sup>nd</sup> April 2019, an EA paper was tabled at a meeting of the Water UK/EA Strategic Steering Group (SSG) of their intent to require permits for the biological treatment of sewage sludge above the IED thresholds (Appendix 1)
- On 9<sup>th</sup> July 2019, WaSCs received an official letter from the EA confirming the requirement to apply for permits. The deadline for compliance was August 2022. This was received a few months after our PR19 submission where only funding for permit application was included in our submission (Appendix 2)
- A low-cost and quick turn-around was expected by the EA, as they assumed compliance to be predominantly a paperwork exercise and could be accommodated in their normal permitting activity and unlikely to require significant investment as a risk-based approach to demonstrate environmental protection would be considered (Appendix 3)
- Ofwat Draft Determination was published in July 2019
- Subsequently, Northumbrian Water and Yorkshire Water were granted further IED funding through their challenge to the Competition and Markets Authority (CMA)<sup>1</sup>
- In February 2020, communication from the EA suggested more significant capital work would likely be required post-permit application (e.g., covering of tanks to minimise fugitive emissions, containment solutions to meet requirements of CIRIA C736)<sup>2</sup> (Appendix 4)
- The consultation draft technical guidance 'Appropriate Measures for the biological treatment of waste' was issued in July 2020<sup>2</sup>. This document defines the expectations on minimum standards for treatment (e.g AD) facilities
- In June 2021, communication from the EA set the expectation that major capital schemes would likely be required within AMP7 (Appendix 5)
- During the period April 2021 to June 2022, we submitted applications for 16 STC permits, but none were deemed to be 'duly made' by the Environment Agency.
- The official deadline for live permits and full IED compliance set as August 2022.

- Final 'Biological waste treatment: appropriate measures for permitted facilities' document was not issued until 21<sup>st</sup> September 2022<sup>3</sup>. The guidance moved away from a risk-based approach to a more stringent view of BAT
- In September 2022, communication from the EA indicated to companies verbally that they would give them until the end of 2024 to complete major capital schemes. This, however, would be agreed on a case-by-case basis. This has only been communicated in writing in the Ofwat Green Economic Recovery: Draft Decision<sup>4</sup>: "...from conversations with the Environment Agency we understand that the IED permits will be issued during the 2020-25 period, and investment to meet any improvement conditions within the permits will be required by the end of 2024, before the start of the 2025-30 period."
- Ofwat wrote in its PR24 Final Methodology<sup>5</sup> "The Industrial Emissions Directive (IED) is not a new obligation. We expect companies to meet existing obligations within the 2020-25 period." and that "Capital-intensive projects may need permission from other regulators and the Environment Agency will take this into account when considering improvement timescales." However, the EA will not use improvement conditions to address proposals not designed to BAT
- In November 2022, visits to some of our sites in Sussex and Hampshire were organised with local EA Installation Officers. These enabled us to better understand the local EA's view on key BAT requirements and to consider the potential for Local Enforcement Positions (LEP). However, it should also be noted that it was unclear if some of the local guidance were fully aligned with recent guidance from the National Permitting Team
- In June 2023, a letter from [REDACTED] (Director, Regulated Industry at the EA) was sent to all WaSCs CEOs mentioning most of the permit applications submitted by the industry were "deficient" and "lacking sufficient detail" which is the reason why - according to the agency - so few draft permits have been issued so far (2 draft permits issued at the time of the letter). As part of the letter, the EA also required each CEO to provide details on how each company were intending to bring their facilities to standard required and to commit to achieving full compliance with BAT by 31<sup>st</sup> of December 2024 whilst committing the appropriate resources and carry out a necessary work to do so – if necessary, in advance of the issue of the permit. Our answer to this letter reiterated our commitment to comply with relevant IED requirements. However, we requested the opportunity to discuss specific points further with the EA, especially on the following points:
  - as nothing specific was mentioned to us before, any issues with our environmental permit applications;
  - confirmation of the likely timescales involved in the Agency's determination of our permit applications;
  - a discussion about the funding issues, and exploration of whether our environmental permits can include bespoke permit conditions. This would give flexibility on some of the timescales involved, allowing for full IED compliance post 31 December 2024; and
  - how the Agency will support the PR24 Enhancement Case to obtain the required funding (this document)

As clearly demonstrated above, any opportunity for a risk-based approach that includes for a reasonable balance of risk and reward between customers, investors, and other stakeholders was removed by the EA. The expectation of the EA is that we now need to fully comply with BAT and Appropriate Measures and that any risk is fully mitigated. This clearly demonstrates a significant change of scope on the EA's approach to compliance with IED from 2019 onwards and the lack of funding as a result (from a cost estimation of £10m with information available in 2013 to the most recent value of £168.5m as part of this enhancement case). This in turn is affecting the timescales for delivery, pushing some elements to AMP8.

The schemes have associated expenditure of £138.4m (TOTEX in AMP8 - see section 4). This investment is material as it is greater than 6% of predicted modelled TOTEX allowance (£23m). The need does not overlap

[REDACTED]

nor duplicate any activities already funded at previous Price Reviews as the scope, cost and burden of the changes discussed above were not adequately estimated or allowed for in previous Price Review cycles.

The investment has been driven by factors outside of management control as although this was formally a new environmental requirement in 2019, its application was informed too late to be included in AMP7 WINEP proposals. Furthermore, these are new requirements associated with EA guidance which was only finalised in September 2022. This need has been clearly defined and timing of the investment is justified as it meets statutory requirements to operate a regulated facility with the necessary authorisation and compliance requirements under the EPR.

## 2.3. What is the outcome that we want to achieve?

Operating a regulated facility without the necessary authorisation is an offence under the EPR. We therefore want to:

- Successfully achieve permit determinations for our 16 sites and continue to operate these facilities whilst protecting the environment and human health
- Deliver the associated and agreed improvements necessary to achieve compliance, with adequate funding and within realistic timescales and under relevant permit conditions
- Ensure appropriate mechanisms to provide cost effective solutions for the overall Bioresources strategy, which specifically includes completing works at all 16 sites & delivering the Kent 'AAD consolidation' plans.
- This need has been clearly defined as part of our long-term Bioresources Strategy and this enhancement case is critical in enabling us to continue to use anaerobic digestion for sludge treatment and the continued recycling of biosolids bioresources to agricultural land.

Our customers want to see pollution stopped. This is made very clear in our [Customer Insight Technical Annex, Section 4.2 \(SRN14\)](#) as they raised this topic as a top priority. Making these improvements to our sludge treatment centres and by complying with the Industrial Emissions Directive and the new '*Biological waste treatment: appropriate measures for permitted facilities*' guidance and associated permit conditions, we will be achieving a higher level of environmental protection. In addition, regulatory compliance and future wastewater infrastructure is one of the top priorities areas that are important to our customers.

The successful implementation of the Industrial Emissions Directive will also enable us to reduce the risks of harmful emissions to air, more specifically Green House Gas emissions, which aligns with our pledge to achieve Net Zero Carbon by 2030. The combined actions of covering of tanks, cake storage areas and reducing combined heat & power (CHP) emissions (not included in this Enhancement) will significantly improve the emissions from our Bioresources operation.

The investment has been driven by factors outside of management control as, although this was formally a new environmental requirement in 2019, its application to sludge treatment was informed too late to be included in AMP7 WINEP proposals and in addition, there were no specific sludge drivers allowed for in PR19. Furthermore, these are new requirements associated with EA guidance which was only finalised in September 2022.

During the period April 2021 to June 2022, we submitted applications to the EA for 16 Sludge Treatment Centre IED permits in line with agreed target dates. As of the end of September 2023, three sites have been deemed as 'duly made' by the EA and the permit determinations are still pending.

This delay, both to the permitting process and in issuing final EA guidance, has meant that detailed design work cannot not be finalised, without significant risk of abortive work or re-work.

Some of the major capital work required (e.g., covering of sludge tanks) was submitted as part of the Bioresources WINEP as these offer a reduction in greenhouse gas (GHG) emissions associated with storage and helps mitigate landbank challenges by providing greater resilience and an enhanced product, whilst also addressing IED requirements. For these reasons we believed our proposal was consistent with WINEP requirements, but these have since been rejected by the EA on the basis that they do not fit the Bioresources WINEP drivers. As a result, they have been included into this Enhancement Case. In addition, other major capital items (e.g., containment walls, impermeability of soils) have been included as they are not modelled via the current BOTEX and growth econometric models due to their 'one-off' investment. As described above, this is driven by legislation that previously was not applied.

Given the anticipated scope and the timescale to achieve compliance with the EA's BAT requirements, it is not considered feasible to safely deliver the improvements needed within AMP7, therefore pushing delivery into AMP8. We suggest the best option would be for some elements of major capital work to be pushed beyond 2024 and into AMP8 via Local Enforcement Positions agreed at the discretion of local EA Installation Officers. These initial discussions with local EA Installation Officers have suggested that this could be possible although this has not been confirmed at National level within the EA.

As discussed further in sections 3 & 4 below, implementation of some solutions in AMP8 (e.g. lower risk items such as containment solutions) will allow us to align the IED business plan with our PR24 Bioresources plan. This includes the consolidation of 7 sites into 2 which will reduce costs to achieve compliance. Our plan also includes the conversion of our operation in that region to Advanced Anaerobic Digestion (AAD) which will reduce the fugitive emissions to air through improved digestion (see [Advanced Digestion Cost Adjustment Claim SRN21](#)). Our programme to enhance cake storage post-treatment in AMP8 will also ensure the assets installed will fully comply with IED & Appropriate Measures requirements.



### 3. Best Option for Customers

Compliance with IED relies on a variety of schemes. For some of them, a number of options have been considered in regard to specific scope.

The optioneering exercise followed our standard Risk and Value approach, described in [Part A of the Optioneering and Costing Methodology Technical Annex \(SRN15\)](#), adapted to PR24 process & timescales. This involved stakeholder engagement including Southern Water experts, operations personnel, solution design personnel, environmental permitting personnel and asset management leadership to produce a long list of potential solutions. This list was created through workshops to ensure a wide range of unconstrained project options, built off traditional and non-traditional approaches to capture all potential solutions. We challenged ourselves to bring in a wide array of options using our engineering knowledge, delivery experience, operations team’s local knowledge and our customer feedback to ensure that all potential options are considered. These were then reviewed for feasibility and affordability to obtain a short-list of solutions which were then investigated, costed and benchmarked to constrain the short-list to Lowest Cost and Best Value options, presented here.

One of the options assessed the potential beneficial impact of linking IED compliance work with our medium to long-term Bioresources strategy which includes the rationalisation of sites in Kent in AMP8 from 7 to 2. This rationalisation is fully detailed in our [Cost Adjustment Claim for Advanced Digestion \(SRN21\)](#) in Kent, as well as our [Bioresources Strategy Technical Annex document \(SRN36\)](#).

The optioneering and selection of the preferred solutions to comply with IED and secure EPR permits, specifically adhering to the EA’s guidance whilst ensuring best possible outcomes for our customers, are outlined in Table 3, this included:

- Rationalisation of sites to reduce compliance risk. The adoption of Advanced Anaerobic Digestion at two rationalised sites (part of a separate [Cost Adjustment Claim \(CAC\) SRN21 Advanced Digestion](#)) which also provides associated benefits for improved compliance with IED requirements
- Provision of appropriate containment solutions
- Covering of storage tanks
- Tank Inspections and leak detection

**Table 3: Options to Meet Identified Need**

#	Scope Element	Option	Decision	Overview
1	All	Do Nothing	Discounted	Clear differences in current infrastructure and required solutions exist. “Do Nothing” would mean non-compliance with IED and Appropriate Measures requirements likely leading to enforcement action by EA.
2	Strategy	Carry on operating the same number of sludge treatment centres with current AD process	Discounted	Significant costs for all 16 sludge treatment centres.
		Rationalisation of a number of IED AD sludge centres and adoption of Advanced Anaerobic Digestion at specific sites	Adopted	The consolidation of sites in the Kent area (as part of our Bioresources strategy) offers opportunities in the number of sites requiring investment whilst also improving operational resilience. Advanced digestion improves the quality of the Biosolids produced whilst also addressing concerns around fugitive emissions. The new facilities would be constructed to BAT standards.

#	Scope Element	Option	Decision	Overview
3	Containment areas	Risk assessment (no hard engineered solutions)	Discounted	Site risk assessments against Construction Industry Research and Information Association report 'Containment systems for the prevention of pollution' (CIRIA C736) classification identifies high level of protection required (class 2/3). Further risk assessment is not thought to align to the EA expected solutions and feedback on other WaSC permits strongly imply hard engineering solutions will be required for our sites.
		Selection of containment solution	Progress and review	Evaluation of appropriate impermeable surface options and containment walls to identify the most suitable solution (cost, carbon, asset life, operational impact, safety) vs a baseline assumption of concrete. The bund volume allowances (above the 25% & 110% calculations) will be reviewed with respect to rainfall in line with the site response plan, tank failure modes regarding freeboard, and firewater with respect to the products not being flammable.
		Impermeable soil below liner	Progress and review	CIRIA requirement for Class 2/3, it was not initially considered for retrospective applications, but it is thought to be required by the EA as part of BAT requirements.
4	Sludge storage covering	Covering of tanks and lagoons	Progress Extent is subject to survey	Tank covers are required to reduce fugitive emissions. The specific tank need will be based on testing outcomes (does the product emit). Improvement work to existing tank covers may be required to address existing issues.
5	Under-tank leak detection	Replace all storage assets with compliant versions	Discounted	To meet CIRIA <u>fully</u> all storage assets could be replaced with new. This is operationally very hard to do in any reasonable timeframe (redundancy/resilience) and would incur significant costs and carbon footprint (embedded). However, any new assets built as part of planned replacement programme or enhancement will be built to relevant standards.
		Inspect and risk assess	Progress	Solution based on primary containment (tank) inspections and risk assessment. Retrofit of leak detection to some tanks where practical (typically smaller steel tanks) but majority of tanks are not thought suitable, nor solutions effective (e.g., piled &/ concrete tanks). When tanks reach end of life they will be replaced with BAT-compliant versions.
6	Underground pipework	Remove & replace with above ground	Discounted	Underground pipework is not BAT compliant in that there is no leak detection/secondary containment. Replace all existing with new above ground pipework. Remains a risk but initial EA guidance interpreted as aligning. However, any new assets built as part of planned replacement programme or enhancement will be built to relevant standards. <i>Note: above-ground pipework will be provided with containment.</i>

#	Scope Element	Option	Decision	Overview
		Inspection/testing No new underground pipework	Progress	Undertake non-destructive testing and pressure testing to determine pipe condition Complete remedial actions as identified. Determine remaining asset life and, if expired/requires replacing wholesale, replace with aboveground. Replace with aboveground pipework as future projects needs identify/impact related system.
7	Other scope required to meet BAT	Completion of all other works to meet BAT	Progress	Based on current understanding of scope/ EA requirements. All other scope covers a multitude of scope items and BAT measures. There are typically limited options for each, and the intent is to fully meet the BAT. Complexities with individual solutions are thought likely to emerge from detailed design or operational review. Some elements may require detailed discussions with the EA, but an acceptable solution is anticipated to be found.  Non-exhaustive examples: methodology for sampling, combined pressure vacuum release, valve monitoring

Whole Life Cost Analysis were carried out for a number of elements of our scope to ensure the most cost-effective compliant solutions were selected (Table 4).

**Table 4: Whole Life Cost Analysis**

Scope Element	Option	CapEx (Direct - £m)	OpEx (£k/y)	WLC (Across 30 years - £m)
Rationalisation in Kent (IED elements)	Carry on operating 7 sites	[REDACTED]	[REDACTED]	[REDACTED]
	Rationalise to 2 sites			
Containment solutions (Impermeable solutions – example of 1,000m <sup>2</sup> )	Concrete Slab			
	Bentonite Matting			
	Concrete Canvas			
Under-tank leak detection (example of one 2,000m <sup>3</sup> tank used to demonstrate order of magnitude. 5 yearly inspection)	Replace tank with compliant solution			
	Inspection to demonstrate integrity			
Underground pipework (very variable, example for ~100m as comparison)	Wholesale remove and replace with above ground			
	Inspection, testing & minor repair			

As per Table 3 & Table 4, the preferred options are therefore as follows:

- Rationalise of operational AD sites in Kent from 7 to 2 (part of a [Cost Adjustment Claim SRN21](#) separate to this Enhancement). 5 sites will cease their AD operation and will be converted to raw dewatering. To this effect, IED will no longer apply and Appropriate Measures guidelines will only



apply to a smaller number of assets. This will reduce operational and capital costs as demonstrated in Table 4 above.

The conversion of Conventional AD to Advanced AD at two sites will help further address fugitive emissions as Advanced AD doesn't need secondary digesters (covering), requires less digestion capacity (fewer tanks), has better overall gas containment and more stable biosolids at the back end of the process, resulting in less stack emissions

- Make improvements to containment of sludge assets by fully meeting the requirements stipulated in the EA's Appropriate Measures guidance which implements BAT to a standard which will comply with legislative requirements to protect the environment and health
- Covering of sludge tanks in order to reduce carbon emissions to atmosphere, especially Green House Gas emissions, and resulting detrimental impact to the environment
- Underground assets (incl. leak detection) to be assessed and surveyed and replaced on a risk basis. This would provide additional assurance against any loss of containment (e.g. digestate) entering groundwater and adjacent water courses.

We believe the options progressed above will ensure full compliance of our 16 sites with IED & Appropriate Measures in order to secure successful permit applications. A complete Risk & Value (which includes review of need and cost benefit analysis of the different options available to select the best solutions to address the need and for our customers) process will be used to progress all preferred options and will include non-financial capital appraisals (carbon/natural capital evaluation/social capital opportunities). This will also ensure that – when installing new assets - our approach to preventing any types of pollutions from our Bioresources operation is embedded early on at optioneering and design phase.

Even though IED or Appropriate Measures are not mentioned in Ofwat PR24 and beyond final guidance document, it does call for “wider considerations around technological development” and suggests the use of “emissions-reducing technologies”. Whilst our Net Zero Carbon roadmap will include schemes aiming at reducing emissions - particularly GHGs – across our complete operation, we will ensure these will be managed jointly.

Carbon is considered an important factor, particularly in relation to the potential additional embodied carbon from civil works. As mentioned previously, this will form part of the detailed evaluation of solutions and it will be minimised as far as practicable, whilst meeting the performance specifications.

Should significant risks such as the landbank challenge (as described further in our [SRN36 Technical Annex on Bioresources Strategy](#)) materialise and forces our Bioresources strategy to adapt and adopt new concepts such as thermal destruction, the options put forward in this document would still be relevant as anaerobic digestion operation (and most assets currently in operation) is still likely to be retained.

An initial natural capital evaluation has identified the land required within the existing STCs is not of significant value and design development will determine further opportunities for minimising impact on the habitats impacted. There will be some impact from the enhancement work with respect to grassed areas, shrubs and trees which will be evaluated and offset in line with existing processes.

Social capital opportunities include our commitment to implementing further measures to protect the environment and the communities we serve. Wider company social capital programmes will be applicable to the execution of the project and opportunities sought to contribute to the overall community benefit of the completion of the scope.

Customer surveys show that our customers are supportive of our strategy to enhance our current operation to mitigate risks. One of the top customer priorities (as per Customer Insight [Technical Annex section 4.2 – SRN14](#)) is protecting the environment and the implementation of IED and the solutions agreed above will

significantly contribute to this. For residents local to our sites the bioaerosol and odour management elements of IED scope will reduce the instances of our operational activities impacting their lives. In addition, regulatory compliance and future wastewater infrastructure is one of the top priorities areas that are important to our customers.

We believe the options selected are appropriate to the size and complexity of the risks and issues to be addressed and therefore the best for our customers. In some instances, alternative solutions to the more drastic “asset replacement” option were sought, to reduce the capital costs required and the amount of operational and embodied carbon this scheme is likely to generate.

In addition to the solutions described above, we are also improving elements of our base expenditure to support the IED compliance work. For example, as shown in IED Appendix A sent to Ofwat in August 2023, we are making the delivery of our digesters maintenance & inspection programme more efficient in AMP7 and will continue in AMP8. We are implementing a more integrated and strategic asset priority list, based on level of risk, age and performance of the asset. This coupled with a wider range of options of delivery teams as well as innovative solutions such as drone technology for external surveys (instead of scaffolding), will reduce down-time, costs and enable us to ramp-up our inspection programme from 2 digesters a year to 5.



## 4. Cost Efficiency

In July 2013 (pre-PR14), we commissioned [REDACTED] to review (Appendix 6) relevant BAT requirements at the time (i.e., prior to publication of the BREF for waste treatment in 2018) and potential associated costs. The aim of the exercise was to obtain an early view of what type of changes would be required, should compliance with IED for sludge assets materialise in future. At the time, the understanding of the future requirements was significantly different than those that have subsequently materialised and suggested a high-level cost of £627k per operational site (£10.0m for our 16 sludge treatment centres). The 2019 confirmation from the EA that permits would be necessary for AD installations, meant the [REDACTED] report could not be re-commissioned to re-evaluate relevant scope and costing on time for our PR19 submission, based on more updated information. As the EA expected a low-cost (e.g. no major capital investment) and quick-turn around set of solutions to be put in place at the time, we assumed the requirements set in the 2013 [REDACTED] report could be absorbed within the Bioresources BOTEX allowance and existing Capital Maintenance programme.

Our more recent internal assessment based on updated guidance post-PR19 (e.g. CIRIA, Appropriate Measures guidance) and discussion with EA local officers at site level has now identified CapEx costs at £135.5m (£8.4m per site on average – min: £3.2m, max: £19.0m) as summarised in Table 8 below.

Our standard enhancement solution costing approach, described in [Part B of the Optioneering and Costing Methodology Technical Annex \(SRN15\)](#) was followed to estimate the costs of the selected options. This approach involves pricing solutions based on the best available information for the expected scope and the cost of that scope. The level of design development completed determines the granularity of scope that is available and therefore the specific costing approach to use. Costs are predicted using our libraries of standardised and regularly updated cost models developed from historical cost data augmented with industry information where required. These cost libraries are benchmarked internally and externally by our Cost Intelligence Team to understand relative cost efficiency.

Initial costing (without opportunities) is summarised in Table 5 below (as direct costs). Opportunities and efficiencies (summarised in Table 7 below) are then removed from these direct costs before a cost multiplier is applied to it to calculate the final (total) capital cost of this enhancement.

**Table 5: High-level costing of solutions (Direct cost)**

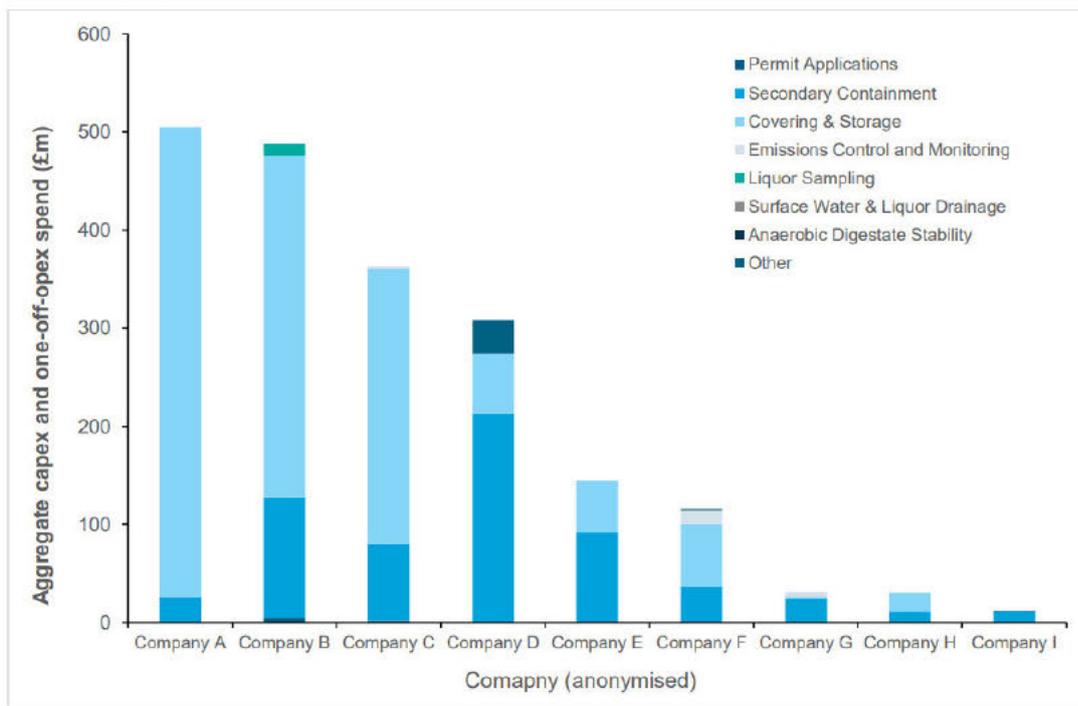
Item	Costs (£m)
<b>Secondary Containment</b>	[REDACTED]
Walls	
Impermeable surface	
Others (e.g. drainage modifications/sump/pumping, local pipework modifications allowance, earthworks, access & egress, pit and duct/services solutions)	
<b>Tanks Covering &amp; Abatement of fugitive emissions</b>	
Enhancement Tanks Covering & Abatement	
CHP abatement (Base)	
<b>Cake pad/Cake Storage Covering</b>	
<b>Control &amp; Monitoring</b>	
<b>Liquors Sampling</b>	

Item	Costs (£m)
Other	[REDACTED]
Loading/Receipt points	
Tank replacement	
Major capital design & surveys	
Underground pipework testing	
Other (protection measures, security, fuel/poly/chemicals improvements, scope in support of the above but not directly attributable to one category)	
<b>IED Total Direct Costs</b>	<b>132.1</b>

High-level benchmarking against other companies was made possible through the independent report on IED commissioned by WaterUK in May 2023 and produced by Atkins (Appendix 7), also issued to EA and Ofwat. Relevant information on costing and scope were sent to Atkins who collated and presented it in an anonymised way. The report is to provide an impartial technical supporting view to this industry challenge. The intention of this report is to support discussions between the industry, the EA and Ofwat, to establish and agree a collaborative way forward which delivers IED compliance in a consistent manner, with funding appropriately apportioned across AMP7 and future AMPs.

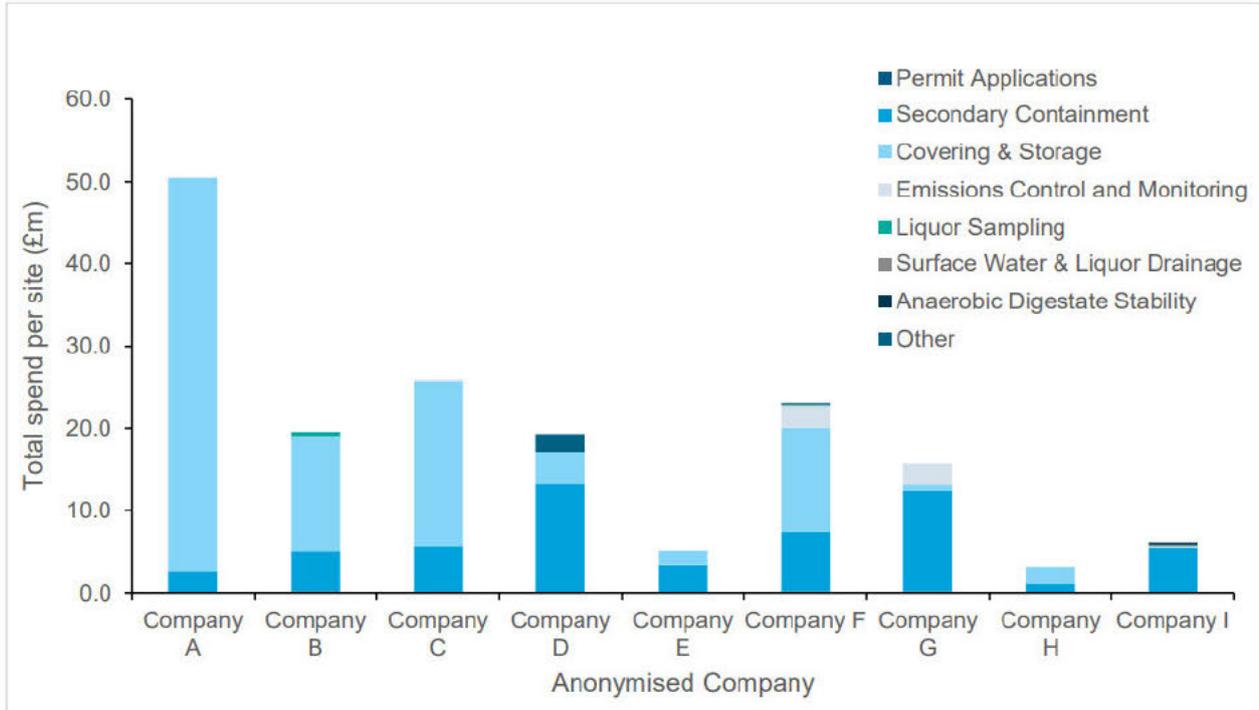
Figure 2 below – extracted from the report - shows the total expected expenditure to comply with IED requirements and Appropriate Measure guidelines. Throughout the report, Southern Water is anonymised [REDACTED] out of 9 by order of total cost. The costs sent to Atkins at the time included a cost multiplier (which includes risk and overhead) of x2.22 ([REDACTED] total costs).

**Figure 2: Aggregate one-off spend by anonymised company (Atkins, 2023)**



Because costing for IED and Appropriate Measures depend significantly on the number of sites to be considered, Figure 3 below shows the expected average cost for the same companies per site. Once again, we (██████████) are within the industry average.

**Figure 3: Total one-off spend per site by anonymised company (Atkins, 2023)**



We acknowledge that secondary containment is the largest component of our IED programme, with new walls and impermeable slabs being the main elements. We have not been able to identify suitable benchmarks at function level for the IED programme so we have sought to break this down into some more comparable component parts where we can demonstrate efficiency. We have taken unit rates for these items, based on 300mm thick reinforced concrete water retaining specification to allow some comparison with industry averages which we have sourced from our Cost Intelligence Team database of industry cost rates. The costs shown are Net Direct Works, before indirect costs, risk and overhead are added. The output of this analysis is shown in Table 6 below.

**Table 6 High level comparison of unit rates (direct costs)**

Secondary Containment Component (all walls slabs assumed to be 300mm thick reinforced concrete)	SWS IED Unit Costs (£)	Industry Unit Costs (£)	Delta	Variance	Comments
Reinforced concrete slab unit rate (m <sup>2</sup> )	██████████	██████████	6.88	2%	
Walls unit rate 1.5m high (m)	██████████	██████████	- 32.04	-2%	
Walls unit rate 2m high (m)	██████████	██████████	25.40	1%	
Earthbund wall (m)	██████████	██████████	363.45	44%	44% variance for Earthbund is due to our reference scheme having

					limited access and working space over varying ground levels.
Impermeable surface unit rate (m2)	██████	██████	- 18.59	- 15%	Our unit rate is influenced by the scale of some of our recent projects where we installed 1,000m <sup>2</sup> . The industry average data point represents a 33m <sup>2</sup> installation.

We recognise that the walls, bunds and impermeable slabs are bespoke to each site condition, including a combination of hard structures and earth bunds to meet the specific containment requirements. This shows that we are comparable with respect to reinforced concrete slabs and walls, but that there are wider differences when looking at earth bunds and alternative impermeable surface solutions. We have concluded that there are economies of scale, based on our unit rates comparison, for items such as slabs and impermeable surfaces but that the complexities involved in our walls and earth bund structures will mean that every site has a bespoke solution.

Taking a unit rate approach is not wholly representative of our high-level IED programme, but it allows a comparison that excludes all of the additional temporary works and operational factors that complicate like-for-like benchmarking. These factors are discussed in more detail below.

- All of the secondary containment structures need to be to a water retaining specification. This has implications for construction joints where joining new assets on to existing structures, or on to one another. Modular construction opportunities will be limited.
- All of the sites need to be kept operational for the duration of construction, and existing assets cannot be shut down. This requires bespoke site plans, temporary works and enabling works.
- Solutions need to accommodate existing site topography. Additionally, the CIRIA guidance requires us to install an impermeable soil layer beneath the new impermeable surface which has additional labour and materials costs.
- We are looking at alternative methods to achieve the same results using more cost-efficient measures. An example would be the use of concrete canvas in place of traditional reinforced concrete slabs (see below).
- Each site may have multiple types of impermeable surface depending on the situation.
- Subbase requirements will be site specific, depending on existing conditions.

We continue to evaluate designs as they develop to ensure the solutions provide the best value whilst meeting the requirements. This will primarily be achieved through our internal risk and value process where evaluation of natural capital and carbon are also important criteria of solution evaluation.

A number of efficiencies have been highlighted and incorporated into the final costings. These are summarised in Table 7 and below:

- The requirements related to digested cake operation have been merged into the [WINEP Enhancement Case for Bioresources Cake Storage \(SRN43\)](#). Any changes related to IED requirements will be applied and managed as part of this scheme. This avoids duplication of enabling costs and corporate overheads that would be incurred if we were to break these costs out in the IED programme.
- The abatement required on a number of our Combined Heat and Power engines has been included into our AMP7 CHP replacement scheme. This avoids duplication of enabling costs and corporate overheads that would be incurred if we were to break these costs out in the IED programme
- As mentioned previously, the consolidation of our sludge treatment centres in Kent in AMP8 provides an opportunity for cost efficiencies by reducing the compliance requirements to IED (and therefore cost to customers) at a number of sites. The consolidation from 7 to 2 STCs will see 5 sites ceasing



AD operation and will therefore not fall under IED. The resulting raw cake production sites will still be subject to Appropriate Measures guidelines, but these will apply to significantly fewer assets. This opportunity remains subject to EA acceptance on phasing and timing

- The cost of the solution developed in our costing in Table 5 for impermeable surfaces (concrete slabs) is significant. There is an opportunity for us to use alternative and cheaper solutions to be brought forward such as concrete canvas. This option (which offers similar protection to concrete slab) is easier to implement and will result in less embodied carbon. However, we have not yet confirmed this approach is acceptable for the Environment Agency so very much see this as a risk at present.

Finally, we added indirect costs and overheads of [REDACTED] x of direct costs, which is based on the design maturity and complexity of the schemes underpinned by an analysis of historical data benchmarked against industry comparators. Description of the tool used and rationale is available in the [Cost & Option Methodology Technical Annex \(SRN15\)](#).

**Table 7 Opportunity Costing**

Opportunity Costing	Type of costs	Cost Source	IED (£m)
<b>Initial Direct Costing</b>	Direct	SWS internal cost curves	[REDACTED]
Cake Covering (under WINEP)	Direct	SWS	
CHP abatement (under existing project (Base cost))	Direct	SWS	
Bioresources Strategy Kent AAD Consolidation (under Cost Adjustment Claim)	Direct	SWS	
Alternative impermeable surfaces material	Direct	SWS	
<b>Final Direct Costing</b>	Direct	SWS	
<b>Total Costs (incl. Indirect)</b>	<b>Total</b>	<b>SWS</b>	<b>135.5</b>

Table 8 describes in more detail the final total costs per category used by Ofwat in Annex A requested in August 2023. It also includes the relevant Cost Drivers.

**Table 8: Total costs per category and relevant cost drivers**

Item	Costs (£m)	Cost Driver
<b><u>Secondary Containment</u></b>	[REDACTED]	181,938m <sup>3</sup> of sludge tanks to be contained
Walls		9,335m of bund walls
Impermeable surface		40,875m <sup>2</sup> of impermeable surfaces
Others		
<b><u>Tanks Covering &amp; Abatement of fugitive emissions</u></b>	[REDACTED]	
Tanks Covering		625m <sup>2</sup> of sludge tanks cover

Item	Costs (£m)	Cost Driver	
<u>Control &amp; Monitoring</u>	[REDACTED]	<u>incl. 131 monitors</u>	
<u>Liquors Sampling</u>			
<u>Other</u>			
Loading/Receipt points			
Tank replacement			
Major capital design & surveys			
Underground pipework testing			
Other			
<b>IED Total Costs</b>			

In addition to the CapEx costs developed above, we are expecting to spend an additional total OpEx of £2.9m across our 16 sites in AMP8. The main activities included in this enhancement OpEx are documents updates, maintenance of secondary containment and new equipment, fluids and gases additional testing/sampling, IT/software upgrade and calibration of additional meters.

Different delivery mechanisms will also be explored in more detail in the ‘Market Analysis’ section of our [Bioresources Strategy Technical Annex \(SRN36\)](#). This includes the consideration of grouping of similar schemes, project procurement strategies, interfaces with other projects on a given site and how these may provide benefits through combined Bioresources and WWN+ project delivery. Potential economies of scale in centralised material procurement will also be looked at.

The investment has been driven by factors outside of management control as although this was formally a new environmental requirement in 2019, its application to sewage sludge was informed too late to be included in AMP7 WINEP proposals. Furthermore, these are new requirements associated with EA guidance which was only finalised in September 2022. This need has been clearly defined as part of our long-term Bioresources Strategy and the scale and timing of the investment is justified as it meets statutory requirements to operate a regulated facility with the necessary authorisation and compliance requirements under the EPR.

In line with the standard approach, some aspects of uncertainty are managed through the use of our costing team established cost curves and the risk element of the indirect cost multiplier. However, because of the significant uncertainty surrounding some of our assumptions, we are proposing to create an uncertainty mechanism in relation to IED (summarised in Table 9) which equals to a total of £247m (total cost). Further information can be found in our [Uncertainty Mechanisms Technical Annex \(SRN58\)](#).

- The opportunity related to the consolidation of our sites in Kent and highlighted in Table 7 is still to be approved by the EA. Whilst we are proposing to carry on work on the site where biological treatment will cease in AMP8, our plans would mainly focus on assets which will carry on being operated post-AMP8, in order to reduce costs. Whilst this opportunity has been discussed with local officers in our Kent region, there has been no formal feedback from the EA. As sites solutions are reviewed by the EA following the issuing of draft permit, we expect to get a better understanding of what could be achieved. If the EA were to dismiss our pragmatic approach, we would require an additional £25.6m (as direct cost, or £54.1m total cost equivalent)
- The opportunity highlighted in Table 7 regarding the use of an alternative solution for impermeable surfaces has not yet been formally discussed with the EA. Whilst it is not listed in CIRIA documentation, we have found case studies where this solution has been approved by the EA when [REDACTED]



used for bunding. If the EA were to dismiss this solution, we would require an additional £11.2m (as direct cost, or £23.7m total cost equivalent)

- There is also an added risk related to the "Biological waste treatment: appropriate measures for permitted facilities" guidance the EA published in September 2022. Our case includes the needs from the Appropriate Measures guidance but only for our IED sites. 15 of our sites operating physio-chemical activities (such as dewatering of raw sludge) are currently operating under T21 exemptions and are therefore not falling under Appropriate Measures guidance. Whilst this hasn't materialised yet, we believe the EA intends to amend the T21 exemption via the Environmental Permitting Regulations but are unclear on timescales or if this will affect our need to comply with Appropriate Measures or not. We are currently estimating that an additional £80m (as direct cost, or £169.2m as total cost) will be required to get these 15 sites compliant with Appropriate Measures guidance.

**Table 9: Summary of uncertainty mechanism**

	Value in the business plan	Estimated value of uncertainty	Price Control affected	Date of uncertainty determined
Timing for Kent consolidation	-	£25.6m (Direct cost)	Bioresources	2024
Alternative solution for impermeable surfaces	£30.4m (Direct cost)	£11.2m (Direct cost)	Bioresources	2024
Appropriate Measure and T21 exemption sites	-	£80m (Direct cost)	Bioresources	2025

## 5. Alternative Delivery

Elements of this scheme have been identified as suitable for a delivery route including third party financing – through an alternative delivery mechanism. £17.8m of TOTEX will be delivered through Alternative delivery (Ashford & Ham Hill sites) as the work would be delivered synergistically with the main Kent Advanced Anaerobic Digestion work (as described in our [Cost Adjustment Claim for Advanced Digestion – SRN21](#)). The proposed alternative delivery model is set out in the Ham Hill & Ashford business case for alternative financing, including the delivery schedule, tender and commercial models and the associated development costs (as detailed in [SRN17: Direct Procurement for Customers and Alternative Delivery](#)). The remaining £120.6m TOTEX will be delivered through normal delivery.

## 6. Customer Protection

Customers expect a proportionate response to the IED compliance, and we will ensure a responsible and efficient use of capital. To this effect, investment will seek to ensure appropriate solutions with respect to the guidance provided so far to meet the intent of IED. The selection of these options protects customers from the risk of abortive spend by pushing the investment to AMP8 to allow for certainty of EA guidance and the ‘reasonable time’ to develop and deliver solutions (in line with requirements under Construction Design and Maintenance Regulations, whilst also assessing the best solution with respect to the customer outcome). This spend also aligns with our long-term adaptive strategy which aims at ensuring a resilient and efficient operational basis.

There are secondary benefits for our customers associated with potential reduction in odour and fugitive emissions and the benefit of consolidation of our STC will reduce costs to our customers. These improvements to meet IED will still be required, even if we added ‘bolt-on’ treatment processes as these would be classed, at the very least, as ‘Directly Associated Activities’ and adherence to Appropriate Measures would still be necessary.

However, in order to protect our customers in case of non or late delivery, we are proposing a scheme specific price control deliverable (PCD) based on the number of sites completed. Where the schemes do not progress or do not manage to build agreed scope, the costs will be returned to our customers.

A mechanism to share ‘pain and gain’ with customers is considered inappropriate in terms of compliance with IED regulations and has therefore not been included.

In the unlikely event of non-delivery of site, costs will be returned to customers at the rate of £0.0014k per % of non-completion.

An assurance exercise will be completed ahead of AMP9 to assess the completion dates of both schemes.

The details of the PCD are set out in Table 10 below:

**Table 10: PCD Summary**

Component	Output based on Capacity
Output	16 sites completed by March 2027
Total Cost	£138.4m
Unit cost	£1.384m/% completion
Penalty rate	£1.384m/% completion (no cost sharing assumed)

Scheme delivery date	March 2027
Gated dates	Assurance of the scheme will be delivered on time 31 <sup>st</sup> of March 2026
Late penalty	The timeliness of delivery will be monitored by the EA. We will deliver the scheme as required as it would mean non-compliance with permit. If the delivery dates change with agreement with the EA we would not expect a late penalty.
Measurement	Performance reported in APR
Conditions (if required)	(if applicable)
Assurance	Third party assurer will assure conditions have been met



## 7. Conclusion

To summarise, we have proposed an Enhancement Case to achieve compliance with IED and prevent pollution to air, land and water by:

- Delivering associated improvements necessary to achieve compliance and provide protection to the environment and human health
- Addressing the risk of industrial emissions due to the biological treatment of sewage sludge at 16 sites to successfully achieve permit determinations to continue to operate these facilities (11 sites are associated with compliance with Industrial Emissions Directive and an additional 5 sites are associated with works under Environment Agency Appropriate Measures guidance)
- This will reduce the risk posed due to fugitive emissions to atmosphere and from the risk of spillages to land and water due to loss of structural containment and spillages.
- This includes containment solutions (incl. containment walls & impermeability of soils), covering of tanks, improvement of odour control units, improvement of inspections & monitoring (incl. leak detection)

Operating without the necessary authorisation to operate a regulated facility is an offence under the EPR. Several options have been considered to secure EPR permits and comply with IED, specifically the EA's recently published 'Biological waste treatment: appropriate measures for permitted facilities' guidance thereby preventing pollution to air, land and water.

As reiterated in the letter from our CEO to the EA, we are committed to work collaboratively to an agreement with the regulator to delivering the required compliance, in particular reducing emissions to air in the shorter-term, which will contribute to our Net Zero Carbon commitment by 2030.

Our customers want to see pollution stopped and in making these improvements to our sludge treatment centres and by complying with the new EA guidance and associated permit conditions, we will be achieving a higher level of environmental protection. In addition, regulatory compliance and future wastewater infrastructure is one of the top priorities areas that are important to our customers.

The £138.4m (TOTEX in AMP8) investment required has been driven by factors outside of management control as although this was formally a new environmental requirement in 2019, its application to sewage sludge was informed too late to be included in AMP7 WINEP proposals. Furthermore, these are new requirements associated with EA guidance which was only finalised in September 2022. This investment will seek to ensure appropriate solutions with respect to the guidance provided so far to meet the intent of IED. The BOTEX cost allowances would be insufficient to accommodate the factor without a claim.

Design work and associated costing exercises have considered options which indicate the overall cost is comparable to what is being put forward by the rest of the industry. In addition, other opportunities have been highlighted which would drive costs down further.



**Table 11: Summary of Key Commentary**

Section	Key Commentary
Introduction & Background	<p>The IED as implemented by EPR require permitted processes to reduce the risk of emissions, control escapes due to containment failure, deliver improvements around operational monitoring and defining environmental management procedures to be followed, through better application of BAT.</p> <p>The Water Industry was formally notified of the need to obtain permits for the AD facilities on its sludge treatment centres in 2019. Once permitted, the sites would need to meet the relevant pollution prevention interventions using the EA’s Biological waste treatment: appropriate measures for permitted facilities (September 2022) to demonstrate BAT.</p> <p>We have 16 sludge treatment centres that fall above the threshold levels that require permit and investment in interventions to meet BAT</p>
Need for Enhancement Investment	<p>Although this was formally a new environmental requirement in 2019, its application to sewage sludge was informed too late to be included in AMP7 WINEP proposals. Consequently, we have proposed it as an Enhancement Case to prevent pollution to air, land and water by:</p> <ul style="list-style-type: none"> <li>• addressing the risk of industrial emissions due to the biological treatment of sewage sludge at 16 sites - 11 sites are associated with compliance with Industrial Emissions Directive and an additional 5 sites are associated with works under Environment Agency Appropriate Measures guidance</li> <li>• This includes containment solutions, upgrade to odour control units, tank covers, enhancement of inspection, monitoring, flows and operating processes</li> <li>• The work to be completed remains subject to the outcome of investigations and testing based on risk assessment and timing</li> </ul> <p>It will reduce the risk posed due to fugitive emissions to atmosphere and from the risk of spillages to land and water due to loss of structural containment and spillages. These requirements are necessary to obtain permits to continue to operate these sludge treatment facilities as the EA will not issue permits for any plants that do not meet BAT. We have costed the scope of improvements to be £138.4m (TOTEX in AMP8).</p>
Best Option for Customers	The optioneering and selection of the preferred solutions will ensure best value for customers.
Cost Efficiency	Costs have been derived through SWS cost curves and additional efficiencies have been applied (e.g. consolidation of sites in Kent in AMP8 resulting in fewer sites/assets requiring significant capital work)
Customer Protection	Investment will ensure adherence to IED and EA Appropriate Measures guidance. A PCD has been created in case of non or late delivery

## References

- 1 Competition and Markets Authority, "Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations, September 2020  
[https://assets.publishing.service.gov.uk/media/5f72f3d2e90e0740cf4eb0a9/Water\\_provisional\\_determinations\\_report\\_all\\_September\\_2020\\_web.pdf](https://assets.publishing.service.gov.uk/media/5f72f3d2e90e0740cf4eb0a9/Water_provisional_determinations_report_all_September_2020_web.pdf).
- 2 Appropriate measures for the biological treatment of waste Consultation draft July 2020  
[https://consult.environment-agency.gov.uk/environment-and-business/appropriate-measures-for-the-biological-treatment/supporting\\_documents/Appropriate%20measures%20for%20the%20biological%20treatment%20of%20waste%20%20consultation%20draft.PDF](https://consult.environment-agency.gov.uk/environment-and-business/appropriate-measures-for-the-biological-treatment/supporting_documents/Appropriate%20measures%20for%20the%20biological%20treatment%20of%20waste%20%20consultation%20draft.PDF)
- 3 Biological waste treatment: appropriate measures for permitted facilities – Environment Agency, 21st September 2022  
<https://www.gov.uk/guidance/biological-waste-treatment-appropriate-measures-for-permitted-facilities/1-when-appropriate-measures-apply>
- 4 Ofwat, "Green economic recovery: Overview of draft decisions," 17 May 2021  
<https://www.ofwat.gov.uk/publication/green-economic-recovery-overview-of-draft-decisions/>.
- 5 Ofwat, "PR24 Final Methodology", 23 December 2022  
<https://www.ofwat.gov.uk/regulated-companies/price-review/2024-price-review/final-methodology/>

## Appendix

- |     |   |
|-----|---|
| A 1 | Strategic Steering Group Meeting: Implementation of the Industrial Emissions Directive for biological treatments of sewage sludge (April 2019)    |
| A 2 | Official IED Letter from EA to SWS (July 2019)  |
| A 3 | Email from [REDACTED] (EA) Confirming Risk-based approach for compliance of existing assets would be accepted                                     |
| A 4 | EA presentation 'Secondary Containment for the Water Industry' [REDACTED], Senior Advisor – Landfill and Resources for Waste Team (February 2020) |
| A 5 | EA/Water UK Waste & Recycling Network meeting minutes (June 2021)   |
| A 6 | Assessment for PR14 of the Potential Impacts and Requirements of the Industrial Emissions Directive upon Sludge Treatment Centres                 |
| A 7 | Industrial Emissions Directive Supporting Document  |

# Appendix 1 – Strategic Steering Group Meeting: Implementation of the Industrial Emissions Directive for Biological Treatments of Sewage Sludge (April 2019)

## Strategic Steering Group Meeting Item No. SSG19.02.04-02

### Subject: Implementation of the Industrial Emissions Directive for biological treatments of sewage sludge

SSG is asked to note that the Environment Agency:

1. has determined that the Industrial Emissions Directive applies to the biological treatment of sewage sludge
2. will be discussing the timetable and process for permit applications through the Water UK waste and recycling network

#### 1.0 Background

- 1.1 Directive 2010/75/EU on industrial emissions (the IED) entered into force on 6 January 2011 and was transposed into UK law on 20 February 2013<sup>1</sup>. The IED recast the Directive on integrated pollution prevention and control (IPPC) and introduced a revised schedule of industrial activities falling within scope of its permitting requirements. The schedule of waste management activities includes the recovery of non-hazardous waste with a capacity exceeding 75 tonnes per day involving biological treatment, but excludes activities covered by the Urban Waste Water Treatment Directive<sup>2</sup> (UWWTD).
- 1.2 There was much discussion about whether the biological treatment of sewage sludge is an activity covered by the UWWTD. In July 2014 we deferred the need to submit permit applications for sewage sludge digestion at sewage treatment works to allow further consideration of the question. All of the UK environmental regulators have now concluded that the biological treatment of sewage sludge is not an activity covered by the UWWTD and is therefore within the scope of the IED. This unanimously held view has been communicated to the UK and devolved governments with a view to commencing implementation.

#### 2.0 Implementation

- 2.1. The IED seeks to achieve a high level of protection for the environment taken as a whole from the harmful effects of industrial activities. It does so by requiring each of the industrial installations to be operated under a permit from the competent authority with conditions based around the use of best available techniques (BAT). In this instance the Environment Agency is the competent authority.
- 2.2. The IED set a deadline of 7 January 2014 for existing installations to obtain an environmental permit. We have therefore delayed

<sup>1</sup> Environmental Permitting (England and Wales)(Amendment) Regulations 2013

<sup>2</sup> Directive 91/271/EEC concerning urban waste water treatment

implementation of this aspect of the IED for over five years. We now need to address this by ensuring all installations involving the biological treatment of sewage sludge obtain and operate under an environmental permit in as short a timescale as can reasonably be achieved.

- 2.3. We recognise that many sludge treatment facilities were constructed prior to the current permitting requirements and their design may not be compatible with the best available techniques as described in the EU BAT reference documents. Where this is the case risk assessments can be used to demonstrate that an equivalent level of environmental protection is being or can be achieved. Where additional measures are required we will use improvement conditions within permits to allow time to achieve the BAT standard.

### 3.0 Next Steps

- 3.1. The Environment Agency is developing a sludge strategy in order to plan and deliver clear and consistent regulation of sewage sludge treatment and use activities. It will be finalised by the end of 2019. The permitting of sewage sludge biological treatment activities is one element of the strategy. It will be delivered in parallel with the development of the strategy.
- 3.2. We will use the Water UK waste and recycling network (WaRN) as the main forum to discuss IED and permitting arrangements. We therefore propose that the representatives who attend WaRN act as the main point of contact. We will also ensure that our water company account managers are kept fully informed of progress.
- 3.3. On a practical level all internal resourcing and training needs are being addressed in preparation to support pre-application discussions and the receipt of permit applications later this year. Through WaRN we be asking each company to provide a definitive list of all sites used to carry out biological treatment of sludge, and to provide a best estimate of the number of permit applications they anticipate making.

Environment and Business, Environment Agency



# Appendix 3 – Email from Clive Humphrey (EA) Confirming Risk-based Approach for Compliance of Existing Assets Would be Accepted

[Redacted]

Subject: RE: EA's position on IED

Hi Adria

Sorry it's later than I'd intended.

To summarise our conversation last week I can confirm that new assets will be required to meet BAT from the outset and any design of new plant should be done with this in mind. There is little difference between the "appropriate measures" requirement under Waste ED and the BAT requirements under IED, the latter is perhaps more prescriptive but otherwise they should be considered as comparable.

Existing assets which are moving into IED as a result of this implementation will have a maximum of four years from publication of the BREF to achieve BAT. When issuing permits we are able to include improvement conditions to phase in improvements to systems and infrastructure so that by the end of that four year window BAT is achieved. **Where existing assets can be proven by risk assessment to give an equivalent level of environmental/human health protection then this will be accepted – avoiding the need to raze existing assets to the ground and rebuild them** We adopted a similar approach when the United Utilities installation permits were determined a number of years ago and this mitigated much of the potential costs.

Given that IED applies to the biological treatment of sewage sludge above the thresholds of 75t/d (100t/d for AD) I would not advise making an application for a waste operation permit as this would inevitably be returned because it is made under the wrong regime. Since we have been very clear that this is our position the application might even be rejected in which case the application fee would be lost.

Let me know if you need any further clarification.

Again apologies for the delay.

Best regards

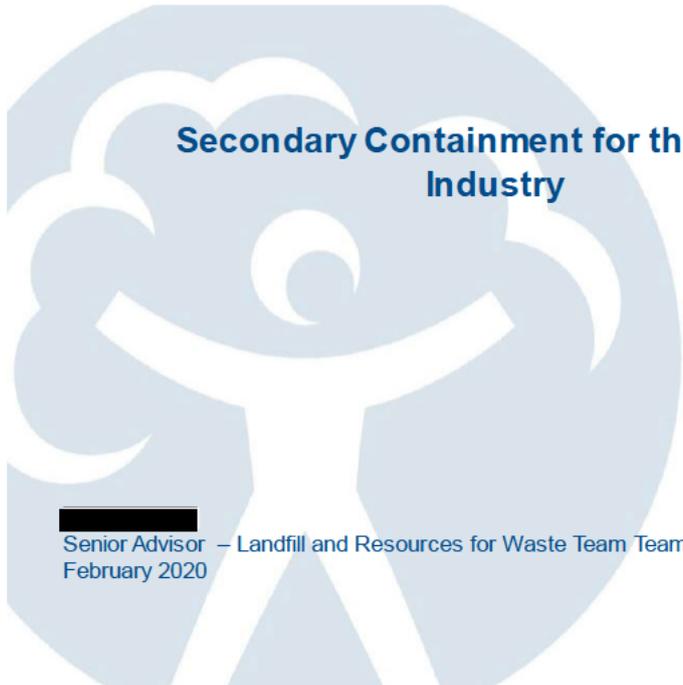
[Redacted]

Clive Jackson, Environment and Business  
Environment Agency | Rivers House, Shury Road, Canterbury, Kent, CT2 0AA

[Redacted]



# Appendix 4 – EA presentation ‘Secondary Containment for the Water Industry’ [REDACTED], Senior Advisor – Landfill and Resources for Waste Team (February 2020)



[REDACTED]  
Senior Advisor – Landfill and Resources for Waste Team Team  
February 2020



## Above ground structures;

- bunds to be impermeable, stable and resistant to the stored materials
- have no outlet (that is, no drains or taps) and drain to a blind collection point
- have pipework routed within bunded areas with no penetration of contained surfaces
- be designed to catch leaks from tanks or fittings
- have a capacity greater than 110 percent of the largest tank or 25 percent of the total tankage, whichever is the larger
- have regular visual inspections - any contents must be pumped out or otherwise removed under manual control after checking for contamination
- be fitted with a high-level probe and an alarm (as appropriate) if not frequently inspected
- have tanker connection points within the bund (where possible), and if not possible you must provide adequate containment for spillages or leakage
- have programmed engineering inspections (extending to water testing if structural integrity is in doubt)
- Be designed, constructed and maintained to meet with the specifications outlined in the Construction Industry Research and Information Association guidance document titled CIRIA 164.



## For sub-surface structures;

- establish and record the routing of all site drains and subsurface pipework
- identify all sub-surface sumps and storage vessels
- engineer systems to minimise leakages from pipes and make sure they can be detected quickly if they do occur, particularly where hazardous (that is groundwater-listed) substances are involved
- provide secondary containment and leakage detection for sub-surface pipework, sumps and storage vessels
- establish an inspection and maintenance programme for all subsurface structures, for example, pressure tests, leak tests, material thickness checks or CCTV



## CIRIA 736

- CIRIA C736 'Design of containment systems for the prevention of pollution : secondary, tertiary and other measures for industrial and commercial premises' (2014) – the landfill industry wanted to move away from the use of this document but didn't;
- Is risk also based and reflects current good practice for all liquids stored on a permitted site – including AD, landfill and oil and gas sectors;
- Provides design criteria for concrete and earth bunds – bunds don't necessarily have to be concrete



# Appendix 5 - EA/Water UK Waste & Recycling Network Meeting Minutes (June 2021)

**Water UK Waste & Recycling Network**  
 16<sup>th</sup> June 2021, 09:00 to 12:30  
 Venue: MS Teams Meeting

**Dratt Minutes**

Minutes: United Utilities  
 Host: N/A

<b>Attendees</b>			
<b>Waste &amp; Recycling Group Members</b>			
[Redacted]	Southern		
	Northumbrian	[Redacted]	Anglian
	Yorkshire	[Redacted]	Wessex
	Yorkshire	[Redacted]	Thames
	Scottish	[Redacted]	Thames
	Welsh	[Redacted]	Severn Trent
	South West	[Redacted]	United Utilities
	Affinity	[Redacted]	United Utilities
	United Utilities	[Redacted]	Thames
	Northern Ireland	[Redacted]	United Utilities
<b>External – Regulatory Bodies</b>			
[Redacted]	EA NPS		
	EA		
	WWN Chair (Thames)		
	Natural Resources Wales		
<b>Apologies (minutes &amp; actions to be circulated to this group for information)</b>			
<b>Waste &amp; Recycling Group Members</b>			
<b>External</b>			
[Redacted]	Water UK	[Redacted]	UKWIR
	Water UK	[Redacted]	Biosolids Chair
	Assured Biosolids Limited (also Northumbrian)		



<p>tankering companies? CH – JCam is on Cesswaste group and can assist with communication of messaging. JCam – letter needs to go further to explain more about EWC codes which would help with the comms piece with all parties. SB – question – do the codes in RPS231 cover sludge? CH – definition of sludge, Ww sludge not Water sludge. If you take untreated sludges it's nice and easy but if further treatment has been carried out i.e. dewater, then it is 19102 code and it's still a sewage sludge and is excluded under the controlled waste regs. Composting cake or solid waste at head of works is unlikely and I would question that being done. Difficult to comment on specific examples without knowing the full process involved at individual companies. Desludging/dewatering is a different process. This needs further discussion.</p> <p>f. WtW T20 where 10,000(?) excluded – possible SR permit for centrifuging –</p> <p>g. CH question to group – Polynite – what is happening to phosphorous removal?</p> <p>CH – Material that mops up phosphorous which is really useful, tried to good effect but it has negatives – it becomes saturated and what happens to the spent polynite? In Sweden they say it is a useful fertiliser. Is anybody aware of this, the spent material and what it is used for? JCam – not aware but aware of Spentearth and Rareearth in Wales - Magical sand filters. Different company trials and technologies. LSB – UU use reactive media – will look into that and when it will spent and what the plan is and will respond.</p> <p><b>Action – LSB to report back on reactive media trials</b></p> <p>h. CH question to group – is the arrangement with PD working? CH - seeing a drop off in questions – is the arrangement working? JC – it is but some issues need clarification with CH before a response. JCam – task &amp; finish groups are working that take pressure off WRN. CH – filter out tranche queries. Next tranche deadline is coming up. As ever we would like to have more people working on the applications but we have what we have.</p> <p>Reg 61 process should be less painful.</p> <p>i. HB started a discussion on BREF BAT Conclusion compliance</p> <p>CH:</p> <ul style="list-style-type: none"><li>• August 22 is the deadline for meeting BAT standards</li><li>• The EA told us IED applied in July 2019</li><li>• Newly listed activities are normally given 30 months to be BAT compliant</li><li>• That means we should have had until the end of 2021 to obtain permits and comply</li><li>• The EA realised this was difficult and added an extra 7 months giving us the 22/08/22 deadline</li><li>• Technically any applications for new permits, which are made after 22/08/19 (when the Bref was published), the operations being applied for should be BAT compliant at the date the permit is issued</li><li>• Where it can be demonstrated that more is needed to comply with BAT there will be an improvement condition to give WaSCs more time</li></ul>	<p>LSB</p>
---	------------

	<ul style="list-style-type: none"> <li>• The EA believe Aug 22-Dec 24 is sufficient time to complete any additional works needed to be BAT compliant and that 5.5 years (from the July 2019 announcement) to apply and comply is reasonable. No extension to the Dec 24 deadline will be given.</li> <li>• The belief is that the vast majority of BAT compliance does not require significant infrastructure work</li> <li>• If improvement work is not completed by Dec 24 the EA would consider enforcement options. If the EA were satisfied that all efforts had been made to comply with BAT by Dec 24 then they would take a soft approach but if there has been a reluctance to take serious efforts to comply then they would consider a firmer enforcement approach</li> <li>• Derogation is an alternative approach but, given that there are strict criteria to be satisfied, the EA do not think we could apply and are therefore going to use IC instead.</li> <li>• Other industries only had the 30 months to plan, apply and be compliant with BAT</li> <li>• 5.5 years we are being given is therefore twice as long as those initial entrants into IED got</li> <li>• Funding is a separate issue to legislation and is for WaSCs to challenge with OFWAT</li> </ul>	
16.0	IED permitting of AD on a WwTW – Thames would like to discuss requirements concerning containment seemingly required before getting to duly made in Tranche 1 of the permitting process – this was covered under section 8.0	
17.0	<p>No AOB</p> <p><u>Date of next meetings:</u></p> <p>T&amp;F IED AD Group on 16/06/2021 13:00hrs &amp; main meeting 16<sup>th</sup> June 2021 09:00 am 18/08/2021</p>	

# Appendix 6 - Assessment for PR14 of the Potential Impacts and Requirements of the Industrial Emissions Directive upon Sludge Treatment Centres



## 1 Introduction

Southern Water Services Limited (Southern Water) has commissioned [REDACTED] to provide an assessment of the potential environmental permitting (EP) implications of the implementation of the Industrial Emissions Directive (the IED) upon approximately 28 of the Sludge Treatment Centres (STCs) that they operate.

The IED has been implemented in England and Wales by the Environmental Permitting (England and Wales) (Amendment) Regulations 2013 (the amendment regulations), which came into force on the 27<sup>th</sup> February 2013. All existing Installations will be subject to IED from 7 January 2014, existing Installations operating newly prescribed activities will be subject to it from 7 July 2015, and Large Combustion Plant will need to meet the requirements from 1 January 2016.

In order to assess what the material costs considerations might be, should all (or some) of the STCs require an environmental permit for their sludge treatment operations, Jacobs was commissioned to survey a sample of three of the STCs and assess their existing infrastructure against the likely requirements/conditions of an EP.

This report provides a discussion of the changes to the Environmental Permitting (England and Wales) Regulations 2010 (the regulations) that are relevant to Southern Water's STCs, details of the STC site surveys and an assessment of their infrastructure against the relevant guidance for the permitting of such activities.



As detailed within this report, there are significant uncertainties concerning what the EA may require for each STC in order for it to obtain a permit, and there are also ranges of costs for certain items. It is, therefore, not possible to provide a single indicative cost that can be applied to each STC.

What this report provides is an indication of costs for what may or will be required. These costs can be used to identify an estimated cost for an individual STC or a range of STCs with similar requirements, once a specific site infrastructure survey and an OPRA assessment has been carried out and discussions have been held with the EA to determine exactly what it will require for the site. The hypothetical site example provided in Table 6-C, which assumes a rigid application of S5.06 by the EA, identified an estimated CAPEX cost of nearly £627K to bring the site up to the required standard. Again, it should be noted that all the costs provided were estimates only and do not include all ancillary items that may also be required.

The report also shows that to obtain a permit for each STC (if required), will likely incur costs of at least £20,000 just to obtain the environmental permit (this cost is for the application fee and application preparation), even if no infrastructure improvements are required initially. For sites where the EA may require significant infrastructure improvements, the costs could easily exceed £100,000.

Therefore, given that Southern Water has an estimated 28 STCs that may require a permit under the EA's current interpretation of the amended permitting regulations, there is the potential for significant costs to be incurred in order to achieve compliance.

Should the EA's interpretation not be challenged, or be unsuccessfully challenged, it is recommended that Southern Water begins a dialogue with the EA to establish exactly how the EA intends to apply the requirements of the regulations and the relevant guidance to the STCs so that more accurate CAPEX estimates can be developed.

# Appendix 7 - Industrial Emissions Directive Supporting Document



SNC • LAVALIN

## Industrial Emissions Directive Supporting Document

IED Supporting Document

Water UK

31 May 2023



# 1. Executive Summary

Transformation in the regulation of sewage sludge treatment and the need to comply with the Industrial Emission Directive (IED) is leading to an investment requirement across the water industry of c. £2.0bn. The publication of the Environment Agency (EA) Appropriate Measures guidance in 2022, introducing additional requirements with associated costs, has further compounded this challenge for the Water and Sewerage Companies (WaSCs) to comply with the IED. The compliance approach taken by the EA appears more precautionary than the original intent of IED, and consequently the scale of change is resulting in a significant challenge to the industry in terms of feasibility, affordability and deliverability. Non-compliance with permit conditions is not an option, as this may result in enforcement action and possibly prosecution.

**This report presents the outputs of an assessment of the compliance requirements being driven by Appropriate Measures standards.**

The way Bioresources is regulated is undergoing a significant phase of transformation, with one key area of adaptation concerning Environmental Permitting. In 2019 the Environment Agency (EA) concluded that anaerobic digestion (AD) of sewage sludge at treatment works is subject to Environmental Permitting requirements under the Industrial Emissions Directive (IED). This conclusion was formed following a review of whether this was covered by Urban Wastewater Treatment Directive (UWWTD) exclusions. The application of IED provisions to sewage sludge treatment centres requires demonstration of 'best available techniques' (BAT). The EA, when informing the Sector that it needed to comply with IED indicated this was a low-cost impact as a fully costed risk-assessment of the implications had not been undertaken. Whilst the Water Industry are supportive of the need to reduce the risk of industrial emissions, there needs to be a pragmatic implementation, considering the environmental benefit, funding, affordability, carbon impacts and deliverability of the requirements.

At the time of IED implementation in 2019, the Water Industry were required to comply with BAT as set out in best available technique reference documents (BREF) [6], with full compliance by August 2022. The anticipated low-cost and quick turn-around was explained by the EA as they expected compliance to be predominantly a paperwork exercise [anecdotal unsubstantiated reference].

The European Commission approach through BREF is based around a risk-based assessment pertaining to a specific site and its impact on local receptors. The guidance is designed to allow flexibility to adapt as further improvements in BAT are developed. Whilst the industry was working to comply with BREF, the EA published Appropriate Measures for the Biological treatment of Waste in September 2022. This document sets out additional standards for operators to comply with at facilities in England, and whilst the EA's Appropriate Measures framework is fundamentally achieving the same goals as BAT, there are several aspects where the EA appear to have been more cautious and prescriptive with tighter or more specific controls. The EA appear to have deemed the risk posed by permitted facilities that handle biowaste (the EA's generic term for any organic waste, as Appropriate Measures applies to other organic wastes as well as sewage sludge) are higher than original BAT conclusions but have not articulated a clear reason why they have come to those conclusions.

Figure 1-1 below illustrates the impact of appropriate measures and BREF 2018 Standards compliance on a notional digestion facility.

This shift in environmental compliance expectations from Appropriate Measures has had significant implications for IED compliance across the Water Industry and thus the level of investment is greater than could have been foreseen in 2019. Furthermore, the timescales to deliver the significant levels of investment will likely take activities to deliver the requirements well into the AMP8 period. It should be noted that Appropriate Measures doesn't define time periods for completion of any improvements, and this may indicate that the EA accept that the timescales for implementation must be flexible and depend on the specifics of each case (e.g., the nature and complexity of the works).

Current estimates indicate that c.£2.0bn of investment will be needed to address IED requirements, the majority to comply with secondary containment (£0.6bn) and covering of treated sewage sludge storage (£1.3bn). Appropriate Measures requirements drive covered storage investment, and for secondary containment this is driven by Appropriate Measures for existing PPC permits being revised, and BREF for new permits.

The expenditure required at each site is highly variable and is only able to be determined accurately once the site-specific assessments are made to determine the improvement conditions required. However, for both BAT and Appropriate Measures compliance the key factor in determining the scale of investment is the calculation and attitude to risk accepted by the regulator. The differing levels of risk within the assessments of improvement conditions seen across sites have had a consequent impact on the expenditure planned. This is leading to a large disparity between company investment requirements, with this disparity clearly seen across the devolved



nations in their adoption of IED BREF for waste treatment. We recommend consistent interpretation of guidance is essential to avoid confusion and excessive investment or under-forecasting of the eventual outcome.

The EA has deemed that the risk posed by permitted facilities that handle biowaste is greater than other industries and it is within the EAs right to make that judgement. We consider that the EA has adopted a precautionary principle approach in setting their Appropriate Measures guidance. It would be helpful if the EA would set out its reasoning to further understand this risk assessment basis.

At PR19 the timing of the regulatory change, between draft and final determination, resulted in a disparity in funding defined for IED compliance between companies. Alignment between environmental and economic frameworks is essential and we recommend consideration should be given to how funding for IED and Appropriate Measures can be included in PR24, given investment will go beyond 2024. The materiality of this investment need, in context to an entire industry spend of c.£2.4bn (PR19 total), makes it evident that it is essential companies have adequate resources to deliver improvements in realistic timescales.

Beyond PR24, it is clear that the changing regulation of the Bioresources treatment has implications for how investment requirements are identified within the Bioresources price control. The regulation of sewage sludge, now sitting within the EPR framework, means that there can be frequent and numerous changes and updates made to the EPR framework which are within the EA's control rather than requiring primary legislative change, for example, changes to guidance or accompanying website text. This can lead to new or tighter standards being implemented quickly and these types of changes cannot be predicted or accounted for in WaSC 5-year investment planning cycles.

We would suggest the water sector discusses with the EA the extension of the 4-year hands-off period, (already in place for the wastewater discharge permits) for waste permits following change to a permit or guidance. Given that BAT will change over time, driven by changes in technology and tightening of permit requirements, current waste permits will periodically change. It is therefore recommended that 'sludge permit' investment planning is considered more akin to wastewater discharge permits, in that it is clearly defined in the WINEP with associated modelling and clearly mapped out deliverables. This will ensure that regulators and the Water Industry are able to work collaboratively to deliver the best environment outcomes, at the most efficient cost for customers in an agreed and realistically deployable timeframe.

