

**Appendix 17a:
Bioresources RCV Allocation
Submission (revised)**



Yorkshire Water

Bioresources RCV Allocation Submission

Updated 31 August 2018

YKY Bioresources RCV submission v2 310818.docx

It's part of our Blueprint for Yorkshire

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1. Bioresources RCV allocation - Board Assurance Statement ¹

Our aim is to produce all regulatory submissions in line with the guidance provided.

Good assurance needs to be provided at the right time, proportionate to the level of risk identified, asks the right questions and produces good evidence to support the statements made within the submission. Our assurance approach is risk based and uses a method called 'three lines of assurance'. This is best practice and is described in more detail in our published Assurance Plan.

To satisfy ourselves that the information is accurate and accessible, all elements of the report are subject to an appropriate assurance process. The Board has noted and confirms that:

- Assurance processes follow the processes we have in place for annual reporting. The annual reporting process is certified to the British Standard ISO9001 Quality Management System. This is best practice and externally verified;
- The assurance process includes audit checks and challenges by data providers, data managers, senior managers and directors and our external auditors, Halcrow. Findings from these assurance processes have been fully reviewed and actions to address any concerns have been implemented;
- As a result of Yorkshire Water being in prescribed assurance, our external auditor, Halcrow, has completed an extensive review of the submission including our approach, information and data that supports the assumptions made in the submission;
- The Board Audit Committee has received the findings from the completed assurance reviews.

The Board understands that it is accountable for the quality and transparency of the information provided within this submission. The Board has read the report, reviewed the content and is supportive of the information that is presented. The Board has obtained comfort from the Board Audit Committee that there are appropriate controls and assurance processes in place regarding the information contained within the report.

The Board notes that:

- The data tables and supporting information has been collated through our data assurance processes. This follows the processes we have in place for annual reporting. The annual reporting process is certified to the British Standard ISO9001 Quality Management System. This is best practice and externally verified.
- It has exposed within the submission the material assumptions and weaknesses in providing this data used to determine the values.
- The approach taken reflects the guidance provided by Ofwat.

The Board confirms its support of the valuation approach and proposed RCV allocation. In addition, the Board notes that cross checks have been completed and, all things being equal, the Board is satisfied that the RCV allocation will not have an adverse impact on customer bills, is consistent with charging rules and is consistent with competition law.

So far as the directors are aware, there is no relevant audit information of which the company's independent technical and financial auditors are unaware. The directors have taken all the steps that they ought to have taken as directors to make themselves aware of any relevant audit information and to establish that the company's independent auditors are aware of the information.

¹ Board Assurance Statement as published in September 2017. The entire Yorkshire Water PR19 plan has been assured by the Yorkshire Water Services Limited Board.

Signed by Yorkshire Water Services Limited Board of Directors



Anthony Rabin
Chairman



Richard Flint
Chief Executive



Liz Barber
Director



Nevil Muncaster
Director



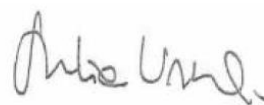
Pamela Doherty
Director



Ray O'Toole
Director



Teresa Robson-Capps
Director



Julia Unwin
Director



Andrew Wyllie
Director



Andrew Dench
Director



Michael Osborne
Director



Scott Auty
Director



Chantal Forrest
Company Secretary

2. Executive summary

2.1 Summary of approach and results

This summary document explains the approach we have taken to the value bioresources assets and our proposals for allocating the single pre-2020 legacy wastewater Regulatory Capital Value (RCV) between the new bioresources and wastewater network plus price controls at PR19.

Since the submission and publication of our initial bioresources RCV allocation proposal in September 2017, we have reviewed the allocation as part of the development of our PR19 plan and have now updated our proposed bioresources RCV allocation outcome accordingly.

This document, previously part of our submission in September 2017, has been updated accordingly to reflect our review of the RCV allocation and data comparing the original and revised allocations is included to aid clarity.

Yorkshire Water (YW) has followed the approach set out in the guidance on the asset valuation and RCV allocation approach published by Ofwat in April 2017 ².

- This document describes our approach to calculating the economic valuation of bioresources assets and a proposed RCV allocation.
- We will move to a bioresources asset base utilising anaerobic digestion by March 2020. We have selected this optimal technology for the demand and supply requirements of our region.
- We have reviewed our RCV proposal from September 2017 as part of the development of our PR19 plan and have updated the RCV allocation outcome accordingly. The key driver for a changed RCV allocation is our identification of around £100m of capital cost efficiency compared with our original costed solutions for the cost base.
- We have completed cross checks to provide assurance that the RCV allocation outcome will not have an adverse impact on customers' bills and is consistent with charging rules and competition law.
- The evaluation and allocation exercise has been assured, including external independent assurance. A Board Assurance Statement from September 2017 is provided within this document. The entire Yorkshire Water PR19 plan, including RCV allocations, has been assured by the Yorkshire Water Services Limited Board.

The summary RCV outcomes from September 2017 and our updated outcome for submission as part of our PR19 plan is set out in the figure 2.1:

Fig 2.1. Updated outcome of the bioresources valuation and RCV allocation analysis.

Information requirement	Initial bioresources RCV valuation figure (from September 2017)	Updated bioresources RCV valuation figure (for September 2018)
Gross valuation of bioresources assets	£599 million	£394 million
New economic value of bioresources assets	£454 million	£291million
Proposed bioresources RCV allocation	£454 million	£291 million

² [Ofwat economic asset valuation for the bioresources RCV allocation at PR19 - 27 April 2017](#)

2.2 Key assumptions

The main assumption underpinning the RCV calculation relates to the completion of the Company's 'Organic Change Strategy'. This strategy completes the transformation of Yorkshire Water's bioresources business from one centred around incineration to one centred around anaerobic digestion. In practical terms this means the replacement of incinerators in Leeds and Huddersfield with anaerobic digestion and energy generation assets.

The strategy is planned for completion by 31 March 2020 and our calculations of the economic value and RCV are assuming this work delivers to plan. We have maintained our approach for our updated RCV allocation proposal assuming the hypothetical asset base is the same as the actual asset base planned at March 2020.

Following the submission of the bioresources RCV submission in September 2017, we have carried out a substantial market testing exercise around the bioresources capital requirements. This covered over 80% of the expected bioresources assets and reached out to over 90 companies for information and evidence. Through this testing we have identified a range of potential solutions which would achieve approximately £100m of capital cost efficiency compared with our original costed solutions based on our current cost base. The efficiency gain also includes the benefits of establishing an autonomous capital delivery model for our Bioresources business.

The £100m converts to a 41% efficiency on the forward-looking cost base and has been translated into our RCV calculation to reflect the efficient cost base that we will incur in AMP7.

2.3 Observed weakness

In preparing the information we have observed that a portion of the data within our Asset Inventory (AI), associated with approximately 12% of the asset value, was not fully up to date. We have addressed this weakness within the submission by engaging our operational and asset management teams to upgrade the information in the valuation process. Since our September 2017 submission we are now in the delivery phase of our SAP programme and asset information upgrades will be accommodated in the asset application once this work concludes.

2.4 Sensitivity assessment

We have conducted a sensitivity assessment of the proposed bioresources RCV allocation of the material assumption and weakness outlined above. The assessment tested the sensitivity of the assumptions associated with the requirements for additional land, land values, cost uncertainty and the valuation of assets. We have refreshed this assessment following the revision to our proposed bioresources RCV allocation

The results, as summarised in figure 5.5, illustrate a relatively small estimated uncertainty of between +£11m and -£12m in the total of the updated proposed RCV allocation submitted within our P19 plan. This results in an uncertainty range of +0.28% and -0.31% of the total pre-202 legacy wastewater RCV of £3,861m (as inflated to March 2018).

2.5 Potential customer bill impacts

We have conducted analysis of the potential impacts on wholesale charges caused by the move to a focused approach to RCV allocation. We have carried out assessments on household and domestic-like non-household wastewater bills, and wholesale trade effluent charges (see section 5.5

for details). We have established that traders on average may experience a small reduction in their overall trade effluent charges of around 0.5%, with a small impact range around this. Household and domestic-like non-household customers may potentially experience a small wastewater bill increase of less than 0.1%.

The tests have been undertaken in isolation from any other drivers of future bill movements, resulting from the implementation of PR19 policies, and the delivery of our own bioresources strategy. The actual impacts on customers' bills experienced from 2020 onwards will be influenced by a range of factors beyond the RCV allocation.

In conclusion, we have determined the shift to the focussed approach to RCV allocation will not have a material impact on wholesale charges and customers' bills. We also conclude that the move to a focused approach will not impact on our ability to set charges in line with both charging rules and competition law.

The revision to our proposed bioresources RCV allocation does not alter our assessment of the potential bill impacts or our ability to set charges in line with both charging rules and competition law.

2.6 Key finding from external auditors

The external independent auditors, Halcrow, have provided a detailed report (attached within Appendix 1). The key findings are summarised as follows:

- In completing the data tables, Halcrow considers that YW has followed the Ofwat guidance. Where the guidance is ambiguous, the YW submission commentary and data table commentary explain the adopted approach.
- The reviewed submission tables reflect the submission commentary and data table commentary;
- No Red or Amber scores, which would otherwise highlight material or minor concerns over the validity of the submission, have been identified in the observations made. YW has informed Halcrow that it will continue to review and respond to Blue issues, reflective of recommended improvements;
- Halcrow has conducted a risk based review on source data. The accuracy of data outside these spot checks cannot be confirmed; and
- Halcrow consider that the submission data tables presented, together with the submission commentary and data table commentary, meet the Ofwat reporting requirements for the submission.

In August 2018 Halcrow again conducted a risk based review on the changed data following the application of identified capital cost efficiency to our updated bioresources RCV allocation proposal. Halcrow confirmed our submission and the data continued to meet the Ofwat reporting requirements.

In its review of the PR19 plan, including data submitted in data table WWS12 (RCV allocation in the wholesale wastewater service), Halcrow confirmed that all the issues it had considered to be material to the plan have now been resolved. The Technical Assurance Report from Halcrow is provided in our wider PR19 plan documentation.

3. Purpose of this document

The 2019 Price Review (PR19) will see the introduction of a separate binding five-year price control on revenues from bioresources at a company level, accompanied by the requirement to publish market information in a structured form.

Each company has a single Regulatory Capital Value (RCV) for its wastewater assets, including its bioresources assets. To determine the level of revenue that a company can recover as part of the new bioresources price control, companies need to provide Ofwat with information and a proposed assessment of how much of the single RCV to allocate to bioresources.

All companies are required to re-value their bioresources assets and must allocate a proportion of their existing wastewater RCV to that new price control on a 'focussed' basis, i.e. broadly in line with the costs that would be faced by an entrant to that market operating to the same capacities as the incumbent company. The remainder of the existing RCV will apply to the wastewater network plus price control.

This document contains commentary to support the submission of information and data as part of the economic asset valuation for the bioresources RCV allocation at PR19 at September 2017 and updates made as part of the submission of the RCV allocation within our PR19 plan. The aim of this document is to aid understanding and allow for proportionate scrutiny of the data we provide to undertake the RCV allocation.

Detailed commentary on individual data tables was provided in a separate document as part of the submission in September 2017. As part of the PR19 plan submission in September 2018 PR19 data table WWS12 (RCV allocation in the wholesale wastewater service) details the movements in the proposed bioresources RCV allocation, and our supporting PR19 data table commentary includes explanations of the data provided in WWS12.

We recognise the importance in the quality of this data submission and have therefore implemented quality assurance processes aligned with our regulatory reporting assurance process. This follows a 'three lines of defence' approach and consists of both internal and external assurance. The external element was provided by our technical assurance provider, Halcrow.

4. Bioresources strategy

4.1 Summary

As part of our review ahead of submission of a revised RCV proposal within our PR19 plan, we can confirm our Bioresources strategy remains consistent with that provided to Ofwat in September 2017.

Between now and 2020, YW will rationalise some smaller digestion sites, replacing them with raw cake export, and increasing the size of its larger digester sites. This has been undertaken after assessments of whole life totex to improve the efficiency of the services it provides.

The Yorkshire Water 'Organic Change' strategy continues to promote exit from sludge incineration technology, the refurbishment and extension of key anaerobic digestion (AD) facilities, and the rationalisation of smaller AD sites.

The strategy builds upon the approach promoted between 2010 and 2015 and delivers a further step towards our long-term plan for Bioresources management whilst remaining compatible for future technological deployments.

The long-term goal for the YW Bioresource business is to move away from sewage sludge incinerator technology to a significantly rationalised, consistent and reliable asset base of renewable energy generation sites providing the capacity to treat all sludge production within the region.

This has resulted in the closure of five small AD sites and the refurbishment and expansion of four larger AD sites to ensure resilient regional treatment capacity.

Rationalisation of sludge treatment facilities (STF) is being achieved whilst ensuring resilience through the selection of AD as the treatment technology. The implementation of this approach will ensure that all remaining AD sites will have been constructed or refurbished to a robust and resilient asset standard.

In July 2015, the Board approved the revised strategy, which delivers totex efficiency, eliminates the need for third party treatment and secures performance commitment delivery.

4.2 Structural review

Our bioresources business is predominantly managed as part of our 'Energy and Recycling Department'. The Energy and Recycling Department also manages wastewater treatment sites which would form part of the 'network plus' price control where it is co-located with sludge treatment.

Several activities that fall within the bioresources price control are not currently within the Energy and Recycling Department accountabilities. Following the Board's strategic review of the changing environmental, societal and regulatory landscape, recommendations were made in September 2016 to functionally separate the bioresources business during the current period to:

- give the bioresources business flexibility to respond to the challenges of an emergent market and new focused price control;
- allow the business to drive efficient services through the price control;

- provide the business with the ability to drive further innovation into the bioresources area, either through new technologies or through innovative use of markets; and
- make the performance of the bioresources business more transparent to allow direct comparison with other water companies and market competitors.

The key recommendations from this review are summarised below, aligned to the four key themes described by Ofwat in its methodology for the 2019 price review;

Great customer service

- The functional separation of the bioresources business and the deployment of the new business model will allow the direct comparison of performance between YW and other providers.

Resilience

- The development of trading relationships with other water and sewerage companies (as demonstrated in the current period) will deliver greater efficiencies whilst mitigating construction of new infrastructure. A greater focus on markets may see trading relationships with businesses treating other organic wastes.
- The separation will allow a price control focus on bioresources including investment and an operating model to ensure that the business performs in a competitive market place.

Affordable bills

- By viewing bioresources as a standalone business, this will allow an even greater focus on efficient service delivery for our customers.
- The use of markets and competition will drive down costs and increase efficiency.

Innovation

- A focus on a functionally separated business will allow the use of more innovative technologies to drive additional efficiencies, for example through greater energy yield from the bioresources product.
- A separate business will allow a greater use of market testing of a range of services provided to the business (e.g. maintenance, investment, operation of sites and logistics).

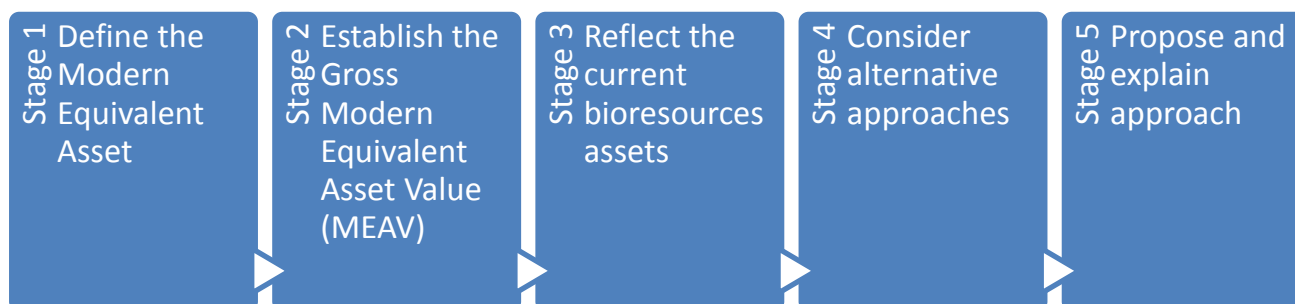
The plan is to commence the functional separation in quarter one of 2018 and to complete it by the end of 2018. This will allow the changes to be embedded ahead of the implementation of the emergent market.

5. RCV allocation process

5.1 Summary

YW has followed the focused approach to RCV allocation and the process as described by Ofwat in its April 2017 guidance document. This consists primarily of 5 key stages as outlined below in figure 5.1.

Fig 5.1. RCV allocation 5 stages.



The following sections summarise how we progressed through these stages highlighting the assumptions and assurances provided where appropriate.

5.2 Stage 1 - Define the modern equivalent asset

Ofwat requirement: companies to clearly set out how they have defined the modern equivalent asset (the asset they believe a hypothetical new entrant would build at that location in order to provide the same service).

We have defined the modern equivalent asset in accordance with Ofwat's guidance, in that the hypothetical new entrant would build modern equivalent assets (MEA) at the same locations as our existing assets as at 31 March 2020, and these assets would be of the same capacity. Following our original RCV submission in 2017 we have undertaken extensive market testing around the bioresources capital requirements. This covered over 80% of the expected assets and reached out to over 90 companies. Through the testing we identified significant capital cost efficiency and we ratified our approach in respect of the hypothetical new entrant.

In respect of technology choice, as outlined in our bioresources strategy in section 4, we have determined that the solution offering the best economic value within the YW region is anaerobic digestion. We retain this position as part of our latest update to the bioresources RCV allocation.

Rationale for anaerobic digestion

Our technology choices are based on whole life cost assessment of technologies. The appropriate technology depends firstly upon the product to be recycled. In most cases within the YW region we can recycle conventionally treated sludge, so there is little advantage in producing enhanced treated sludges at present.

The decision to operate with mesophilic anaerobic digestion (conventional AD) is therefore based primarily on an assessment of the whole life cost of technology. Whilst there is some indication that at the very largest scales, advanced anaerobic digestion (AAD) may deliver a suitable whole life cost, in general conventional AD achieves a lower whole life cost. Conventional AD is less complex to operate, experiences lower failure rates, has fewer single points of failure, and presents lower safety risks.

In every case we have investigated either of these technologies is cheaper than destruction technologies (i.e. incineration), which are only suitable where the product cannot be recycled.

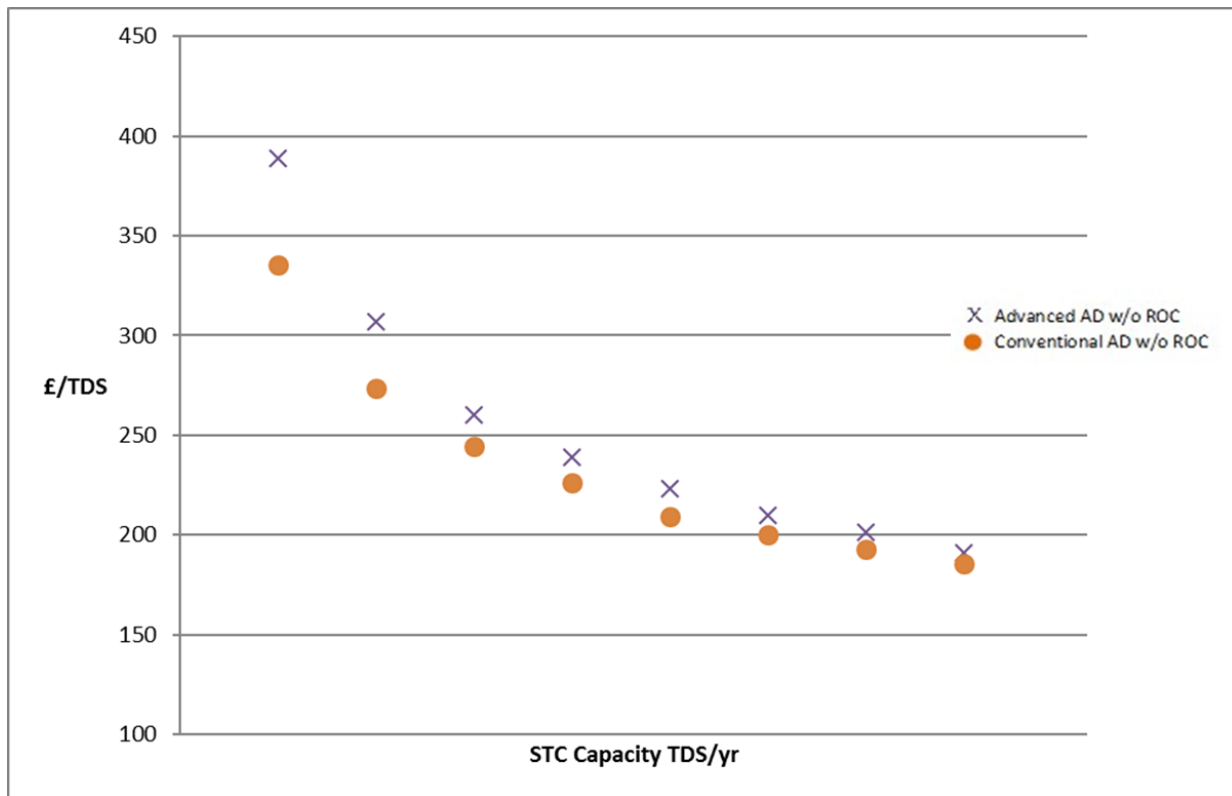
The preference for conventional AD over AAD will largely be determined by whether the higher capital expenditure and additional costs of process intensification associated with AAD are off-set by the benefits of additional energy revenues and the reduced cost of digestate transport.

The relative cost position between AD and AAD will, therefore, be site specific and will partly depend on legacy external factors such as EA ammonia consents and future conditions in the energy market. Given the extent of ammonia removal (and associated lower proportion of surplus activated sludge) across the YW region, plus the recent removal of the Renewables Obligation Certificates (ROC) regime, we conclude that conventional AD is most likely to be the technology choice of a hypothetical new entrant in the region we serve.

An indication of the comparative whole life cost position (pre and post ROC regime closure) is profiled in figure 5.2. This indicates the cost differential between AAD and conventional AD is marginal and can be influenced on site specifics. In 2020 conventional AD is most likely to provide the lowest cost solution.

Therefore, in our valuation we have assumed a modern equivalent asset to be on a 'like for like' technology, based on our actual assets as at 31 March 2020, reflecting the capacity of those assets. This equates to conventional AD at all but one site. For the Bradford Esholt STF we have assumed the modern equivalent asset would use an AAD solution, as per the thermal hydrolysis current asset.

Fig 5.2. Indicative cost per tonne of dry solid (TDS) comparison between AAD and conventional AD within the YW region.



The section below outlines the key characteristics and assumptions we have used in defining the bioresources modern equivalent assets being valued. This is based on the categories described by Ofwat in its April 2017 guidance.

Asset process technology

We have assumed all modern equivalent assets use the same primary technology as actual assets at 31 March 2020 on a 'like for like' basis, as explained in the section above.

Boundary of assets

We have complied with the definitions of the boundary of bioresources assets in RAG 4.06 and see no reasons for deviations from this approach.

Capacity and location of facilities

We have assumed all modern equivalent assets have the same capacity as the assets as at 31 March 2020. We also assume they would be located at the same sites as our existing assets, in accordance with Ofwat's expectations.

Consistent with our bioresources strategy we have assumed hypothetical assets will be of the same type as existing assets. This includes the continuation of a current site's configuration.

We have made no changes from our September 2017 submission.

Level of valuation

Our approach has been to value assets for each sludge treatment facility (STF) within our asset register. Further details on the valuation process is provided in commentaries in the supplementary document to this paper.

We have made no changes from our September 2017 submission.

Sub site processes

Our approach has been to cost at a process level for each sludge treatment works. Further details on the sub site processes is provided in commentaries in the supplementary document to this paper.

Ownership of assets

We have only considered assets that are owned by the appointed business as part of this valuation. All assets listed in the data tables are owned and operated by YW.

Treatment of sludge liquors

We have assumed there is no change to the existing treatment of sludge liquors as set out in RAG 4.06.

Wastewater RCV

We have taken the RCV forecast from our PR14 Final Determination for the wastewater control (as published within the FD14 company specific appendix) and inflated this to the relevant period, using the RPI values as published by the Office for National Statistics (ONS). This is presented in data table 1.

For the updated submission the hypothetical costs have been inflated from March 2017 to March 2018. The impact of this movement is shown in PR19 data table WWS12.

5.3 Stage 2 - Establish the gross MEAV

Ofwat requirement:

- *Companies should reflect the economic value of their sludge assets as at 31 March 2020.*
- *Companies should estimate their costs for the asset processes for the Modern Equivalent.*
- *Companies should estimate the economic value components of sludge treatment centres and allocate revenue streams including energy, bioresources end product value and third party income to this.*
- *Companies will need to include in the valuation other assets that contribute to sludge transport, treatment and disposal.*

We have used the economic valuation approach as outlined by Ofwat in its guidance of April 2017.

Within data table 2 we have provided the gross and net modern equivalent asset values (MEAV) as published in our Regulatory Accounts for 2015. Asset disposals or additions between April 2015 and March 2017 have been accounted for.

Following this step, we have made adjustments to reflect where sludge treatment or sludge disposal assets have been reclassified due to boundary changes set out in RAG 4.06.

Further detail of how we have sourced data for inclusion in data table 2 is provided in the commentary to the table.

Economic value of energy generation

We have considered the economic value for energy generation and renewable energy incentives attributable to our sludge assets.

Details are provided in data table 6, block O including our forecast revenues from ROCs. We have assumed the hypothetical new build assets would not be in receipt of renewable energy incentives.

We have made no changes from our September 2017 submission.

Other assets

YW moves sludge from smaller catchment sites into larger processing sites to ensure compliance and sludge treatment. The collection of sludge is carried out by the Company's fleet consisting of 26,000kg, 32,000kg and 44,000kg gross plated weight vehicles.

This activity utilises Kelda Transport Management Limited (KTML) information around fleet availability and our business planning processes to understand the capacity of the existing assets and the expected volumes to be moved.

Data relating to sludge disposal management and general, transport (raw cake) and transport (digestate cake) has been excluded as YW does not own any assets relating to this activity. This activity has been outsourced to service partners.

It has been assumed that the hypothetical capacity of the replacement of the logistics fleet is the same as the current fleet capacity. Any marginal changes in sludge demand are planned to be delivered through non-YW owned (outsourced) vehicles.

5.4 Stage 3 - Reflect the current assets

Ofwat requirements: Companies need to adjust gross MEAV of sludge assets to reflect the economic value of current assets that will be owned/operated as at 31 March 2020.

Adjustments to reflect, as far as possible, differences in economic value to the hypothetical new build costs that have been assumed.

- *existing assets will have different age profiles and remaining economic lives than the new build assets.*
- *assumptions have been made on the maintenance and operating costs of the new build asset, adjustments are required to reflect differences to what the existing assets are already delivering.*
- *identify what revenues (e.g. from energy generation and from bioresources end product) would be generated from the hypothetical new build assets, adjustments are required to the net value to reflect the existing potential revenue generation from the actual assets.*
- *clearly set out how they have arrived at market prices assumed in making any adjustment.*

YW has applied an economic approach consistent with Ofwat's published economic value formula.

Value and economic adjustments

To understand and reflect any adjustments in the gross value of the sludge assets we need to understand the economic value of the current assets that will be in operation at 31 March 2020.

The economic valuation approach requires an estimate of the income the incumbent operator would receive, at the sludge boundary, from the service provided under the company's duty. Ofwat has assumed this will be equivalent to the minimum price that a new entrant would be willing to accept to build new assets.

In operating cost terms, the new technology is assumed to be identical to the existing technology. Other revenues from end product sales are also deemed to be equivalent, therefore we have assumed that:

- the operating costs for the current assets (as at 2020) are equal to the operating costs of the new hypothetical assets, and,
- the income from the sale of bioresource end products for the current assets is equal to the income the new hypothetical assets would attract.

We have used the asset lives – existing remaining and hypothetical new build (data table 6, block H and block G) - for each individual process to assess the value of the present value adjustment term. The value of capital cost for the hypothetical new build is the estimated (gross) replacement cost of each equivalent individual process item (data table 6, block E).

For the energy generating income we have assumed that the hypothetical new build will not have access to ROC revenues post 2020, whereas the relevant current asset will have access to 20 years' worth of ROC revenue from the date of the original accreditation. This remaining ROC revenue period is used to calculate the second present value adjustment term. The income difference between current and hypothetical new build assets is reflected in the differential in the reported revenues received from power generation (data table 6, block O, lines 166 and lines 170).

Since the submission of the bioresources RCV allocation in September 2017, we have carried out a substantial market testing exercise around the bioresources capital requirements. This covered over 80% of the expected assets at March 2020 and reached out to over 90 external companies (potential asset owner, operators and service providers).

The results of the market testing were a range of potential solutions which identified approximately £100m of capital cost efficiency compared with our costed solutions from September 2017 based on our current cost base. This efficiency also includes the benefits of establishing an autonomous capital delivery model for bioresources.

This £100m converts to a 41% efficiency on the forward looking cost base. This is reflected in PR19 data table App24a and the bioresources totex within the table WWS1.

This efficiency has been translated into our RCV calculation, to reflect the efficient cost base that we will incur and a hypothetical entrant would be able to match.

Ofwat has provided an illustrative example of the economic adjustment in table 4.3 of its guidance³.

Our approach to several other key valuation issues are outlined below.

Land values

Ofwat requirement: Land values separately disclosed and approach to valuations explained.

The following commentary applies to the allocation of land and land values in data table 6, Block M. The valuation exercise was based on a desktop assessment and is aligned to industry best practice techniques in deriving the value.

The boundary measurements include all sludge treatment facility assets. Where there are split facilities on a site, separate measurements are taken and added together.

- Access roads associated with the STF are included.
- Bioresource assets include all assets mapped in the process.
- Sludge phyto-conditioning and sludge lagoons are excluded.

The land values have been sourced externally based on comparable industrial land values derived from market data reports⁴, and taking account of transactions completed by the Group's land development arm, Keyland Developments. The comparable evidence is based on completed transactions. Valuing land using comparable evidence is a surveying profession standard and recognised by the Royal Institution of Chartered Surveyors (RICS) for deriving a value.

The appropriate sourced land value is multiplied by the land area to obtain the value of land allocated for bioresource use (lines 152,153,156 from data table 6, block M).

The apportionment as to primary, secondary and tertiary land values is based on our understanding of the property market, demand and supply.

The valuation has been prepared based on the following assumptions and approach:

- Based on a hypothetical new asset build basis,
- The bioresources resource forms part of the operational STW/STF,
- The land is 'serviced land',
- The work carried out as a desktop based assessment,
- Any hypothetical new entrant occupies as a "Licence Holder" third part,

³ Economic asset valuation for the bioresources RCV allocation at PR19 – Ofwat (27 April 2017)

⁴ Carter Jonas Market Data, Department for Communities and Local Government - Land values estimated for policy appraisal (2015).

- The wastewater network plus land remains operational,
- There will be no negative impact to the regulatory obligations of the wastewater operation,
- Any premium land values (hope values) will be ignored, similarly any impact on value due to scarcity or lack of alternatives sites,
- The sludge facility will have rights for access and services with standard user maintenance obligations, and,
- The valuation is of the land only and specifically excludes any building and apparatus.

We have made no changes to land values from our September 2017 submission.

On costs

Ofwat requirements: Where explicable, an explanation for “on-costs”, which have been added to project values. This, is not limited to, and could include:

- *Project overheads (project management, central overheads, etc.)*
- *Risk and Contingencies applied.*
- *Any preliminaries.*
- *Design and Management Factors.*
- *Any commercial settlements arising from disputes.*

The standard costing methodology at YW comprises a core asset cost derived using models from our Unit Cost Database (UCD), the output of which is then used as the “x” input into an ‘on-cost’ model to apply overheads and non-core costs. The on-cost model is a linear regression plus offset model based upon observed costs from previous capital projects which uses the relationship between core asset costs and total delivery cost.

In the context of the on-cost model, the ‘core asset costs’ used here are essentially the contract value paid to the capital delivery partner to construct the asset. Project “overheads” covering preliminaries, design and management, supervision and project management by partner, are all embedded in the UCD cost models. The models also capture all ancillary costs, covering; roads, drainage, power supplies, fencing, lighting, security etc. as all costs that are not modelled separately, are included as an ancillary.

As the UCD cost models are built from observed outturn costs, they contain all materialised risk and contingencies used and the settlement of claims, etc. Therefore, we make no specific adjustments for additional risk or contingency costs.

The total delivery cost derived from the combination of both model sets represent total gross YW expenditure on a capital project exclusive of any income from 3rd parties. The on-cost model is sub-divided by investment area, for example waste, clean, network and treatment assets, and also by asset size, as differences observed between areas are statistically significant.

The best model fit is obtained with a linear regression of the form $y=mx+c$ (i.e. slope and an offset).

Where there is uncertainty about how work will be packaged into schemes a simple linear regression is used. This is preferable where the packages of work are difficult to determine.

On-costs for sludge are part of the sewage treatment on-cost models and these are:

	<i>Multiplier (m)</i>	<i>Intercept offset (c)</i>	<i>Input costs (x)</i>
$Y=mx+c$	1.247	£21,029	as relevant
$Y=mx$	1.28	n/a	as relevant

As part of the £100m of capital cost efficiency applied to our allocation for our RCV resubmission within the PR19 plan, the benefits of establishing an autonomous capital delivery model for bioresources will deliver an expected reduction in the level of on-costs related to capital project spend. The effect of this is therefore captured within the application of the 41% efficiency as detailed in PR19 data table WWS12.

5.5 Stage 4 - Consider alternative approaches

Ofwat requirements: Companies can consider cross checks and alternative approaches at a company level, not individual process or site level. One cross check that is likely to be relevant for companies to explain how the valuation has moved compared to the previous full revaluation carried out at PR09.

Alternative approaches

We consider that the most appropriate approach to allocating the RCV for bioresources is a 'focused economic value' method. In assessing the materiality of the impact from the allocation we have taken a proportional approach to cross checks.

Using the economic valuation method has meant that current and future cost considerations have been used for the basis of allocation where available.

This ensures that the allocation is robust as we are not reliant on historic asset valuations that were last updated in PR09. Whilst we continue to monitor MEAV allocation on a roll forward basis, we have placed greater emphasis on the impacts of the economic valuation method as a cross check. In assessing the impact, we have evaluated against key considerations, including our compliance with charging rules, our obligations under competition law and the protection for customers.

Setting the allocation based on a 'focused economic valuation method' will allow markets to develop within bioresources whilst protecting customers. It does so by considering the forward-looking revenues for bioresource assets and activities. The forward-looking revenues are important as these reflect what hypothetical entrants would pay for them. This ensures a level playing field within the industry as well as in adjacent external markets such as organic waste treatment. It also maintains consistency between charges and costs, aiding in the transparency of the market.

Cross checks

Ofwat requirements: Companies should undertake cross checks to provide assurance that the RCV allocation based on economic value is appropriate and protects customer interests. These should include testing if the allocation has an impact on customer bills or on the company's ability to set charges in line with both charging rules and competition law.

- *Companies will need to consider the impact of the RCV allocation on customer charge structures, as any changes in asset values from the previous MEAV valuation could have implications for their PR19 RCV run off rates.*
- *In arriving at the RCV allocation the choice between different approaches should consider the wholesale charge structure impacts.*
- *Explanation of how the impact on wholesale charges, including trade effluent, has been considered should be included. Where appropriate please support the explanations with evidence.*

Following our analysis, we consider that there will be no impact on wholesale charging structures. We will continue to charge trade effluent received via the Mogden formula and charge household customers and domestic-like non-household retailers for foul sewage services on a measured volumetric or an unmeasured Rateable Value (RV) basis.

Any customer bill impacts, caused by the move from an unfocused to a focused approach to RCV allocation, will primarily be seen within the Mogden formula. The Mogden formula accounts for differences in customer's pollutant concentrations (chemical oxygen demand and solids).

Firstly, we have undertaken an assessment based on hypothetical typical traders discharging low and high effluent strengths respectively. Our analysis shows that the low strength trader will typically see a small bill reduction of around 1.25% and the high strength trader will see a bill increase of less than 1% on the trade effluent component of a customer's bill.

Secondly, we assessed the potential impact by class of customer, between traders and other customers (household and domestic-like non-households). Traders on average may experience a small reduction in their overall trade effluent bill of around 0.5%. In contrast, other customers may experience a small wastewater bill increase of less than 0.1%.

These tests have been undertaken in isolation from any other drivers of future bill movements, resulting from the implementation of PR19 policies, and the delivery of our own bioresources strategy. We have done this to aid clarity in understanding the impact resulting from this specific policy. Further details of our assessment of impacts on wholesale charges and customers' bills are provided in Appendix 2.

In conclusion, our assessment indicates the shift to the focussed approach to RCV allocation will not materially impact on customer's bills. We will keep this under review through the business planning process.

We also conclude that the move to a focused approach will not impact on our ability to set charges in line with both charging rules and competition law.

We have made no changes in our approach from our September 2017 submission.

5.6 Stage 5 – Supporting information to explain our approach

Ofwat requirement: Companies to provide a comprehensive narrative which will aid Ofwat's understanding and allow for proportionate scrutiny of each company submission.

Sources of our explanatory narrative

Within this section we have provided a summary of the valuation approach and the assumptions made and weaknesses identified.

In figure 5.3 below, we outline where we have provided the information against the elements Ofwat listed in its April 2017 guidance document.

Fig 5.3. Location of the explanatory narrative within the document.

No	Item	Section in this document
1	A clear explanation of the approach taken to the valuation.	Section 5. – 5.2
2	A rationale of the valuation approach and how it satisfies the guidance document.	Section 5. – all sub-sections.
3	A clear explanation for how the economic value of the assets has been assessed, both how the hypothetical new asset has been defined and adjustments made to reflect the life and differences in economic value for the actual assets. A commentary for the submission tables, cross-referenced to supporting evidence may be useful.	Section 5. – 5.2, 5.3. 5.4 and the supplementary commentaries provided alongside this paper.
4	An explanation of the sources of asset cost, asset life and operating cost and revenue information, and the degree of confidence that companies have in this data.	Documented in the supplementary commentaries provided alongside this paper.
5	An overview of the sludge assets should be provided	Section 6.
6	Land values separately disclosed and approach to valuations explained.	Data tables and section 5 – 5.4
7	An overview of the sludge processes for each site.	Section 6.
8	Where applicable an explanation for “on-costs”, which have been added to project values.	Section 5. – 5.4
9	An explanation of the assurance procedures undertaken.	Section 8. and Appendix 1
10	A description of the cross checks that the company has considered and the sensitivity of the proposed allocation to the approach taken. Companies should confirm that they have followed the specific expectations set out in this guidance. Explanation of how the impact on wholesale charges, including trade effluent, has been considered should be included. Where appropriate please support the explanations with evidence.	Section 5. – 5.5 and Appendix 2
11	An explanation of the proposed RCV allocation taking into account all of the above, including updates for PR19 plan submission in September 2018.	Section 7.

Material assumptions

The material assumptions pertinent to the economic valuations exercise and RCV allocation are summarised in the figure 5.4. Detailed commentaries that cover the population of Ofwat's data tables are contained in a separate document.

Fig 5.4. Material assumptions underpinning the valuation and RCV allocation.

Area	Description of the assumption
Locations and capacities	We have assumed all hypothetical new build assets are located at the same sites and have the same capacities as the YW sludge assets as at 31 March 2020
Asset technology	We have assumed all hypothetical new build assets are of the same process technologies on a like for like basis, including the current configuration of sites, as the YW sludge assets as at 31 March 2020
Renewable energy incentives	We have assumed the hypothetical new build assets will not be in receipt of renewable energy incentives (ROCs)
Energy generation	We have assumed the hypothetical new build assets will generate the same level of energy as YW sludge assets as at 31 March 2020, due to their like for like technology, capacities and configuration. In addition, we have assumed there is no change in the underlying cost of energy imported or price of energy exported.
Operating expenditure	We have assumed the operating costs for hypothetical new build assets are equal to the operating costs of the YW sludge asset bases as at 31 March 2020
On costs for project values	We have used our standard costing methodology with project on-costs being based on observed levels for bioresources assets. We have assumed the level of on-costs associated with hypothetical new build assets will be the same as those we evaluate using our universal approach.
Land values	The valuation of land was based on a desktop assessment aligned to industry best practice. The apportionment of primary, secondary and tertiary land values is based on an understanding of the property market, demand and supply. We have not assessed or applied any premium land values
Processes not used in our assets	As at 31 March 2020 we will not utilise the following process categories across our assets: <ul style="list-style-type: none"> • 3. Raw / thickened sludge de-watering with liming, • 4. Raw sludge Incineration, • 8. Secondary digestion, and • 11. Digestate incineration.
Capital efficiency	Following review of the original RCV application submission in September 2017 we identified a further £100m capital efficiency which we have applied to produce a revised RCV position. We expect the hypothetical new entrant would also be able to identify and deliver this level of efficiency associated with the asset base from March 2020.

Weaknesses

In preparing the information we have observed that data within our Asset Inventory (AI), relating to some of the physical assets and their age, was not fully up to date.

We have addressed this weakness within the submission by engaging our operational and asset management teams to upgrade the information in the valuation process. This exercise impacted upon approximately 12% of the asset valuation.

The next step is to translate the upgrade into our AI ahead of the next submission of the data through accelerated data capture and reflecting the information collected through the action set out above. Since our September 2017 submission we are now in the delivery phase of our SAP programme and asset information upgrades will be accommodated in the asset application once this work concludes.

Sensitivity assessment

We have considered the sensitivity of the proposed bioresources RCV allocation of the material assumptions and weaknesses by undertaking a relatively simple assessment. The results are summarised in figure 5.5 and illustrate a relatively small estimated uncertainty in the total proposed allocation from significant variation in individual components.

Fig 5.5. Result of the sensitivity analysis on the proposed RCV (original and updated).

Cost component	Original RCV submission at September 2017		Updated RCV submission as part of the PR19 plan	
	£m	Proportion of wastewater RCV (%)	£m	Proportion of wastewater RCV (%)
Proposed bioresources RCV allocation	454.0	12.1	290.7	7.5%
Material assumptions sensitivity	Estimated uncertainty value (£m)	Estimated RCV allocation uncertainty (%)	Estimated uncertainty value (£m)	Estimated RCV allocation uncertainty (%)
We have assumed all hypothetical new build assets are located at the same sites, without additional land requirement, and have the same capacities as the YW sludge assets as at 31 March 2020. <i>Test: we require 10% additional land for hypothetical assets.</i>	+2	+0.05	+2	+0.05
We have used our standard costing methodology with project on-costs being based on observed levels for bioresources assets. We have assumed the level of on-costs associated with hypothetical new build assets will be the same as those we evaluate using our universal approach. <i>Test: we experience observed cost fluctuation between +2 to -6%.</i>	+2 to -6	+0.05 to -0.17	+1.4 to -4.5	+0.03 to -0.12

Material assumptions sensitivity	Estimated uncertainty value (£m)	Estimated RCV allocation uncertainty (%)	Estimated uncertainty value (£m)	Estimated RCV allocation uncertainty (%)
The valuation of land was based on a desktop assessment aligned to industry best practice. The apportionment of primary, secondary and tertiary land values is based on an understanding of the property market, demand and supply. We have not assessed or applied any premium land values. <i>Test: we have under or over estimated land values by 20%.</i>	+/-4	+/- 0.11	+/-4	+/- 0.10
Weakness sensitivity				
In preparing the information we have observed that data within our Asset Inventory (AI) relating to some of the physical assets and their age was not fully up to date. <i>Test: we have under or over estimated asset values by 10%.</i>	+/-5	+/-0.13	+/-3.5	+/-0.09
Estimated overall uncertainty	+13 to -15	+0.35 to -0.41	+11 to -12	+0.28 to -0.31

6. Overview of assets and processes

Ofwat requirement: An overview of the sludge assets should be provided: We expect this to include:

- An asset description.
- Site and capacity information.
- An overview of the sludge processes for each site

As per our strategy, by 31 March 2020, YW will own and operate 14 sludge treatment assets, where the primary treatment process is AD (one of which is AAD). There will also be 17 sludge treatment facility export sites which, after suitable preparation, allow for the collection and transport of sludge on to one of the 14 AD import sites.

The YW treatment asset base, through the 'Organic Change Strategy' has undergone significant change between 2015-20, with the closure of the remaining two incinerators and the rationalisation of several smaller AD sites. Therefore, there are some significant differences between data tables that represent AMP6 data and table 6, the 2020 planned position.

We have made no changes to our asset base assessment from our September 2017 submission.

Figure 6.1 summarises the YW interpretation of the 16 Ofwat categories.

Fig 6.1. Interpretation of the Ofwat categories.

1.	<p>Thickening</p> <p>These assets are defined as the complete thickening system including polymer and thickened sludge storage assets. Thickening system dewater raw sludges from source to a target 5%-6%.</p>
2.	<p>Raw / thickened sludge de-watering</p> <p>These assets are defined as the complete dewatering system including polymer and dewatered cake sludge storage assets. Dewatering system dewater raw sludges from source to a target 25%.</p>
3.	<p>Raw / thickened sludge de-watering with liming</p> <p>These assets are defined as the complete dewatering system including polymer and dewatered cake sludge storage assets. Dewatering system dewater raw sludges from source to a target 25% with the addition of lime injection.</p>
4.	<p>Raw sludge incineration</p> <p>No assets for incineration identified due to the YW strategic exit route from incineration completing by 2020.</p>
5.	<p>Sludge pre-treatment</p> <p>These include all assets upstream of primary treatment. Pre-treatment or preliminary treatment within the YW hierarchy include:</p> <ul style="list-style-type: none"> • Imported sludge liquid and cake reception facilities, • Sludge screening, • Sludge storage and transfer prior to thickening and or dewatering.

6.	<p>Primary anaerobic digestion</p> <p>These assets include the complete end to end digestion system including:</p> <ul style="list-style-type: none"> • Sludge pumping, • Digestion vessels and associated recirculation system, mixing and instrumentation, • Biogas handling plant, including gas holder and waste gas burner and condensate collection system, • How water boiler and recirculation system, • Digester compounds.
7.	<p>Energy generation</p> <p>These assets include combined heat and power units associated to digestion treatment processes and biogas handling.</p>
8.	<p>Secondary digestion</p> <p>Secondary digestion is not used by YW in the form of secondary retention vessels.</p>
9.	<p>Digestate de-watering / drying</p> <p>These assets are defined as the complete dewatering system including polymer and dewatered cake sludge storage assets. Dewatering system dewater Digested sludges from source to a target 25%.</p>
10.	<p>Digestate conditioning</p> <p>These assets include all associated digested sludge secondary treatment to meet pathogen levels for the safe sludge matrix and are made up of impermeable surfaces to facilitate windrowing of digested cake for e retention period of 8 weeks.</p>
11.	<p>Digestate incineration</p> <p>YW do not process digested sludge via incineration (note -incineration assets no longer in service by 2020).</p>
12.	<p>Liquor treatment (as part of sludge assets)</p> <p>These assets include the transfer and storage/buffering of centrate liquors from the digested dewatering process prior to transfer to the WwTW.</p>
13.	<p>Transport (tankering)</p> <p>Any tankering of untreated liquid sludge from sludge production sites. YW have included only activity/assets owned by YW and have excluded contracted activity.</p>
14.	<p>Transport (raw cake)</p> <p>Any transport of untreated cake sludge from sites with dewatering activity. YW have not included any activity/assets as none are owned by YW and all are contracted activity.</p>
15.	<p>Transport (digestate cake)</p> <p>Any transport of treated cake sludge from sites with treatment activity to disposal route. YW have not included any activity/assets as none are owned by YW and all are contracted activity.</p>

16.	<p>Other</p> <p>Costs associated with buildings plus specific capital spend lump sum estimates:</p> <ul style="list-style-type: none">• Aldwarke STF - £3m Lump sum for predicted capital spend not yet fully designed/defined.• Blackburn Meadows STF - £3.2m Lump sum for predicted capital spend not yet fully designed/defined.• York Naburn STF - £3m Lump sum for predicted capital spend not yet fully designed/defined.
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Figure 6.2 below, summarises the YW asset base as at 31 March 2020, totalling 31 active sites, summarising information from data table 6 (unless otherwise stated).

Fig 6.2. Summary table of the YW asset base at 31 March 2020.

Asset SAI ref	Asset Name	Capacity (TDS) - Block B	Mean Asset Life (years) - Table 3	Mean Age (years) - Table 4	Gross Replacement Cost (£m)	Valuation of Land (£m)	Gross MEAV - M&G table 3_4 column O	Gross MEAV
SAI00037747	ALDWARKE/STF	7,080	32	11	31.837	1.175	2.440	35.452
SAI00061597	BEVERLEY/STF	1,631	43	18	1.532	0.099	0.117	1.748
SAI00522999	BLACKBURN MEADOWS/2 STF	15,161	34	7	37.324	1.813	2.861	41.998
SAI00131385	BRADFORD ESHOLT/NO 2 STF	27,564	37	11	64.309	2.008	4.929	71.246
SAI00165401	BRIDLINGTON/STF	3,900	29	16	11.650	0.094	0.893	12.637
SAI00017487	HUDDERFIELD/STF (was Calder valley STF)	16,493	26	0	46.725	1.209	3.581	51.515
SAI00061599	CALDER VALE/STF	3,674	56	26	21.679	1.406	1.662	24.747
SAI00061600	CASTLEFORD/STF	1,682	41	5	5.852	0.086	0.449	6.387
SAI00192163	COLBURN/NO 2 STF	1,631	25	14	6.721	0.043	0.515	7.279
SAI00002709	* DEIGHTON/STW	-	-	-	-	-	-	-
SAI00061249	DEWSBURY/STF	11,432	40	20	35.727	1.258	2.738	39.723
SAI00163089	GOOLE/STF	1,747	31	19	6.637	0.079	0.509	7.225
SAI00310311	HALIFAX COPLEY/STF	6,989	31	13	19.329	0.246	1.481	21.056
SAI00275428	HARROGATE SOUTH/NO 2 STF	2,236	37	12	4.835	0.037	0.371	5.243
SAI00208571	HULL/STF	19,346	45	17	27.538	2.812	2.111	32.461
SAI00104837	KNOSTROP/NO 2 STF	32,987	35	2	66.471	1.813	5.095	73.379

Assets marked with * are current assets in 2017 that will no longer be operational as bioresources assets by 31 March 2020. Table continues over the page.

Asset SAI ref	Asset Name	Capacity (TDS) - Block B	Mean Asset Life (years) - Table 3	Mean Age (years) - Table 4	Gross Replacement Cost (£m)	Valuation of Land (£m)	Gross MEAV - M&G table 3_4 column O	Gross MEAV
SAI00001820	* LEEMING BAR/STW	-	-	-	-	-	-	-
SAI00121664	LUNDWOOD/STF	4,065	46	30	15.635	0.422	1.198	17.255
SAI00214649	NEILEY/STF	2,726	25	12	4.795	0.095	0.368	5.258
SAI00062413	OLD WHITTINGTON/STF	5,194	32	8	20.505	1.198	1.572	23.275
SAI00244008	RIPON/NO 2 STF	2,376	28	19	9.850	0.096	0.755	10.701
SAI00024242	SANDALL/STF	3,905	35	19	15.132	2.220	1.160	18.512
SAI00210040	SCARBOROUGH/STF	5,591	36	18	18.064	0.036	1.385	19.485
SAI00130756	SELBY/STF	1,456	37	20	2.672	0.087	0.205	2.964
SAI00023324	SKIPTON/STF	1,398	22	14	2.193	0.047	0.168	2.408
SAI00099757	STAVELEY/STF	1,561	27	18	5.618	0.119	0.431	6.168
SAI00062333	SUTTON/STF	2,796	39	18	2.121	0.089	0.163	2.373
SAI00163058	WHITBY/STF	3,494	42	19	5.503	0.017	0.422	5.942
SAI00097390	WOMBWELL/STF	3,494	8	4	4.165	0.129	0.319	4.613
SAI00522088	WOODHOUSE MILL/NO 2 STF	4,114	32	8	13.074	0.388	1.002	14.464
SAI00217358	YORK NABURN/NO 2 STF	8,392	42	18	24.261	0.767	1.859	26.887
SAI00094182	MALTON/STF	233	23	18	2.146	0.100	0.164	2.410
SAI00123918	* NORTHALLERTON/STF	-	-	-	-	-	-	-
SAI00105064	SOUTH ELMSALL/STF	1,747	27	23	0.823	0.054	0.063	0.940
N/A	SLUDGE TRANSPORT				3.568	-	-	3.568
ALL ASSETS	ALL ASSETS	206,095			538.291	20.042	40.986	599.319

Assets marked with * are current assets in 2017 that will no longer be operational as bioresources assets by 31 March 2020

Figure 6.3 summarises the processes utilised across the YW asset base as at 31 March 2020.

Fig 6.3. Summary processes used across the YW asset base at 31 March 2020.

Site Name and associated processes per site - detailing the dominant process on each site (as at 31 March 2020)	Dominant Process	1. Thickening	2. Raw / thickened sludge de-watering	3. Raw / thickened sludge de-watering with liming	4. Raw sludge incineration	5. Sludge pre-treatment	6. Primary anaerobic digestion	7. Energy generation	8. Secondary digestion	9. Digestate de-watering / drying	10. Digestate conditioning	11. Digestate incineration	12. Liquor treatment (as part of sludge assets)	16. Other
ALDWARKE/STF	Conventional Anaerobic Digestion	•				•	•	•		•	•			•
BEVERLEY/STF	Other		•			•								•
BLACKBURN MEADOWS/2 STF	Conventional Anaerobic Digestion	•				•	•	•		•				•
BRADFORD ESHOLT/NO 2 STF	Advanced Anaerobic Digestion		•			•	•	•		•	•		•	•
BRIDLINGTON/STF	Conventional Anaerobic Digestion	•				•	•	•		•	•			•
HUDDERFIELD/STF (was Calder valley STF)	Conventional Anaerobic Digestion	•				•	•	•		•			•	
CALDER VALE/STF	Conventional Anaerobic Digestion	•				•	•	•		•	•			•
CASTLEFORD/STF	Other		•			•								•
COLBURN/NO 2 STF	Other	•	•			•								•
* DEIGHTON/STW	Other													
DEWSBURY/STF	Conventional Anaerobic Digestion	•				•	•	•		•	•			•
GOOLE/STF	Other	•	•			•								•
HALIFAX COPLEY/STF	Other		•			•								•
HARROGATE SOUTH/NO 2 STF	Other		•			•								•
HULL/STF	Conventional Anaerobic Digestion	•				•	•	•		•				•
KNOSTROP/NO 2 STF	Conventional Anaerobic Digestion	•				•	•	•		•			•	

Assets marked with * are current assets in 2017 that will no longer be operational as bioresources assets by 31 March 2020. Table continues over the page.



Site Name and associated processes per site - detailing the dominant process on each site (as at 31 March 2020)	Dominant Process	1. Thickening	2. Raw / thickened sludge de-watering	3. Raw / thickened sludge de-watering with liming	4. Raw sludge incineration	5. Sludge pre-treatment	6. Primary anaerobic digestion	7. Energy generation	8. Secondary digestion	9. Digestate de-watering / drying	10. Digestate conditioning	11. Digestate incineration	12. Liquor treatment (as part of sludge assets)	16. Other
* LEEMING BAR/STW	Phyto Conditioning / Composting													
LUNDWOOD/STF	Conventional Anaerobic Digestion	•				•	•	•		•	•			•
NEILEY/STF	Other		•			•								•
OLD WHITTINGTON/STF	Conventional Anaerobic Digestion	•				•	•	•		•	•			•
RIPON/NO 2 STF	Other		•			•								•
SANDALL/STF	Conventional Anaerobic Digestion	•				•	•	•		•	•			•
SCARBOROUGH/STF	Other	•	•			•								•
SELBY/STF	Other		•			•								•
SKIPTON/STF	Other		•			•								•
STAVELEY/STF	Other	•	•			•								•
SUTTON/STF	Other		•			•								•
WHITBY/STF	Other	•	•			•								•
WOMBWELL/STF	Other		•			•								•
WOODHOUSE MILL/NO 2 STF	Conventional Anaerobic Digestion	•				•	•	•		•	•			•
YORK NABURN/NO 2 STF	Conventional Anaerobic Digestion	•				•	•	•		•	•			•
MALTON/STF	Thickening	•				•								
* NORTHALLERTON/STF - Network Plus Only	Thickening													
SOUTH ELMSALL/STF	Thickening		•											

Assets marked with * are current assets in 2017 that will no longer be operational as bioresources assets by 31 March 2020

7. Proposed RCV allocation

The evaluation and RCV allocation exercise has been carried out using a forward looking economic value assets approach, in accordance with the guidance provided by Ofwat.

The evaluation and allocation has been assured, including external independent assurance, scrutiny by the Board Audit Committee and the provision of the Board Assurance Statement at September 2017. Halcrow have assured our updated RCV assessment.

The summary of our proposed bioresources RCV outcome is set out below in the figure 7.1:

Fig 7.1. Updated outcome of the valuation and RCV allocation analysis.

Information requirement	Initial bioresources RCV valuation figure (from September 2017)	Updated bioresources RCV valuation figure (for September 2018)
Gross valuation of bioresources assets	£599 million	£394 million
New economic value of bioresources assets (net MEAV)	£454 million	£291 million
Proposed bioresources RCV allocation	£454 million	£291 million
Pre-2020 legacy wastewater RCV *	£3,736 million	£3,861 million
Proportion of pre-2020 legacy wastewater RCV	12.2%	7.5%

* We have updated the 2019-20 wastewater RCV value to reflect the March 2018 RPI value.

The material changes made to the proposed final net MEAV as reflected in PR19 data table WWS12 are set out in figure 7.2 below:

Fig 7.2. Material changes in RCV allocation as presented in PT19 plan (table WWS12).

Change description	Impact of change
Inflation from March 2017 to March 2018 prices. The hypothetical costs have been inflated from March 2017 to March 2018 prices	+£14m
Gross cost of hypothetical new assets. The identified c£100m capital cost efficiency has been translated into our RCV calculation, to reflect the efficient cost base that the hypothetical will incur.	-£225m
Differences in revenue and costs between hypothetical and actual assets. Hypothetical assets remain the same. We have used the opex and capex forecasts that are included within PR19 data table WWS1 for 2019-20 and updated our ROC income on our current assets to reflect the forecast within table WWS1.	-£5m
Adjustment for the remaining economic life of existing processes. Asset lives on hypothetical and current assets remain the same. This adjustment is due to the change in the hypothetical costs that we have included.	+£52m

8. Assurance

8.1 Approach to assurance

In line with our regulatory reporting assurance processes, YW has implemented a programme of assurance to support the preparation of the information. It has been based on our existing 'three lines of assurance' approach.

We have two main assurance processes:

- A data assurance process to ensure that the data we produce is accurate.
- A wider assurance process to make sure that the overall publication meets any guidance and that the publication is accessible and easy to understand.

Further information on our assurance processes is detailed within our published Assurance Plan ⁵.

In summary, the activities in place to deliver this submission were as follows:

Level 1 Assurance:

- For our data assurance processes, data providers and data managers were identified to compile the information required. These roles are accountable for providing information in line with the guidance. In addition, these roles ensure that a procedure for obtaining the information is developed to document the process and methodology for obtaining the information, ensuring that the information can be collected again consistently in the future.
- For our wider assurance processes, a submission manager was identified to ensure that the overall submission meets the requirements and is delivered within the necessary timescales.

Level 2 Assurance:

- For our data assurance processes, senior managers have reviewed and approved the information within the publication, ensuring the data provided meets the requirements of the submission. In addition, regulatory oversight of the full information obtained has been completed.
- For our wider assurance processes, senior managers have reviewed the submission to confirm it meets the necessary guidance, whether the overall impact and implications have been appropriately and transparently explained and whether the submission meets the standards expected. This will specifically include a review on whether the RCV allocation is appropriate, will not have an adverse impact on customer bills, is consistent with charging rules and is consistent with competition law.

Level 3 Assurance:

- Halcrow Management Sciences Limited were appointed to provide independent assurance. As a company within prescribed assurance status, Halcrow has provided an extensive review on the following areas:
 - Assurance that data tables and supporting information is accurate. This was completed through ensuring consistency with source data and ensuring supporting information accurately explains the process of populating the tables.
 - Assurance that material assumptions have been exposed, including any weaknesses or uncertainty in the data and how this will be rectified. This was completed through a review of any assumptions and limitations declared and using the review of data tables (as above) to identify whether any other assumptions or limitations should be stated.

⁵ [Yorkshire Water Assurance Plan for 2016/17 and 2017/18](#)

- Assurance that the approach taken reflects the guidance provided by Ofwat. This was completed through a review of the data tables and commentary for alignment against the Ofwat guidance.
- Assurance on the source of costing and supporting information used to support the calculation of economic value. This was completed through a review of the source data supporting the data tables to assure the process of determining the MEAV, and the quality of the source data.
- Assurance on the asset data appropriate to the source. This was completed through a review of the source data supporting the data tables to evaluate the reliability of information extracted from source systems, including underlying accounting records.
- Assurance that the RCV is appropriate. This was completed through a review of the data tables, accompanying commentary and source data.

The report from Halcrow is attached within Appendix 1 of this submission document.

8.2 Role of the Board Audit Committee

The production of the bioresources RCV allocation has been subject to detailed review and challenge by the Board Audit Committee (BAC).

The BAC has:

- reviewed the processes and controls in place for managing this submission,
- reviewed the output of the valuation and allocation analysis, and
- reviewed the audit findings and received a report from the independent auditor, Halcrow,

Following scrutiny of the submission documentation, the methodology for deriving the RCV and having received feedback on the findings of the assurance process, the BAC challenged management to:

- close out all red and amber actions identified by the third line of assurance, provided through Halcrow,
- ensure that all assumptions and weaknesses are exposed in the submission,
- complete a sensitivity analysis associated with the assumptions and weaknesses,
- make sure the Board Assurance Statement reflected the uncertainties at this stage of the process, and
- re-present the submission and assurance for formal recommendation by the BAC before requesting final Board approval.

8.3 Board approval and assurance

The Board has received:

- confirmation from management that the information meets Ofwat's guidelines,
- confirmation that material assumptions and weaknesses have been exposed,
- feedback from the third line of assurance that Ofwat's guidelines have been followed, and,
- assurance from the BAC that appropriate governance and controls have been put in place.

The Board Assurance Statement from September 2017 is attached at the beginning of this document.

The entire Yorkshire Water PR19 plan has been assured by the Yorkshire Water Services Limited Board.

9. Contact

For any contacts about this RCV allocation submission document or the supporting information, please contact:

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Email: colin.fraser@yorkshirewater.co.uk

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Appendix 1 – Auditors report (Sept 2017 submission)



FINAL REPORT: SUMMARY OF AUDIT FINDINGS

Halcrow Management Sciences Ltd

Bioresources Valuation and Allocation Tables

PREPARED BY: Alex Lane, Andy McConkey, Chris Turner

DATE: 01 September 2018

This Summary of Audit Findings (SAF) Report describes the assurance by Halcrow Management Sciences Limited (HMS) of Yorkshire Water Services (YWS) Bioresources Valuation and Allocation. It consolidates two previous reports submitted to YWS on 13 September 2017 and 22 September 2017.

1. Key Findings

Key findings from the assurance of the Bioresources Valuation and Allocation are as follows:

- In completing the data tables, HMS considers that YWS has followed the Ofwat guidance⁶. Where the guidance is ambiguous, the YWS Submission Commentary and Table Commentary explain the adopted approach.
- The overarching Submission Commentary (*Bioresources RCV commentary August 2017 Draft v6 210917.docx*) and accompanying Table Commentary (*Bioresources RCV table commentary September 2017.docx*) prepared by YWS describe the approach and methodology adopted, and assumptions applied. HMS has made recommendations (observations assigned Blue RAG scores) for additional descriptions to be included in these documents. These observations have been supplied to YWS alongside of tracker of all comments and responses made during the assurance process (*YWS Bioresources Assurance Tracker – 280917.xlsx*);
- The reviewed submission tables reflect the Submission Commentary and Table Commentary;
- No Red or Amber scores which would otherwise highlight material or minor concerns over the validity of the submission have been identified in the observations made. YWS has informed HMS that it will continue to review and respond to Blue issues, reflective of recommended improvements;
- HMS has conducted a risk based review on source data (as described in the comment tracker). The accuracy of data outside these spot checks cannot be confirmed; and
- We consider that the submission tables presented, together with the Submission Commentary and Table Commentary, meet the Ofwat reporting requirements for the submission.

2. Background and Scope

In May 2016, Ofwat published *Water 2020: our regulatory approach for water and wastewater services in England and Wales*. This included a decision to introduce a binding separate price control for bioresources at the 2019 price review (PR19) using an explicit regulatory capital value (RCV) allocation. This decision is also reflected in consultation documents on PR19 released in July 2017.

⁶ Bioresources RCV allocation tables have been published by Ofwat -

<http://www.ofwat.gov.uk/consultation/consultation-on-economic-asset-valuation-for-the-bioresources-rcv-allocation-at-pr19/#Consultation>

Currently, the water and sewerage companies (WaSCs) have a single value for wastewater RCV that is the capital value of its wastewater assets, including bioresources assets, for regulatory purposes. To allocate part of the wastewater RCV to the new bioresources price control, Ofwat has decided that WaSCs will take a *focused* approach, where the allocation is based on the value of the assets used. The RCV remaining after deducting the economic value of the bioresources assets will be allocated to the Wastewater Network Plus control.

WaSCs will complete the valuation based on the future economic value of bioresources assets as at 31 March 2020. This means that WaSCs will need to accurately forecast asset changes from 2017 to 2020.

WaSCs will complete a valuation based on the future economic value of bioresources assets using the net modern equivalent asset value (MEAV). WaSCs should also complete cross checks to provide assurance that the RCV allocation based on economic value is appropriate, and that it protects customer interests.

Ofwat have been published Microsoft Excel tables to be used to present the bioresources economic valuation and RCV allocation¹. Ofwat has also maintained a forum through which WaSCs can raise queries related to the submission, and through which revised tables have been made available.

HMS has been engaged by YWS to provide the assurance tasks outlined in **Table 2-1**. The project has been delivered through a series of face-to-face meetings at YWS head office, telephone calls and WebEx workshops to review specific items of the submission, and through an offline review of data.

A risk based approach has been taken to the assurance of source data: A number of data checks of source data have been conducted and these are described in the comments tracker. The accuracy of source data that has not been spot checked cannot be confirmed.

Table 2-1: Scope of Assurance

Item	Assurance Tasks Completed by HMS
Assurance that data tables and supporting information prepared by YWS are accurate.	<ul style="list-style-type: none"> • HMS has reviewed the following documents to check consistency with Ofwat expectations for the submission (previous versions of these documents were also reviewed): <ul style="list-style-type: none"> - Bioresources Data Tables provided on 21 Sep 2017 (Bioresources-RCV-allocation-tables-final - allocations 21.09.2017.xlsx). - Bioresources Table Commentary provided on 21 Sep 2017 (Bioresources RCV table commentary September 2017.docx). - Bioresources Submission Commentary provided on 21 Sep 2017 (Bioresources RCV commentary August 2017 Draft v6 210917.docx). • HMS has conducted limited spot checks on source data as described in the comment tracker.
Assurance that material assumptions have been exposed, including any weaknesses or uncertainty in the data and how this will be rectified.	<ul style="list-style-type: none"> • HMS has reviewed the assumptions and limitations declared by YWS in the Bioresources Submission Commentary, Bioresources Table Commentary and has used the review of the Bioresources Data Tables (above) to identify if other assumptions or limitations should be stated. Recommended improvements to the commentary documents are listed in the comment tracker.
Assurance that approach taken reflects the guidance provided by Ofwat (or alternative approach fully explained).	<ul style="list-style-type: none"> • HMS has reviewed the Bioresources Data Tables, Bioresources Submission Commentary and Bioresources Table Commentary for alignment against the Ofwat guidance.
Assurance on the source of costing and supporting information used to support the calculation of economic value.	<ul style="list-style-type: none"> • HMS has conducted spot checks on source data used to populate the Bioresources Data Tables (described in comment tracker). The accuracy of source data that has not been spot checked cannot be confirmed.

Item	Assurance Tasks Completed by HMS
Assurance on the asset data appropriate to the source.	<ul style="list-style-type: none"> HMS has conducted spot checks on source data used to populate the Bioresources Data Tables (described in comment tracker). The accuracy of source data that has not been spot checked cannot be confirmed.

Item	Assurance Tasks Completed by HMS
Assurance that the RCV allocation is appropriate.	<ul style="list-style-type: none"> By reviewing the Bioresources Data Tables and bioresources commentaries, HMS has reviewed whether the RCV allocation is in accordance with Ofwat guidance.
Assurance that the RCV allocation will not have an adverse impact on customer bills.	<ul style="list-style-type: none"> By reviewing the Bioresources Data Tables and bioresources commentaries, HMS has reviewed whether the RCV allocation is in accordance with Ofwat guidance. It is understood that YWS will run the derived RCV split between Bioresources and Network Plus through its charging model.
Assurance that the RCV allocation is consistent with charging rules.	<ul style="list-style-type: none"> By reviewing the Bioresources Data Tables and bioresources commentaries, HMS has reviewed whether the RCV allocation is in accordance with Ofwat guidance. It is understood that YWS will run the derived RCV split between Bioresources and Network Plus through its charging model.

3. Summary of Audit Checks

HMS has conducted the following audit checks to prepare this report:

- Audit meeting held with YWS data providers and data managers on 23 August 2017 to review current tables and methodologies;
- Limited offline review of submission tables received on 7 Sep 2017 (*Bioresources-RCV-allocation-tables-final - allocations 30.08.17.xlsx*);
- Limited offline review of *Bioresources RCV commentary August 2017 Draft v4 050917.docx*, received on 7 Sep 2017;
- Limited offline review of *Bioresources RCV table commentary August 2017 Draft v2.docx*, received on 7 Sep 2017; and
- Audit teleconference and WebEx held with YWS data providers and data managers on 12 September 2017 to review the following tables and methodologies:
 - Bioresources-RCV-allocation-tables-final - allocations 11.09.2017.xlsx*
 - Bioresources RCV commentary August 2017 Draft v5 110917.docx*
 - Bioresources RCV table commentary September 2017.docx*
 - Sludge Production Treatment capacity methodology_V2.docx*
- Offline review of the following tables and methodologies:
 - Bioresources-RCV-allocation-tables-final - allocations 21.09.2017.xlsx*, emailed to HMS on 21 Sep 17;
 - Bioresources RCV table commentary September 2017.docx*, emailed to HMS on 21 Sep 17 (referred to in this document as the Table Commentary); and
 - Bioresources RCV commentary August 2017 Draft v6 210917.docx*, emailed to HMS on 21 Sep 17 (referred to in this document as the Submission Commentary).

4. Issues Log

The definitions of the RAG scores applied during the assurance are presented in **Table 4-1**.

Table 4-1: Confidence Grades

RAG Score	Description
Green	No material exceptions and compliant with the requirements.
Blue	Content with reported information but supporting data needs completion or noting of future improvements required.
Amber	Minor concerns over reported data or concerns over supporting documentation.
Red	Material concerns over the validity of the submission.

Table 4-2 summarises the final RAG scoring of issues identified during the assurance process. No Red or Amber scores which would otherwise highlight material or minor concerns over the validity of the submission have been identified in the observations made. YWS has informed HMS that it will continue to review and respond to Blue issues, reflective of recommended improvements.

Table 4-2: Summary of RAG Scores

Table	Red	Amber	Blue	Green	Total Audited
Overview	0	0	1	3	4
Tables 1 and 2	0	0	3	2	5
Tables 3, 4 and 5	0	0	17	29	46
Table 6	0	0	23	20	43
	0	0	44	54	98

The SAF submitted to YWS on 13 September 2017 recorded a total of 12 issues that were assigned a RAG score of Amber, indicating minor concerns over reported data or concerns over supporting documentation. The submission documentation reviewed on 22 September 2017 addressed these issues to the extent that they are all now scored either Blue or Green.

Table 4-3 lists each of the Amber issues raised in the SAF of 13 September 2017, alongside a YWS response and HMS comments in light of a review of the documents listed in **Section 3** on 22 September 2017.

Table 4-3: Review of Responses to Amber Issues in SAF

Amber Issue Raised in SAF (13 Sep 17)	YWS Response	HMS Comment	RAG Score 22 Sep 17
<p>Audit Ref. G_4: Latest commentary file reviewed (<i>Bioresources RCV table commentary September 2017.docx</i>). It is recommended that a table be included to indicate where each of Ofwat's expectations (Table 4.5 of guidance note - April 2017) has been addressed. Section 6 - Proposed RCV Allocation should include an explanation of the allocation as per Ofwat requirements. Section 6 - Overview of Assets and Processes should be updated once all other observations made in this issues tracker have been addressed.</p>	<p>Updates to the commentary have been made.</p>	<p>Recommended updates have been made. We note that sections of this Submission Commentary are to be completed (Section 2.5 and Fig. 6.1 for example) We have conducted a limited review of the Submission Tables and make the following observations:</p> <ul style="list-style-type: none"> • In Fig 5.3, check cross-referenced sections (no Section 4.3, Appendix 1 does not address item 4, overview of assets comes in Section 6) • In Fig 5.4 (assumptions) recommend highlighting that assumption related to remaining life (default 1 year if negative) referred to in this table of observations. • Check numbers in Fig. 5.5 • In Fig 6.2, summing for mean asset age and life is inappropriate. • In Fig 6.3, why does Malton have a treatment process (No. 5) when it appears in submission Table 3. 	<p>B (noting that several HMS observations have been made against the Submission Commentary. This report requires a review to ensure consistency with the submitted tables)</p>
<p>Audit Ref. T3_4-8: YWS to correct the following sites where sites have a Population Equivalent value, but no Total Volume Received in the year in question: Malton (2016/17), Huddersfield (2015/16 and 2016/17), Beverley (2015/16). Line commentary for PE should be expanded to explain why one site may have lower volume received but higher PE than another (Malton and Northallerton in 15/16 for example).</p>	<p>This has been reviewed and updated. If there is zero volume there is zero Population Equivalent (PE) value and vice versa. The line commentary has been updated to explain why one site may have a lower volume received but higher PE than another.</p>	<p>Table 3 and Table 4 have been updated as stated in YWS response. Noted that stated amendment to the Table Commentary has been made.</p>	<p>G</p>

Amber Issue Raised in SAF (13 Sep 17)	YWS Response	HMS Comment	RAG Score 22 Sep 17
<p>Audit Ref. T3_4-14: Age and remaining life traced to source data for Lundwood. Error identified against Process 9. YWS to repeat transposition of data from working sheets to final data tables and to review all age entries. Noted that for approximately 10% of assets, remaining life is negative and a 1 year value is assumed. This assumption has an impact on the Net modern equivalent value calculated and should be listed in the commentary assumptions.</p>	<p>The table has been fully reviewed. The latest tables now show the correct information for Lundwood. A full quality assurance check of the table has been completed as a Level 1 assurance check. The commentary has been updated to provide information on the assumption of a 1-year remaining life when the calculation reports a negative value.</p>	<p>Confirmed that no negative remaining life values exist in Table 6, 3 or 4. Noted that stated amendment to the Table Commentary has been made.</p>	<p>G</p>
<p>Audit Ref. T3_4-40: Dominant process should be updated to match one of the Ofwat drop down options.</p>	<p>The table has now been updated. The commentary has also been updated.</p>	<p>Noted that stated amendment to the Table Commentary has been made.</p>	<p>G</p>
<p>Audit Ref. T3_4-41: Noted that Calder Valley has age of 26 years and remaining life of 30 years. YWS explained that this reflects sludge lagoons which have a long life (77 years). Recommend that this is explained in table commentary. Noted that Wombwell has age of 4 years and remaining life of 4 years. YWS should review this data and confirm it is correct or otherwise update. If correct, it should be explained in table commentary.</p>	<p>The table has been fully reviewed and a full quality assurance check of the table has been completed as a Level 1 assurance check. Regarding Calder Vale, the commentary has been updated. The table has been updated to show that Wombwell has an age of 4 years and remaining life of 15 years. The commentary has been updated for Table 6 Section.</p>	<p>Noted that stated amendment to the Table Commentary in relation to Calder Vale has been made (note typo in response and Table Commentary – ‘reaming’) Noted that stated amendment to the Table Commentary in relation to Wombwell has been made. The Table Commentary should make it clear which sites have used cost and capital data from planned capital schemes. HMS has not reviewed or spot checked source data in relation to the change described by YWS.</p>	<p>B</p>
<p>Audit Ref. T6-1: Observed that one site within table 6 only has dewatering process (South Elmsall). This should be in Table 3, not Table 4. Observed that many sites in Table 6 have only dewatering and pre-treatment. YWS to review Ofwat definition in forum and confirm that sites are correctly presented in either Table 3 or 4. Assigned Amber RAG as no impact on total RCV number.</p>	<p>We can confirm that we have reviewed the guidance available and can confirm that we have correctly presented the information in line with the guidance.</p>	<p>Submission Commentary Fig 6.2 should be updated to make it clear which sites are thickening sites and that these sites do not appear in Table 6.</p>	<p>B</p>



Amber Issue Raised in SAF (13 Sep 17)	YWS Response	HMS Comment	RAG Score 22 Sep 17
<p>Audit Ref. T6-4: HMS checked that data in Column K of RCV - CHP Generation FINAL.xlsx is correctly transposed into Bioresources Data Tables. YWS should explain if the commentary why CHP's identified as 'Not Commissioned' in RCV - CHP Generation FINAL.xlsx have been included in the Energy Generation capacity.</p>	<p>We have stated within the commentary that the energy generation is based on the assumed energy capacity as at the 31 March 2020.</p>	<p>The YWS response does not address the original observation. If it is the case that CHPs identified as not commissioned will actually have been commissioned by 2020, this should be stated in the Table Commentary.</p>	<p>B</p>
<p>Audit Ref. T6-18: Recommend that use of ARUP quality and growth model and its status is included in line commentary. Reference to appropriate appendix to be included. Observed that forecast average throughputs for several processes and sites exceed capacity. YWS explained that these values are correct but that there are no confirmed plans to increase capacity as yet. The Ofwat guidance on this issue could be clearer and it is considered that retaining existing numbers along with an explanation of why they occur in the line commentary on a site-by-site basis is appropriate. It is possible to interpret the Ofwat guidance in such a way that would allow the future capacity (and hence value) of the assets to be based on the forecast future throughput, which would increase the reported net value and the 5% RCV split for bioresources.</p>	<p>The data table commentary has been updated under Table 6 Section D. Within the commentary we will include (where appropriate) that we have not included any additional capacity as we do not currently have any plans to build any by 31.03.2020. If we had chosen to include costs for capacity that would not be in place at the 31.03.2020 then we would have adjusted the RCV allocation down in section N to reflect that the RCV allocation should not include the assets. Either method would result in no impact on the RCV allocation therefore we understand that there is no potential '5%' error on the RCV allocation as stated in this reported action.</p>	<p>Noted that stated amendment to the Table Commentary has been made. Noted that amendment to Submission Commentary will be made.</p>	<p>G</p>
<p>Audit Ref. T6-29: Spot checks conducted to check that length of ROC allowance in line commentary is reflected in equations. Lines 166 and 170 for Dewsbury are zero hence no adjustment for renewable obligation certificates (ROCs) is applied. YWS to review.</p>	<p>We have reviewed this action and have adjusted the 2016-17 ROC income for Dewsbury and Esholt, this has been included within the commentary. This update increased the RCV allocation by £2.9m, 0.1%.</p>	<p>Block L of Table 6 corresponds with data in Block O. Require three decimal places in Line 149 and 151.</p>	<p>B</p>



Amber Issue Raised in SAF (13 Sep 17)	YWS Response	HMS Comment	RAG Score 22 Sep 17
<p>Audit Ref. T6-40: On costs applied on gross-costs. A table of the component on-costs and assumptions should be included in the line commentary. An explanation of on cost is a requirement of the Ofwat guidance. Line commentary should confirm that on costs for conditioning pads are built up in same manner.</p>	<p>Additional commentary has now been added to the data tables commentary.</p>	<p>Noted that stated amendment to the Table Commentary has been made.</p>	<p>G</p>
<p>Audit Ref. T6-41: Approximately 10% of asset records have a reported age greater than expected life. For the purposes of the valuation, the expected life has been set as 1 year. This is appropriate where assets are being sweated. However, if the asset data is incorrect, and the asset has actually been replaced but not recorded, then the net value of this asset will be underreported. Based on numbers interrogated at the audit, this 10% of assets might account for up to 15% of the gross value of bioresources and have a material impact on the net valuation. It is recommended that before final submission of the RCV in 2018, sensitivity testing of this data is undertaken, and other assumptions considered. Several sites where age of existing asset exceeds hypothetical life. For Neiley process 5, existing age is 50 years and hypothetical life is 12 years. YWS to review methodology, confirm its appropriateness, and report this in line commentary.</p>	<p>The audit observation is acknowledged and additional activity will be undertaken to understand the sensitivity to change in time for the strategic business plan submission.</p> <p>A review has taken place. No changes to the table are required. The commentary has been updated.</p>	<p>Noted that stated amendment to the Table Commentary has been made.</p>	<p>B (reflecting data improvement comment)</p>
<p>Audit Ref. T6-43: Error noted for Calder Vale Block M, corrected in meeting. YWS to review raw data for all sites and confirm reported values are correct.</p>	<p>The raw data and the table have been reviewed. It can be confirmed that this was a one-off transposition error. This has now been corrected and a full quality assurance check of the table has been completed as a Level 1 assurance check.</p>	<p>Confirmed that observed error has been corrected. HMS has conducted no further spot checks on Block M data.</p>	<p>G</p>



Appendix 2 – Impact on Yorkshire Water customers of the bioresources RCV allocation

A2.1 Background

The bill impact assessment below is as per our original proposed RCV allocation, as submitted in September 2017.

The latest evaluation lowers the RCV allocation to the bioresources price control from £454m to £291m, conversely increasing the level of RCV retained within the wastewater network plus price control.

Having reviewed our earlier bill impact assessment we determine that this remains valid and continues to indicate the shift to the focussed approach to the bioresources RCV allocation will not have a material impact on customer's wastewater bills.

The assessment below was prepared for our original bioresources RCV allocation submission in September 2017

The Mogden formula is the core charging mechanism for sewerage services in sector. The formula is used to charge for trade effluent provided for treatment. It is also used to inform our measured foul sewage charges for households and domestic-like non-households via the foul sewage-trade effluent differential.

The foul sewage-trade effluent differential is based on the concept that when assumed average household pollutant strengths for Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS) are run through the standard Mogden formula the associated volumetric charge broadly mirrors the equivalent measured household volumetric rate (in p/m³) for foul sewage collection, treatment and disposal.

These measured foul sewage volumetric charges are then used to inform our unmeasured foul sewage charges via the measured-unmeasured differential.

Changes to the allocation of profit between the bioresources and network plus price controls for PR19, as a consequence of the new focused approach to bioresource RCV allocation, will have a potential impact on wholesale charges, and customers' bills, through associated changes in the Reception (R), Preliminary treatment (V), Sludge (S) and Biological (B) components within the current Mogden formula and the operation of these tariff differentials (see figure A2.1 for detailed explanation of these charges).

Although the focused allocation of the bioresources RCV drives changes in the operation of the Mogden formula and the above differentials, the key test is 'are such changes material?'

To answer this, we have considered the impacts on the influence of pollutant strengths, at both a customer class and individual trader level. We have then assessed how the Mogden formula charges might change following the focused allocation of the bioresource RCV.

Fig A2.1. Description of Mogden formula

The Mogden formula is presented in our charges scheme as follows.

$$R + V + (Ot/Os) * B + (St/Ss) * S$$

Where:

R = the cost per cubic metre for the reception and conveyance of trade effluent

V = the cost per cubic metre of the preliminary treatment of foul sewage (including such preliminary treatment as is appropriate to the circumstances of the receiving waste water treatment works in question).

B = the cost per cubic metre of biological oxidation of foul sewage, together with such proportion of the sludge cost as may be attributable to the treatment and disposal of sludge arising from the said biological oxidation

S = such proportion as is not included in B of the average cost, per cubic metre of foul sewage received, of the treatment and disposal of sludge (the whole of such cost being referred to above as "the sludge")

Ot= the Chemical Oxygen Demand of the effluent

Os= the Chemical Oxygen Demand of the foul sewage

St = settleable solids in the effluent

Ss = settleable solids in the foul sewage

Ot, St, Os and Ss are derived after one hour's quiescent settlement. Ot and St are adjusted to a pH of 7. Ot & St are derived from the average strength of all chargeable samples taken over a rolling six month period prior to the settlement calculation or according to the assessed strength of the effluent or the standard regional strength of the relevant type of trade effluent.

A2.2 Pollutant strengths

Customer class: Customer volumetric charges and associated bills are determined by associated pollutant strengths. Currently the assumed household strengths for TSS and COD are 450 mg/l and 650 mg/l respectively.

These assumed household pollutant strengths can be compared to the average pollutant strengths received from traders. The average pollutant strengths for our traders for TSS and COD are 151 mg/l and 1,710 mg/l respectively, as summarised in figure A2.2.

Fig A2.2. Inferred pollutant strengths from traders

Trader Size	TSS mg/l	COD mg/l
0-50 ml	93	1,715
50-250 ml	198	1,712
>250	154	1,647
Average	151	1,710

In general, traders have higher COD concentrations and lower TSS concentrations, when compared to households and domestic-like non-households.

Individual trader: The above trader averages will cover a range of pollutant strengths. In order to evaluate bill impacts on individual traders, it is therefore sensible to select some hypothetical examples outside the average.

In Ofwat's tariffs report a low strength (TSS = 300 mg/l, COD = 200 mg/l) and a high strength (TSS = 1,000 mg/l, COD = 2,000 mg/l) trade effluent scenario were identified to assess annual bill impacts. We have used the same high strength example in our wholesale charges impact assessment. For the low strength example, we have reduced the value of TSS to 100 mg/l to push it to below our reported trader average.

A2.3 Mogden charge impacts

We assume that our post 2020 Mogden formula charges for the S (and part of the B) charge will mirror the average revenue control for bioresources, aligned to Ofwat's expectations of companies. The average revenue control will be based on an allowed return, on the allocated bioresource RCV, and the results of the bioresource cost assessment.

As yet, we do not have full sight of our average revenue control for bioresources. This complicates our ability to assess in detail the potential bill impacts of one particular regulatory change. The bill impact assessment we have carried out is therefore isolated to the RCV allocation change and is illustrative only.

Our start point is to construct an average revenue control that might be determined in 2020 (expressed in 2017-18 prices). We then compare this to the current strength based (B and S) components of Mogden to see how our current charges might move after PR19, noting that if a change in strength driven charges is seen other volume driven charges within Mogden will move in the opposite direction.

Our current S charge is around £810/TSS. Our latest Annual Performance Report (APR) indicates our total operating costs for bioresource management is around £750/TDS. Our inferred profit recovery from the bioresource management activity is currently around £60/TDS.

The economic approach to valuation proposed by Ofwat provides for a focused bioresource RCV of £256m in 2017 and £454m in 2020. We can simply use the building block approach to scale the impact of the focused approach.

Applying the current cost of capital for wholesale (3.6%) and dividing by the sludge to be processed, we can estimate that the equivalent bioresource profits charge under the focused approach would be around £60/TDS in 2017. It increases by up to £40/TDS to around £100/TDS in 2020.

On this basis, we can see that there will be no material charge impact for 2017. The S charge of £810/TDS equates almost exactly to the shadow revenues that would be required (£750/TDS + £60/TDS) under the proposed focused approach.

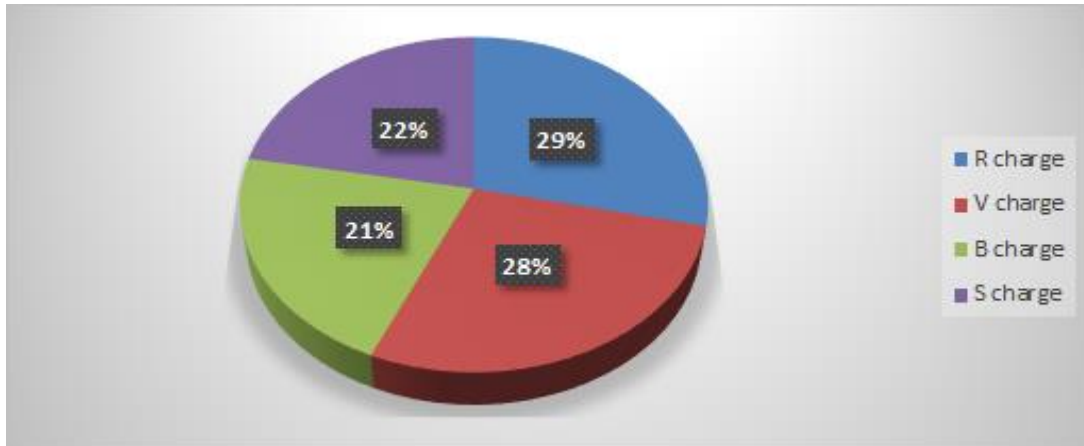
The situation will change in 2020. All other bill determinants being equal, we could see up to £40/TDS added to the bioresource revenue requirement. This would lead to an increase in the S charge of around 5% and a smaller bioresource driven increase of around 2% in the B charge. This would be offset by a reduction in associated wastewater network+ costs. We believe this hypothetical S and B charge increases are a worst-case scenario.

The next part of the assessment will address the reduction in the volumetric related charge components (R and V) within Mogden as the S charge increases. Furthermore, the sewage treatment component of the B charge will also fall, and this will counter the increase driven by the sludge component of the B charge.

Given that the RCV allocation split between bioresources and wastewater network plus should be revenue neutral we can, using the approximate split in revenues from the four components of the Mogden formula (see figure A2.3), assess the scale of the reduction on the other charge components.

Post 2020 we would expect the R and V charge to fall by around 2% and the B charge to only increase by around 0.5%.

Fig A2.3. Revenue balance between different charges



A2.4 Bill implications and conclusion

At customer class: Changes in R, V, B and S component charges will have a small impact on wastewater bills through our tariff differentials. The balance of revenue and cost recovery between the trader customer class and other customer classes, will be indirect and can be managed via traditional tolerance limits.

Based on the customer class concentrations detailed earlier in this Appendix and the above changes in our Mogden formula charges, we have assessed the potential impact on bills as extremely small. We calculate traders’ bills, on average, would be slightly lower (down <0.5%) and households and domestic-like non-household’s bills slightly higher (up <0.1%). This is driven by the lower average S concentrations from traders.

At individual trader: Although traders will see the changes in Mogden charges directly based on their trade effluent concentrations, we calculate the impact on bills will be small. Our example low strength trader trade effluent bill would be slightly lower (down ~1.25%) and our example high strength trader bill would be slightly higher (up <1%).

In practice the trade effluent charges described would be levied on the relevant non-household retail licensee, and not billed directly to the trader by the wholesaler. Therefore, the exact impact on a traders’ trade effluent bill would be determined by the commercial arrangements they have with their appointed retailer.

It is important to note the tests we have undertaken have been isolated from any other drivers of future bill movements, resulting from the implementation of PR19 policies and the delivery of our bioresources strategy.

In conclusion, our assessment indicates the shift to the focussed approach to the RCV allocation will not have a material impact on customer’s wastewater bills.

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