

UUW86

Bioresources

October 2023

Data Table Commentaries

This document provides a commentary and supporting information for the Bioresources PR24 data tables

Executive Summary

This supplementary commentary document is designed to support and provide commentary on the bioresources (BIO) tables within the United Utilities Water (UUW) price review submission. The purpose of these data tables is to capture the outcomes and expenditure to deliver our business plan, as set out in the line definitions and RAG guidance.

Our low regrets business plan for AMP8 allows us to manage a period of unprecedented change and uncertainty in the bioresources sector, whilst keeping one eye on the future to enable transformation of our service over the longer-term to deliver better outcomes for customers and the environment:

- **Our largest ever investment in the bioresources price control:** We will invest £979 million in AMP8 to start to transform our service, to respond to a period of unprecedented change in the bioresources sector and ensure our service is fit for the future;
- **A transformational investment programme for the future:** We are anticipating a step-change in the bioresources business model, although there is significant uncertainty over the scale and the timing of the change. Our long-term plan for bioresources identifies the need for £1.8 billion of enhancement investment expenditure over the next 25 years to meet new challenges and realise opportunities to deliver better outcomes for customers and the environment;
- **Our stretching botex plan:** Our AMP8 plan sets out to achieve an ambitious performance, without increasing the level of botex (beyond the adjustments for additional scope). We will embrace innovation and new ways of working to unlock greater social, economic, and environmental value. Stretching cost forecasts will absorb growing cost challenges due to reducing income from energy incentives, increasingly constrained agricultural landbank for biosolids recycling and increasing waste permit compliance standards;
- **Enhanced environmental protection:** We will deliver a substantial WINEP to achieve significant enhancements to the natural environment across the North West, improving resilience in our agricultural recycling activities and meeting increasing regulatory controls under the Waste Framework Directive;
- **Generating additional value:** We will reduce our operational carbon emissions, recover phosphorus for the first time, and generate green energy equivalent to 19 per cent of our total electricity consumption;
- **Embracing markets to realise greater value:** We will manage growing demand and a predicted capacity shortfall through efficient capacity release investment and short-term use of markets. We will create an opportunity for a market solution for up to 20 per cent of our sludge treatment activity to meet rising demand; and
- **Managing uncertainty:** Our AMP8 business plan is focussed on low regret interventions, where we have high certainty in the scope and the investment needed to meet new service standards. We propose a Notified Item to manage the risk over uncertain future investment requirements and believe this is the right approach to best protect the interest of customers.

Contents

1.	General	4
1.2	External Drivers Influencing Our Plan	4
1.3	Remaining AMP7 Delivery and AMP8 Plan	4
2.	BIO1 – Bioresources sludge data	7
2.1	Summary	7
2.2	BIO1.1 – 5 Sewage Sludge Produced and Treated	7
2.3	BIO1.6 – 8 Sewage Sludge Disposal	8
2.4	BIO1.9 – 13 – Sludge intersiting ‘work’ done.....	9
2.5	BIO1.14 – 17 Sludge disposal ‘work’ done	10
2.6	BIO1.18 Chemical P Sludge	11
3.	BIO2- Bioresources operating expenditure analysis	12
3.1	Whole table.....	12
3.2	Cost changes over the period	12
3.3	Other	13
4.	BIO3a – Bioresources energy analysis	15
4.1	Energy	15
4.2	Electricity.....	15
4.3	Heat.....	15
4.4	Biomethane.....	16
5.	BIO3b – Bioresources: income, liquors and metering analysis	17
5.1	Income from renewable energy subsidies	17
5.2	Bioresources liquors treated by network plus (shadow reported).....	17
5.3	BIO3b.12 Metering.....	18
6.	BIO4 – Bioresources sludge treatment and disposal data	19
6.1	Sludge treatment process	19
6.2	(Un-incinerated) sludge disposal and recycling route	19
7.	BIO5 – Bioresources – additional treatment and storage data	21
7.1	BIO5.1 – BIO5.9 – WINEP Enhancement.....	21
7.2	Bioresources data	21
7.3	Sludge management/sludge treatment/ Bioresources cost driver	23
8.	BIO6 – Bioresources – NMEAV for capital enhancement schemes	24
8.1	Whole table.....	24
9.	Data table confidence grades	25

1. General

1.1.1 Our plan for the remainder of AMP7 and AMP8 creates material changes to our operations and assets to meet existing and new regulatory requirements. The key regulatory requirements creating the need for change and the material actions in our plan are summarised below and referenced, where relevant, in the commentary. Further context and detail of our bioresources plan is presented in our Bioresources business plan supplementary document (*UUW58 – Bioresources Business Plan*).

1.2 External Drivers Influencing Our Plan

Sludge Growth

1.2.1 We are forecasting year-on-year increases in sludge produced from Wastewater Network Plus (WwN+). This is due to population growth and continued improvements to wastewater treatment standards to meet final effluent quality drivers. This is resulting in more sludge requiring treatment and disposal.

Waste Regulation

1.2.2 Two recent regulatory changes seek to transition the regulation of bioresources as a waste under the Waste Framework Directive:

- **Implementation of the Industrial Emissions Directive (IED):** Part of our regional response to comply with the IED is to accelerate the closure of small Sludge Treatment Centres (STCs) to mitigate compliance costs which would be abortive in the medium term; and
- **Implementation of the EA Sludge Strategy:** The introduction will regulate biosolids recycling to agriculture under Environmental Permitting Regulations (EPR) and introduces a new compliance requirement and cost.

Landbank Availability

1.2.3 We are forecasting there will be a reduction in landbank availability in AMP8. This is due greater regulatory restrictions, raw sludge growth and decreasing market demand. This will increase the distance we need to travel to recycle biosolids to land.

Green Energy Incentives & Net Zero

1.2.4 A large proportion of our Renewable Obligation (RO) accreditations are coming to an end in 2027. This will reduce the income we receive for electricity generated from our Combined Heat and Power (CHP) engines from 2028. We also have a number of proposed net zero enhancements to reduce carbon emissions, and these create change in our energy balance in terms of energy used and generated. This is driving the change in our energy data presented in BIO2, BIO3a and BIO3b.

1.3 Remaining AMP7 Delivery and AMP8 Plan

1.3.1 In response to these external drivers the main actions we are taking are summarised below.

Existing Sludge Treatment Centre Capacity in AMP7 and AMP8

1.3.2 Our plan for our regional asset base for sludge treatment by Anaerobic Digestion (AD) is impacted by the requirement to comply with the IED. To provide an overall efficient regional compliance plan and reduce abortive medium-term spend we are commencing a series of AD site closures and implementing some tactical capacity releases from our remaining AD sites. Overall, our total treatment capacity remains relatively flat with an increasing “capacity gap” due to sludge growth. The main changes to our existing asset base are summarised below:

- In the remainder of AMP7 we plan to commence an efficient plan for the closure of small, aging sludge treatment centres (STC). In the short-term this will reduce our sludge treatment capacity; and

- We plan to release tactical treatment capacity to off-set the loss of capacity due to closures through continuous operational improvement and targeted asset investment, with interventions at our two largest sludge treatment sites.

Managing Excess Sludge due to Treatment Capacity Deficit

1.3.3 [✂]

]. We will continue to engage with markets to seek opportunities for the provision of short-term sludge treatment capacity via trading throughout AMP8 whilst we progress a strategic procurement to deliver a long-term guaranteed sludge treatment capacity via the market towards the end of AMP8.

1.3.4 Since short term sludge treatment capacity provided by the market is uncertain, we have assumed for the forecasts presented in these tables that any excess sludge beyond our treatment capacity is sent to land restoration as a raw sludge cake, with an allowance for shorter term sludge trading with other WaSC's in-line with recent years.

AMP8 New Capacity

1.3.5 Our ambition is to create a market opportunity, where it adds best value, to deliver large scale new sludge treatment capacity based on a third party delivered solution. This will have the capability to treat circa 20% of our total sludge production. The new treatment capacity, forecast to come online 2029/30 will mitigate raw sludge to restoration and short-term trading requirements, providing a long-term guaranteed capacity solution. The introduction of this capacity has a significant impact on several of the reporting lines and we have used the following assumptions for the provision of this capacity in our forecasts presented in this table:

- A third party delivered design, build, operated and financed (DBFO) solution;
- Advanced Anaerobic Digestion (AAD) technology producing enhanced biosolids;
- Enable closure of indigenous STC capacity and transfer to new capacity; and
- [✂

]

AMP8 Enhancements

1.3.6 Our enhancement programme represents our largest ever bioresources environmental improvement programme. The programme proposes to deliver a substantial WINEP to achieve significant enhancements to the natural environment across the North West and deliver further enhancements to improve the resilience of our biosolids recycling to agriculture service, as supported by customers. Further information can be found in the bioresources enhancement cases, (*UUW66 - Bioresources Enhancement Claims*), and as summarised below:

Proposed WINEP Enhancements

- We have four statutory requirements identified in the Water Industry National Environment Programme (WINEP) under the sewage sludge drivers:
 - Enhanced dewatering of cake after AD;
 - Final product storage;
 - Sludge to land compliance under Environmental Permitting Regulations; and,
 - Enhanced biosolids quality surveillance.

Proposed Standard Enhancements

- **Improving resilience in biosolids recycling to agriculture:** An enhancement case to increase the resilience of the agricultural outlet for biosolids, by improving product quality through the enhanced removal of non-degradable contaminants (such as microplastics) and thereby support market acceptance of higher quality products; and,

- **Alternative outlet adaptive planning:** An enhancement case to deliver preparatory works for uncertain and long-term options for alternative biosolids disposal outlets.

Net Zero Enhancements

- *UUW's* net zero enhancement programme includes a suite of projects, which all have a primary driver of emissions reduction. Proposed investment includes measures in bioresources for immediate operational carbon emissions reduction and includes reducing fossil fuel use in our bioresources treatment operations and switching our bioresources HGV fleet to biofuel.

2. BIO1 – Bioresources sludge data

2.1 Summary

- 2.1.1 For the financial year 2022/23 this table has been completed as part of our Annual Performance Report (APR), figures were published in July 2023 in APR table 8A.
- 2.1.2 The forecasted values for future years (2023/24 to 2029/30) have been produced using our Bioresources Regional Integrated Asset Planning (RIAP) Model.

2.2 BIO1.1 – 5 Sewage Sludge Produced and Treated

BIO1.1 Total sewage sludge produced, treated by incumbents

- 2.2.1 Total sewage sludge produced, treated by incumbents: This line is reported as all of the sludge which is produced and treated by *UUW* (e.g. anaerobic digestion or liming) and any sludge that is untreated prior to disposal (e.g. raw sludge to land restoration).

BIO1.2 Total sewage sludge produced, treated by 3rd party sludge service provider

- 2.2.2 We have assumed that sludge treated by third parties remains in-line with previous years until the market delivered sludge treatment capacity comes online.

BIO1.3 Total sewage sludge produced

- 2.2.3 BIO1.3 – Total sewage sludge produced is presented as the total of BIO1.1 – Total sewage sludge produced, treated by incumbents and BIO1.2 – Total sewage sludge produced, treated by 3rd party sludge service provider. We have first forecast our total sludge production and then allocated it to STCs with excess being sent to land restoration.
- 2.2.4 The total amount of sludge produced by WwN+ continues to increase due to the impacts of the following:
- Population growth; we have forecast increasing volumes of sludge production due to an increasing population served, in-line with the forecasts used in our Drainage and Wastewater Management Plans (DWMP); and
 - Delivery of quality enhancement schemes in WwN+ as part of the WINEP. The sludge growth from WwN+ enhancement is primarily driven through chemical dosing to meet phosphorus consents.
- 2.2.5 The forecast rate of sludge growth is consistent within that seen in AMP6 and 7. Due to the phasing of the wastewater WINEP, the full impact of sludge growth from AMP8 wastewater treatment investment is only expected in AMP9.
- 2.2.6 The sludge production forecast is dependent upon population projections and the volumes of additional sludge arising from WwN+ WINEP projects, including their timing, therefore there is a degree of uncertainty in long-term forecasting of sludge production. We expect our sludge forecast to be within an accuracy of +/- 6%.

BIO1.4 Total sewage sludge produced from non-appointed liquid waste treatment

- 2.2.7 This is an estimate of the sludge produced from *UUW* non-appointed Bioprocessing facilities. For the forecast we have assumed that an average of the reported values from the period 2019/20 to 2022/23 is maintained as we do not expect any material change. Overall this represents only a small percentage of our total sludge production, circa 1%.

BIO1.5 Percentage of sludge produced and treated at a site of STW and STC co-location

- 2.2.8 We do not include STCs centres which transfer liquid digestate via the Mersey Valley Sludge Pipeline (MVSP) for dewatering at Shell Green prior to disposal.
- 2.2.9 Due to the rationalisation of smaller AD sites in AMP7, we are forecasting a decrease in our percentage co-location in 2024/25. This requires sludge from these sites to be exported for treatment.

- 2.2.10 We forecast a further reduction in the percentage co-location in 2029/30 due to indigenous site closure as sludge is transferred to new third-party capacity.

2.3 BIO1.6 – 8 Sewage Sludge Disposal

BIO1.6 – Total sewage sludge disposed by incumbents

- 2.3.1 This line includes all treated sludge disposed from *UUW* STCs and includes:
- Digested sludge to land; and
 - Limed sludge to land.
- 2.3.2 We are not forecasting any volumes of digested sludge to incineration.
- 2.3.3 To provide forecast values we have used asset standard volatile solids destruction rates for sludge based on the treatment technology at each STC e.g. conventional AD, Enzymic Hydrolysis (EH) AD, Enhanced Enzymic Hydrolysis (EEH) AD, Thermal Hydrolysis (TH) AD. An increase in material to account for the addition of liming is included based on asset standards.
- 2.3.4 There is an increase in sludge disposal from the 2022/23 actual and the model forecast position for 2023/24. The reasons for this variance are:
- The actual quantity of sludge disposed by incumbent, reported as part of our annual performance report, excludes any sludge which is held in storage or stockpiles and therefore only reports sludge in this line when it is applied to land. The forecast assumes all sludge produced within the financial year is disposed of within that year; and
 - The volume of sludge going to digestion is based on all STCs operating to their capacity, and the resulting volume of digested sludge produced is based on asset standard destruction rates for the treatment technologies installed at each facility. Actual destruction rates at each sludge treatment centre can vary from asset standards depending on operating conditions and sludge type.
- 2.3.5 It is assumed that indigenous sludge growth at STCs can be accommodated, and this drives a small increase in volume of digested sludge produced.
- 2.3.6 Implementation of enhanced sludge screening (enhancement case, *UUW66 – Bioresources Enhancement Claims*, Improving resilience in biosolids recycling to agriculture) will lead to an increase in the amount of non-degradable material removed prior to digestion and therefore a reduction in the amount of digestate produced.
- 2.3.7 [✂]

]

BIO1.7 Total sewage sludge disposed by 3rd party sludge service provider

- 2.3.8 This line includes all untreated sludge which is sludge disposed of and therefore includes:
- Raw cake to land restoration; and
 - Sludge screenings / grit removed within the Bioresources price control disposed of to landfill.
- 2.3.9 This line does not include raw sludge traded out by bioresources for treatment by other WaSC's or third parties where they also undertake the disposal of any resulting biosolids; this volume is captured in BIO1.2 only.
- 2.3.10 [✂]

]

- 2.3.11 The consequence of an increase in sludge treatment capacity via the market in 2029/30 reduces the quantity of raw sludge to land restoration.

BIO1.8 – Total sewage sludge disposed

- 2.3.12 This line is the sum of lines BIO1.6 and BIO1.7. Overall, this is showing a year-on-year increase from 2023/24 to 2029 and then a reduction in 2029/30.

2.4 BIO1.9 – 13 – Sludge intersiting ‘work’ done

BIO1.9 Total measure of intersiting ‘work’ done by pipeline

- 2.4.1 We operate pipelines to transport both raw and digested sludge and report both in this line. The reported total amount of ‘work-done’ is dominated by the Mersey Valley Sludge Pipeline (MVSP), which conveys digested sludge from several STCs to the dewatering centre at Shell Green.
- 2.4.2 There are no material changes planned to raw sludge pipelines, therefore we see only a small increase year-on-year due to sludge growth.
- 2.4.3 For digested sludge pipelines from 2023/24 to 2027/28 there is a slight increase in the amount of work-done due to indigenous growth at AD sites.
- 2.4.4 Delivery of our proposed WINEP enhancement; Enhanced dewatering of cake after AD, will reduce the amount of digested sludge sent to the MVSP, leading to an overall reduction in the amount of ‘work-done’ via pipeline.

BIO1.10 Total measure of intersiting ‘work’ done by tanker

- 2.4.5 This line includes raw sludge and thickened sludge, which requires tankering to STCs (digestion, liming or dewatering). The forecast ‘work-done’ by tanker is derived from the forecast of sludge production for each Wastewater Treatment Works (WwTW) and forecast transport destinations (STCs). The actual amount of ‘work-done’ by tanker can vary from the modelled outcome due to specific operational conditions of each WwTW and the regional bioresources system in-year.
- 2.4.6 To forecast the distance in kilometres (km) travelled we used the actual average distance travelled for liquid sludge transport reported in 2022/23, and the forecast quantities of liquid sludge production that requires transfer to treatment sites. The forecast data assumes that the transport distance per tonne of dry solids remains the same as the volume of sludge to be transported increases due to sludge growth.
- 2.4.7 There is a significant increase in the ‘work-done’ by tanker in 2023/24 due to the closure of a digestion site in 2022/23 as the facility is then exporting raw liquid sludge. We are forecasting a further increase in the amount of ‘work-done’ by tanker in 2024/25 due to the closure of an additional digestion site and conversion to a liquid export site.

BIO1.11 Total measure of intersiting ‘work’ done by truck

- 2.4.8 This line includes the movements of raw sludge cake between STCs, typically raw sludge dewatering centres to digestion facilities.

- 2.4.9 This line includes transport of raw cake to third party STCs.
- 2.4.10 This line excludes transport of raw cake to disposal (e.g. land restoration or landfill) as this is captured under disposal in like BIO1.16.
- 2.4.11 Total 'work-done' in intersiting operations by truck has been calculated in the RIAP model based on the configuration of the regional bioresources system and the modelled transport distances between dewatering centres and digestion facilities.
- 2.4.12 There is an increase in the 'work-done' by truck in 2024/25 due to the closure of a digestion site and conversion to a cake export site, however, some of the increase is captured under disposal as it is forecast to be sent to land restoration in the short-term.
- 2.4.13 There is an increase in the amount of 'work-done' by truck in 2029/30 as new third party capacity is delivered and sludge is diverted from land restoration (disposal) to the new capacity (intersiting).

BIO1.12 Total measure of intersiting 'work' done (all forms of transportation)

- 2.4.14 This is calculated as the sum of BIO1.9, BIO1.10 and BIO1.11.
- 2.4.15 For lines BIO1.9 - 12 intersiting sludge operations have been calculated as one-way journeys only.

BIO1.13 Total measure of intersiting 'work' done by tanker (by volume transported)

- 2.4.16 This line has been calculated based on the same set of assumptions for the mass of sludge transported as BIO1.10.
- 2.4.17 We are forecasting an improved % dry solids (%DS) raw sludge quality produced from WwN+ in AMP8. From 2025-26 we have modelled performance based on increasing the average %DS from 2.8% to 4% by the end of 2024-25. This leads to a significant reduction in the 'work-done' in intersiting work by tanker on a volume basis.

2.5 BIO1.14 – 17 Sludge disposal 'work' done

BIO1.14 Total measure of 'work' done in sludge disposal operations by pipeline

- 2.5.1 We do not operate a sludge disposal pipeline as defined in RAG 4.11. Therefore, the return for this line is nil. 'Work-done' for our MVSP digested sludge pipeline is included in BIO1.9.

BIO1.15 Total measure of 'work' done in sludge disposal operations by tanker

- 2.5.2 We do not dispose of any sludge via tanker, all treated sludge is taken to land and any untreated sludge sent to land restoration as a cake. Therefore, the return for this line is nil.

BIO1.16 Total measure of 'work' done in sludge disposal operations by truck

- 2.5.3 Sludge disposal is a combination of biosolids disposal by incumbent (reported in BIO1.6) and disposal of raw sludge by third party, including sludge screenings removed in the bioresources price control (reported in BIO1.7). The combination of these lines is reported in BIO1.8.
- 2.5.4 Sludge disposal by third party to land restoration (reported in BIO1.7) was higher than usual in 2022/23 due to operational issues. Disposal to land restoration is forecast to return to typical levels in 2023/24 and 2024/25
- 2.5.5 The average distance to land restoration sites has been taken from the current restoration sites we use 2022/23. The distances to transport sludge to land restoration are significant and contribute to the total amount of work-done in this line.
- 2.5.6 The forecast amount of work-done in sludge disposal by truck for treated sludge recycling to land is dependent upon the availability of suitable landbank. The availability of landbank is dependent on regulatory requirements and market demand. Our AMP8 programme is based on all treated sludge, which is almost all digested sludge, continuing to be recycled to land, but to enable this we will need to travel further to recycle biosolids.

- 2.5.7 In AMP7 we have voluntarily implemented the Biosolids Assurance Scheme (BAS) draft “20 measures” in 2021/22 and we have seen a slight increase in ‘work-done’ in 2022/23. We have forecast that the ‘work-done’ for treated sludge to land between 2023/24 and 2024/25 will be similar to 2022/23. This is based on the assumption that Defra Statutory Guidance is in place to prevent the Environment Agency enforcing their interpretation of the Farming Rules for Water, rule 4(1). The guidance has to be reviewed no later than September 2025.
- 2.5.8 Increased sludge production results in increasing quantities of sludge to be disposed, increasing the amount of ‘work-done’ in sludge disposal operations.
- 2.5.9 We have forecast our ‘work-done’ for treated sludge disposal using external modelling expertise. This predicts an increase in the distance we will need to travel to secure landbank for the disposal of our treated sludge in AMP8, and therefore an increase in the ‘work-done’.
- 2.5.10 The impact of our AMP8 enhancements and new treatment capacity in 2029/30 through a third party supports a reduction in ‘work-done’

BIO1.17 Total measure of 'work' done in sludge disposal operations (all forms of transportation)

- 2.5.11 This line is the sum of BIO1.14, BIO1.15 and BIO1.16. Overall, we forecast an increase in 2025/26 which continues through to 2027/28 and then a progressive reduction due to our enhancement programme and new treatment capacity.
- 2.5.12 The forecast of the amount of work-done in sludge disposal is subject to a degree of uncertainty due to the dependence on the volume of sludge produced, treatment route for sludge and on external factors affecting the average distance travelled to landbank or restoration.
- 2.5.13 The forecasts are based on outputs from landbank modelling, we will continue to monitor and plan for developing landbank availability and requirements.

BIO1.18 Total measure of 'work' done by tanker in sludge disposal operations (by volume transported)

- 2.5.14 We do not dispose of any sludge via tanker, all treated sludge is taken to land and any untreated sludge sent to land restoration as a cake. Therefore, the return for this line is nil.

2.6 BIO1.18 Chemical P Sludge

BIO1.19 Chemical P sludge as % of sludge produced at STWs

- 2.6.1 This line represents the quantity of sludge produced at a WwTW which uses chemical dosing for Phosphorous (P) removal expressed as a percentage of the total regional sludge production.
- 2.6.2 If chemicals are dosed in the wastewater treatment process to meet a permit consent, then all of the sludge arising from that site is then deemed to be "Chemical P sludge".
- 2.6.3 Biological P removal with a consent of <1mg/l is assumed to have a "chemical trim" to meet the lower consent, therefore these schemes are assumed to be "Chemical P" for this reporting line.
- 2.6.4 The amount of Chemical P sludge has been derived from the sludge forecast. Future schemes are as per the WINEP, and solutions to these schemes (e.g., biological / nature based / chemical treatment) are the based on current proposed solutions.
- 2.6.5 There is an increase in the amount of chemical P sludge in 2025/26 due to the impact of the delivery of the remaining AMP7 WINEP schemes. This remains relatively stable through AMP8, with an increase in the last year of the AMP and there is a continued increase through AMP9 as the wastewater quality projects become fully operational.

3. BIO2- Bioresources operating expenditure analysis

3.1 Whole table

BIO2.1 - 30

- 3.1.1 This table is compiled on the same basis as Table 8B in line with RAG 4.11 guidelines, except where otherwise stated.
- 3.1.2 The total operating expenditure (excluding 3rd party) for sludge transport, sludge treatment and sludge disposal reconciles to CWW1.
- 3.1.3 BIO2.11 (Power) & BIO2.12 (Inc. treated as negative expenditure) reconcile in total to the APR submission in 8B but the split between the two rows has been restated in BIO2 2022/23 so that 2022/23 is on a like-for-like basis with the PR24 Ofwat guidance that states energy exported from Bioresources to other price controls should be considered a sale and therefore negative opex in Bioresources.

3.2 Cost changes over the period

BIO2.1, BIO2.11 and BIO2.21 Power

- 3.2.1 Electricity costs are allocated between process and network assets on a cost centre basis. For co-located sites, costs are allocated between sewage treatment and sludge treatment. The full benefit of CHP generation is allocated to sludge treatment minus the element consumed by Bioresources.
- 3.2.2 Power expenditure profile assumes an increased unit cost in 2023/24 and reduction in 2024/25 and are reflective of our hedged position. AMP8 power prices are assumed to follow June 2023 Cornwall 'central' scenario price assumptions, including the cost of Renewable Energy Guarantee of Origin (REGO) certificates. Given that UUW is hedged below the Cornwall forecast for 2023/24 and 2024/25, there is an assumed unit cost increase into 2025/26, which is contrary to the Cornwall forecast year on year movement.
- 3.2.3 The sector, through Water UK, jointly commissioned Cornwall Insight to provide delivered electricity cost forecasts (i.e. "import prices") for the period to 2031/32 in order to support our business plan submissions to Ofwat. Cornwall Insight is a third-party consultancy considered expert in its field who provides price forecasting services to many businesses. Due to the nature of the electricity grid, the economic regulation of the network operators, and the diverse nature of each company's portfolio of assets, a separate forecast for each company which takes into account the specific nature of its portfolio was requested. Underlying macro-economic assumptions remain consistent across each of the forecasts, however company specific variations are accounted for as far as possible. Cornwall Insight provided two forecasts to each company, the first in October 2022 and the final in June 2023. We have used the most recent June 2023 forecast and the 'central' scenario as the basis for the price assumptions implicit in our business plan submission.

BIO2.2, BIO2.12 and BIO2.22 Income treated as negative expenditure

- 3.2.4 This relates to income received from Renewable Obligation Certificates, Renewable Heat Incentives, Gas Exports and Electricity Exports.
- 3.2.5 The income treated as negative expenditure on line BIO2.12 reduces from 2027/28 due to Renewable Obligation Certificates being phased out from 31st March 2027.

BIO2.3, BIO2.13 and BIO2.23 Discharge Consents

- 3.2.6 This relates to service charges.

BIO2.4, BIO2.14 and BIO2.24 Bulk Discharges

- 3.2.7 Bulk discharges are nil.

BIO2.5, BIO2.15 and BIO2.25 Renewals expensed in year (Infrastructure)

- 3.2.8 For Sludge Transport (BIO2.5), as we have only a small number of raw pipelines, we have assumed no further infrastructure issues in the remainder of AMP7 or AMP8.
- 3.2.9 For Sludge Treatment (BIO2.15) we have assumed some efficiencies in the remaining two years of AMP7. The average of these three remaining years of AMP7 align to the AMP8 programme.
- 3.2.10 There is no infrastructure renewal expenditure planned in Sludge Disposal (BIO2.25).

BIO2.6, BIO2.16 and BIO2.26 Renewals expensed in the year (non-infrastructure)

- 3.2.11 The purpose of this line is to capture any renewal expenditure against non-infrastructure that is not capitalised however *UUW*'s accounting policy is to treat any renewals expenditure on non-infrastructure as capex and write off any replaced / refurbished asset where applicable and as a result this line is zero.

BIO2.7, BIO2.17 and BIO2.27 Other operating expenditure excluding renewals

- 3.2.12 Other operating expenditure reduces as a result of chemical price reductions between 2022/23, and other efficiencies from 2023/24 into AMP8 through innovation and optimisation of solutions, robust cost challenge and effective use of markets.
- 3.2.13 In Sludge Treatment the increase in other operating expenditure on line BIO2.17 for AAD relates to industrial emissions directive (IED) costs which are part of our cost adjustment claim.
- 3.2.14 In Sludge Disposal the increase in other operating expenditure on line BIO2.27 for Sludge Recycled to Farmland from 2025/26 is due to new regulatory requirements resulting in an increase in the distance travelled to landbank and compliance activities including fees to comply with the Environmental Permitting Regulations (EPR). In 2029/30 the growth in sludge and EPR costs are partly offset by new capacity.

BIO2.9, BIO2.19 and BIO2.29 Local authority and Cumulo rates

- 3.2.15 The Mersey Valley Sludge Pipeline (MVSP) is allocated directly to Sludge Treatment as it contains sludge that has already commenced a treatment process.
- 3.2.16 The remaining Wastewater rates relate to operational assets (excluding the Wastewater Network), so are allocated proportionately based on the GMEAV (excluding the MVSP) of non-infrastructure assets at each site.

3.3 Other**Principal use recharges**

- 3.3.1 Where possible, fixed assets and associated depreciation are directly attributed to a single price control unit. Where this is not possible, the asset is assigned to the price control of principal use with recharges made to other price controls reflecting the proportion of the asset used by the other price controls.
- 3.3.2 Each commissioned asset in the SAP register is assigned to a business unit code which determines the price control unit that the asset/depreciation is allocated using the 'principal use' method. Assets that are used across more than one price control are assigned an M&G business unit code. These codes determine the allocation percentages across the price controls. Using Financial Year 2023 data, circa 11% of depreciation and amortisation relates to assets used by more than one price control (all M&G assets).
- 3.3.3 The resultant recharges are detailed in the Table 1 below:

Table 1: Recharges

Price control	Water Resources £m	Water Network+ £m	Wastewater Network+ £m	Bioresources £m	Residential Retail £m	Total £m
Recharge from other segments	(0.1)	(13.8)	(2.8)	(3.1)	(3.1)	(22.9)
Recharge to other segments	0.0	3.6	18.7	0.1	0.5	22.9
Net recharge	(0.1)	(10.2)	15.9	(3.0)	(2.6)	-

3.3.4 The nature and extent of the most material principal use recharges are detailed in the Table 2 below:

Table 2: Material principal use recharges

Assets allocated over Price Control	Key assets	Drivers	Principal Use Price Control	Value of recharge (£m)
IT assets used by all employees	Microsoft, printer, internet, video conferencing	FTE allocation	Wastewater Network Plus	5.6
Mobile Asset & Resource Scheduling System	Systems	Number of assets in each price control	Wastewater Network Plus	3.1
Corporate systems	SAP system/Workforce Management systems	Number and type of licence/users	Wastewater Network Plus	3.0
Head office	Head office buildings	Floor space occupation	Wastewater Network Plus	2.3
Geographic Information System (GIS)	Systems	Analysis of data layers and usage	Wastewater Network Plus	1.1
Total				15.2

3.3.5 The principal use recharges are forecast to increase in 2024/25 as a project to replace desktop and laptop computers across *UUW* is commissioned in that year.

Equity issuance costs

3.3.6 Equity issuance costs of £2m have been included in AMP8.

Total operating expenditure – Sludge treatment

3.3.7 We believe there is an inconsistency in the PR24 data table on line BIO2.20, the formula is incorrectly double counting line BIO2.18. The correct formula should be =IFERROR (E34+E35, 0).

4. BIO3a – Bioresources energy analysis

4.1 Energy

- 4.1.1 The values reported in lines BIO3a.1 to BIO3a.11 for 2022/23 to 2024/25 are the same as the shadow reported values in lines BIO3a.12 to BIO3a.22.
- 4.1.2 For the financial year 2022/23 this table has been completed as part of our Annual Performance Report (APR), figures were published in July 2023 in APR table 8C.
- 4.1.3 The forecasted values for future years (2023/24 to 2029/30) have been produced using our Bioresources Regional Integrated Asset Planning (RIAP) Model.
- 4.1.4 The values reported in line BIO3a.12 are the sum of BIO3a.13 and BIOa.17 with an additional amount relating to the transport fuel usage which is not reported elsewhere in the table.
- 4.1.5 Transport fuel usage varies over the period 2022/23 to 2029/30 due to the forecast changes in 'work-done' in sludge intersiting and disposal, refer to the commentary for BIO1 for full details.

4.2 Electricity

Electricity Generation

- 4.2.1 Output from our combined heat and power (CHP) fleet was lower than expected in 2022/23 and is forecast to increase to expected levels in 2023/24 and 2024/25. Electricity generation from CHP is forecast to decrease in 2025/26 as biogas is diverted to boilers to offset fossil fuel use, delivered through the fuel switching Net Zero enhancement. New third-party sludge treatment capacity is forecast to be online in 2029/30, which will accommodate some sludge previously treated by UUW and therefore there is a drop in the amount of biogas produced by UUW.

Electricity Consumption

- 4.2.2 Bioresources electricity consumption is forecast to increase slightly from 2022/23 to 2026/27 due to indigenous sludge growth at STCs. From 2027/28 there is a significant increase in electricity consumption due to additional activity required to comply with the industrial emissions directive (IED). A further increase in electricity consumption is forecast from the phased delivery of enhanced sludge screening from 2026/27 onwards. New third-party capacity delivered in 2029/30 facilitates the closure of one digestion site leading to a decrease in the amount of UUW Bioresources electricity consumption.

Electricity used in WwN+ or exported to grid

- 4.2.3 The amount of electricity used in WwN+ and exported to grid is linked to the amount of electricity generated and the consumption of Bioresources. As a result of the decrease in electricity generation and increase in Bioresources consumption as detailed above, we are forecasting a reduction in the amount of electricity used in WwN+ and exported to grid over AMP8.

4.3 Heat

Heat demand

- 4.3.1 Heat is required within bioresources to maintain digester temperatures and to provide heat for anaerobic digestion pre-treatment (e.g. thermal hydrolysis). Heat demand in 2022/23 was lower than expected and is forecast to increase to expected levels in 2023/24. Heat demand is forecast to remain fairly steady until 2028/29. New third-party sludge treatment capacity is forecast to be online in 2029/30, which will accommodate some sludge previously treated by UUW and therefore there is a drop in the amount of heat required by UUW bioresources.

Generation of heat

- 4.3.2 In 2023/24 and 2024/25 the increase in heat produced by bioresources is related to the increase in CHP generation as detailed above. The generation of heat increases significantly in 2025/26 as biogas is

diverted to boilers to offset fossil fuel use, delivered through the fuel switching Net Zero enhancement (there is a corresponding decrease in heat imported on line BIO3a.17).

Heat purchased from grid or third party

- 4.3.3 In 2023/24 and 2024/25 the decrease in heat purchased by Bioresources is related to the increase in CHP generation as detailed above. The purchase of heat decreases significantly in 2025/26 as biogas is diverted to boilers to offset fossil fuel use, delivered through the fuel switching Net Zero enhancement.
- 4.3.4 The amount of heat bought from grid or third party is reported as the gross calorific value of the fuel prior to any combustion, whereas the amount of heat generated by bioresources is reported as the thermal output post-combustion of biogas in CHP engines or boilers.

4.4 Biomethane

- 4.4.1 The amount of biomethane generated by bioresources and injected to grid (BIO3a.15) is reported as the energy content of the upgraded biogas injected to grid and does not include the energy content of the propane addition used to enrich the biomethane to meet grid entry requirements. The amount of propane purchased is reported under energy bought from grid and used in third party (BIO3a.17)
- 4.4.2 We currently operate one biomethane facility, and we have forecast stable production for the remainder of AMP7 and AMP8 from this plant.
- 4.4.3 In our analysis, the AMP8 operational greenhouse gases (GHG) (wastewater) (tonnes of CO₂e) performance commitment (PC) is not aligned with the government strategies and policies for biomethane and dis-incentivises further biomethane generation. Therefore, expansion of our biomethane production capacity has not been included in our plan due to the financial penalty the GHG PC creates. Our plan is focussed on continuing to optimise our sludge processing to continue to increase energy recovery year on year at existing facilities.
- 4.4.4 We believe there is benefit in increasing our biomethane production and we would welcome a review of the GHG PC with Ofwat in the spirit of effective regulation that supports the most sustainable long-term solutions for society.

5. BIO3b – Bioresources: income, liquors and metering analysis

5.1 Income from renewable energy subsidies

BIO3b.1 - 8 Income from renewable energy subsidies

- 5.1.1 The income claimed from Renewable Energy Certificates (ROCs) in line BIO3b.1 reduces post 31st March 2027 due to the expiry of RO accreditations. This is also reflected in lines BIO3b.7 and BIO3b.8.
- 5.1.2 The Green Gas Certs (RGGO's) in line BIO3b.3 accrued at the end of 2021/22 and earned during 2022/23 were traded at unusually high prices in 2022/23 resulting in higher than usual income. Future years assume that prices will normalise.
- 5.1.3 During 2022/23 the income claimed from Renewable Transport Fuel Obligation (RTFO) detailed in line BIO3b.4 was due to the volumes accrued in the final quarter of 2021/22 being traded in 2022/23 at a better price than Renewable Heat Incentives (RHIs).

5.2 Bioresources liquors treated by network plus (shadow reported)

BIO3b.9 – 11 Bioresources Liquors

- 5.2.1 For the financial year 2022/23 this table has been completed as part of our Annual Performance Report (APR), figures were published in July 2023 in APR table 8C.
- 5.2.2 The forecasted values for future years (2023/24 to 2029/30) have been produced using our Bioresources Regional Integrated Asset Planning (RIAP) Model.
- 5.2.3 The following assumptions have been made in the forecasting of lines BIO3b.9 – BIO3b.12:
- Liquor strengths (mg/l) for BOD and ammonia are assumed to remain fixed by STC at 2022/23 average values;
 - The volume of liquors produced by bioresources has been calculated using a mass balance approach with asset standard parameters for thickening and dewatering; and
 - The “total wastewater cost in scope (W)” of the liquor charging methodology remains fixed for all sites.
- 5.2.4 Therefore, for the forecasts presented in this table the relative WwN+ liquor charge (£/m³) remains fixed for each STC, with variable factors being the volume of liquor and the STC at which the liquors are produced.
- 5.2.5 The following system changes have a significant impact on the liquor production and recharge to bioresources by WwN+:
- Sludge growth throughout the remainder of AMP7 and AMP8 leads to increased thickening and dewatering requirements within bioresources;
 - Closure of small conventional digestion sites and increase in advanced anaerobic digestion throughput which produces liquors with a higher ammonia load;
 - WwN+ % dry solids (%DS) efficiency, increasing from 2.8% to 4% DS in 2025/26 leads to a reduction of thickening and dewatering work required within the bioresources price control;
 - Delivery of our proposed WINEP enhancement, Enhanced dewatering of cake after AD, will result in an increase in the volume of treated sludge dewatered at MBC; and,
 - New third-party sludge treatment capacity is forecast to be online in 2029/30 which will accommodate some sludge previously treated by UUW, the liquors produced in the dewatering of

treated sludge at the new capacity are not included in this table, resulting in a decrease across BIO3b.9-BIOb.12.

- 5.2.6 Our WINEP options development has taken a holistic approach across the integrated wastewater and bioresources production line in order to identify the lowest cost and best value solution. This integrated approach is driving investment in the Bioresources price control to deliver a digested liquor treatment plant to maintain performance of existing secondary treatment processes through improved ammonia management. This will have a significant impact on the sludge liquor recharge in AMP9, as the project is expected to be delivered at the end of AMP8.

5.3 BIO3b.12 Metering

BIO3b.12 Percentage of bioresources energy consumption that is metered

- 5.3.1 We have interpreted 'energy' in this line to refer to electricity metering only as there is no transfer of other sources of energy (e.g. heat) between price controls.
- 5.3.2 We have forecast an increase in the percentage of bioresources electricity consumption that is metered based on the ongoing delivery of our sub-metering programme. STCs with electricity consumption of <2% of total bioresources energy consumption have been excluded from our forecasted value for the delivery of robust fiscal type electricity sub-metering. However, we are deploying energy monitoring devices on key assets (e.g. pumps, centrifuges) to allow improved estimates of energy consumption where robust fiscal type metering has not been deployed.

6. BIO4 – Bioresources sludge treatment and disposal data

6.1 Sludge treatment process

6.1.1 The values reported in this table are aligned to the total sludge produced reported in BIO1.3

BIO4.1 % Sludge - untreated

6.1.2 The forecast values of the % untreated sludge include the amount of untreated sludge cake we dispose of to land restoration and the amount of sludge screenings removed within the Bioresources price control and disposed of to landfill.

6.1.3 Sludge untreated is reported under incumbent, as per RAG4.11 line 8A.1.

6.1.4 The % of sludge untreated increases over 2026/27 to 2028/29 due to the phased delivery of enhanced sludge screening and increased removal of non-degradable material. These sludge screenings are reported in this line.

6.1.5 The % of sludge untreated decreases in 2029/30 as new third-party capacity comes online and accommodates sludge previously reported as untreated. The residual amount of untreated sludge is sludge screenings.

BIO4.2 % Sludge treatment process - Raw sludge liming

6.1.6 One liming STC is in operation from 2022/23 until 2028/29, sludge from this treatment centre will be diverted to the new capacity in 2029/30.

BIO4.3 % Sludge treatment process – Conventional AD

6.1.7 Small AD site closures are offset by capacity release at our two largest AD sites, as a result the % sludge treated by conventional AD is steady across the remainder of AMP7 and AMP8.

BIO4.4 % Sludge treatment process – Advanced AD

6.1.8 Small AD site closures are offset by capacity release at our two largest AD sites, as a result the % sludge treated by advanced AD is steady from 2022/23 to 2028/29.

6.1.9 Delivery of third-party sludge treatment capacity in 2029/30 leads to a large increase in the amount of sludge treated by third party and a decrease in the amount treated by incumbent as one *UUW* STC closes.

BIO4.5 % Sludge treatment process - incineration of raw sludge

6.1.10 We do not forecast any incineration of raw sludge. Therefore, the reported value is nil.

BIO4.6 % Sludge treatment process - other

6.1.11 We do not forecast the use of any other treatment process of raw sludge. Therefore, the reported value is nil.

BIO4.7- % Sludge treatment process - total

6.1.12 This line is the sum of BIO4.1 – BIO4.6.

6.2 (Un-incinerated) sludge disposal and recycling route

6.2.1 The values reported in this table are aligned to the total sludge produced reported in BIO1.8

BIO4.8 % Sludge disposal route - landfill, raw

6.2.2 The forecast values presented in this line are sludge screenings disposed to landfill, reported under third-party. There is an increase from 2026/27 onwards due to the phased delivery of the enhanced sludge screening.

BIO4.9 % Sludge disposal route - landfill, partly treated

6.2.3 We do not forecast the disposal of partly treated sludge to landfill. Therefore, the reported value is nil.

BIO4.10 % Sludge disposal route - land restoration/ reclamation

6.2.4 The forecast values presented in this line are the raw sludge disposed of to land reclamation, reported under third-party.

6.2.5 The % of sludge untreated decreases to zero in 2029/30 as new third-party capacity comes online and accommodates sludge previously reported as untreated.

BIO4.11 % Sludge disposal route – sludge recycled to farmland

6.2.6 This line has been forecast on the basis that there is sufficient landbank availability to recycle all treated sludge, this is all reported under incumbent.

BIO4.12 % Sludge disposal route - other (specify)

6.2.7 We do not forecast the use of any other disposal route. Therefore, the reported value is nil.

BIO4.13 % Sludge disposal route - other (specify)

6.2.8 We do not forecast the use of any other disposal route. Therefore, the reported value is nil.

7. BIO5 – Bioresources – additional treatment and storage data

7.1 BIO5.1 – BIO5.9 – WINEP Enhancement

7.1.1 This section has been populated with data relating to projects proposed to be delivered through WINEP enhancement to meet the following WINEP driver codes:

- SUIAR_IMP - Actions to improve resilience in the sludge supply chain to agriculture and other relevant use or disposal outlets; and
- SUIAR_ND - Actions to meet requirements to prevent deterioration in soil quality or water quality

7.1.2 Table 3 below details the *UUW* Bioresources WINEP actions.

Table 3: Bioresources WINEP

WINEP Action ID	WINEP Driver Primary (Secondary)	Action Name	Action Description
08UU100130 (Component a to j)	SUIAR_ND	Enhanced biosolids quality surveillance	Proposing enhanced biosolids quality surveillance at 10 sites to manage sewage sludge sustainably
08UU100132	SUIAR_ND (SUIAR_IMP)	Enhanced dewatering of cake after AD.	Proposing enhanced dewatering of cake after AD to manage sewage sludge sustainably
08UU100134	SUIAR_IMP	Final product storage	Proposing regional final product storage to manage sewage sludge sustainably
08UU100135	SUIAR_IMP	Sludge to land compliance under Environmental Permitting Regulations	Proposing sludge to land compliance under Environmental Permitting Regulations to manage sewage sludge sustainably

7.1.3 Data for this table has been populated against the fiscal year upon which the scheme is expected to be fully delivered, and therefore does not represent phasing of delivery.

7.2 Bioresources data

BIO5.1 Tonnes of dry solids treated via main sludge treatment

7.2.1 The proposed WINEP actions do not include any provision for the treatment of additional volume via main sludge treatment (e.g. anaerobic digestion). Therefore, the return for this line is nil.

BIO5.2 Tonnes of dry solids undertaking thickening/dewatering

7.2.2 WINEP action 08UU100132 – “Enhanced dewatering of cake after AD” includes the provision for additional dewatering of digestate at Manchester Bioresources Centre (MBC) to produce a higher dry solids product. The value reported is the additional dewatering occurring at MBC, reported as the additional amount in the year of completion.

BIO5.3 Additional sludge storage - tank volume (pre-thickening/pre-dewatering/untreated sludge)

7.2.3 The proposed WINEP actions do not include any provision for additional storage tank volume (pre-thickening/pre-dewatering/untreated sludge). Therefore, the return for this line is nil.

BIO5.4 Additional sludge storage - tank volume (thickened/dewatered/treated sludge)

7.2.4 WINEP action 08UU100132 – “Enhanced dewatering of cake after AD” includes the provision for additional sludge storage. The additional volume of storage quoted in the table is the engineering estimate of the required silo size to store the additional dewatered treated cake at MBC prior to disposal.

BIO5.5 Additional sludge storage - cake pads/bays area or equivalent (cake)

7.2.5 WINEP action 08UU100134 – “Final product storage” is for the provision for two months final product storage. The additional storage area quoted in the table is the current engineering estimate of the required storage, the actual area of storage delivered could vary depending on final design.

BIO5.6 Total number of sludge treatment schemes providing sludge storage

7.2.6 We have reported one scheme as providing sludge storage, delivered under WINEP action 08UU100134 – “Final product storage”.

7.2.7 We have not included the scheme under WINEP action 08UU100132 – “Enhanced dewatering of cake after AD” in this reporting line. The silo storage delivered under this scheme is for operational purposes rather than storage.

BIO5.7 Total number of sludge treatment schemes providing sludge thickening and dewatering

7.2.8 We have reported one scheme as providing sludge thickening and dewatering, delivered under WINEP action 08UU100132 – “Enhanced dewatering of cake after AD”.

BIO5.8 Total number of sludge treatment schemes providing main sludge treatment enhancement

7.2.9 The proposed WINEP actions do not include any provision for sludge treatment schemes providing main sludge treatment enhancement. Therefore, the return for this line is nil.

BIO5.9 Volume of sludge processed via thickening or dewatering

7.2.10 As per BIO5.2, WINEP action 08UU100132 – “Enhanced dewatering of cake after AD” includes the provision for additional dewatering of digestate at Manchester Bioresources Centre (MBC). The value reported is the additional dewatering occurring at MBC, reported as the additional amount in the year of completion.

BIO5.10 – Landbank availability

7.2.11 This line asks for the estimated percentage change in the availability of landbank, specific to the companies reporting region. We have interpreted the “companies reporting region” as the North West of England, however we currently dispose a proportion of biosolids to locations outside of the North West as business as usual operations. Change in the availability of landbank outside of our region will have an impact on our sludge disposal operations which is not fully reflected in this line.

7.2.12 The line does not include for changes in landbank required. This is a different set of landbank modelling information that is excluded from the scope of this line.

7.2.13 Landbank assessments have been completed by a consultant with significant experience in undertaking landbank modelling. They have produced information on future landbank availability, landbank requirements and travel distance required to secure landbank for UUW biosolids under a range of scenarios.

7.2.14 The landbank assessments used for populating this table are based on the following sets of assumptions:

- “Baseline” - restrictions in line with the draft BAS-20 measures in response to concerns regarding the Farming Rules for Water; and
- “2029/30: Modest restrictions”: Slightly increased restrictions on phosphate additions (e.g. no application at index 4 and above and matching offtakes at index 3), reduced farmer acceptance to model concerns over contaminants (e.g. PFAS and microplastics or regulatory uncertainty) and restrictions in line with the draft BAS-20 measures in response to concerns regarding Farming Rules for Water.

- 7.2.15 We have already implemented the draft BAS-20 measures, and with Defra Statutory Guidance in place to restrict Environment Agency enforcement of the Farming Rules for Water (to be reviewed in September 2025 or earlier) we have forecast no change in landbank availability until 2025/26.
- 7.2.16 We have then linearly interpolated between the baseline modelled landbank availability in 2025/26 and the 2029/30: Modest restrictions outcome.
- 7.2.17 As landbank is an increasingly important factor for all companies to report, we would like to support Ofwat to improve the consistency in reporting and review wider reporting requirements (including landbank required) to provide better information in relation to this activity.

7.3 Sludge management/sludge treatment/ Bioresources cost driver

- 7.3.1 We have used the additional line within this table to quantify our standard enhancement case *UUW66 – Bioresources Enhancement Claims* “Improving resilience in biosolids recycling to agriculture” which aims to improve biosolids quality through the delivery of enhanced sludge screening.

BIO5.11 Additional Line 1; Sludge management/sludge treatment/ Bioresources cost driver

- 7.3.2 This line represents the percentage (%) of the total amount of raw sludge produced (tDS) which has undergone new/additional enhanced sludge screening. The value has been reported as the total amount of sludge treated in the reporting year upon which the scheme is fully delivered and does not represent any phasing of delivery.

8. BIO6 – Bioresources – NMEAV for capital enhancement schemes

8.1 Whole table

BIO6.1-49

8.1.1 There are no material year on year variations.

8.1.2 The depreciation forecasts are calculated from the capital expenditure on WINEP/NEP Bioresources capital enhancement schemes in CWW3 allocated using asset life categories, average asset lives and commissioning profiles, as follows:

- Asset life categories - each project is allocated across asset life categories based on the assets expected to be constructed as part of the project;
- Average asset lives – analysis was completed on the existing asset register to identify the average asset life for Bioresources assets in each asset life category; and
- Commissioning profiles – analysis was completed on projects commissioned between 2017 and 2022 to identify the period over which similar projects have been commissioned.

8.1.3 The resulting input data is shown in Table 4 and Table 5 below:

Table 4: Asset lives

Category	Very short	Short	Medium	Medium Long	Long	Infrastructure	Land
% of expenditure	6%	4%	56%	1%	28%	4%	1%
Average asset life (years)	4	13	23	36	61	79	Infinite

Table 5: Commissioning profiles

Commissioning Profiles	Commissioned in the year of expenditure	Commissioned in the year following expenditure	Commissioned two years+ after expenditure
%	43%	33%	24%

8.1.4 Although the data in BIO6 is derived from CWW3, which has been prepared on a pre-efficiency basis, we have assumed it is more appropriate to input the capital expenditure for BIO6 on a post-efficiency basis in order to derive the closing NMEAV. Consequently, the capex in BIO6 (post efficiency) does not directly reconcile to the capex in CWW3 (pre-efficiency).

9. Data table confidence grades

Table 6: Data Quality Confidence Grades

Table	Line	APR Line	Description	Units	PR24 Forecast Confidence Grade
BIO1	BIO1.1	8A.1	Total sewage sludge produced, treated by incumbents	ttds/ year	B3
BIO1	BIO1.2	8A.2	Total sewage sludge produced, treated by 3rd party sludge service provider	ttds/ year	B3
BIO1	BIO1.3	8A.3	Total sewage sludge produced	ttds/ year	B3
BIO1	BIO1.4	8A.4	Total sewage sludge produced from non-appointed liquid waste treatment	ttds/ year	C3
BIO1	BIO1.5	8A.5	Percentage of sludge produced and treated at a site of STW and STC co-location	%	B3
BIO1	BIO1.6	8A.6	Total sewage sludge disposed by incumbents	ttds/ year	C3
BIO1	BIO1.7	8A.7	Total sewage sludge disposed by 3rd party sludge service provider	ttds/ year	C3
BIO1	BIO1.8	8A.8	Total sewage sludge disposed	ttds/ year	C3
BIO1	BIO1.9	8A.9	Total measure of intersiting 'work' done by pipeline	ttds*km/year	B4
BIO1	BIO1.10	8A.10	Total measure of intersiting 'work' done by tanker	ttds*km/year	B4
BIO1	BIO1.11	8A.11	Total measure of intersiting 'work' done by truck	ttds*km/year	B4
BIO1	BIO1.12	8A.12	Total measure of intersiting 'work' done (all forms of transportation)	ttds*km/year	B4
BIO1	BIO1.13	8A.13	Total measure of intersiting 'work' done by tanker (by volume transported)	m3*km/yr	B4
BIO1	BIO1.14	8A.14	Total measure of 'work' done in sludge disposal operations by pipeline	ttds*km/year	N/A
BIO1	BIO1.15	8A.15	Total measure of 'work' done in sludge disposal operations by tanker	ttds*km/year	N/A
BIO1	BIO1.16	8A.16	Total measure of 'work' done in sludge disposal operations by truck	ttds*km/year	C5
BIO1	BIO1.17	8A.17	Total measure of 'work' done in sludge disposal operations (all forms of transportation)	ttds*km/year	C5
BIO1	BIO1.18	8A.18	Total measure of 'work' done by tanker in sludge disposal operations (by volume transported)	m3*km/yr	N/A
BIO1	BIO1.19	8A.19	Chemical P sludge as % of sludge produced at STWs	%	C4
BIO2	BIO2.1	8B.1	Sludge transport method: Power	£m	B3
BIO2	BIO2.2	8B.2	Sludge transport method: Income treated as negative expenditure	£m	B3
BIO2	BIO2.3	8B.3	Sludge transport method: Discharge consents	£m	B3

Table	Line	APR Line	Description	Units	PR24 Forecast Confidence Grade
BIO2	BIO2.4	8B.4	Sludge transport method: Bulk discharge	£m	B3
BIO2	BIO2.5	8B.5	Sludge transport method: Renewals expensed in year (Infrastructure)	£m	B3
BIO2	BIO2.6	8B.6	Sludge transport method: Renewals expensed in year (Non-Infrastructure)	£m	B3
BIO2	BIO2.7	8B.7	Sludge transport method: Other operating expenditure excluding renewals	£m	B3
BIO2	BIO2.8	8B.8	Sludge transport method: Total functional expenditure	£m	B3
BIO2	BIO2.9	8B.9	Sludge transport method: Local authority and Cumulo rates	£m	B3
BIO2	BIO2.10	8B.10	Sludge transport method: Total operating expenditure (excluding 3rd party)	£m	B3
BIO2	BIO2.11	8B.11	Sludge treatment type: Power	£m	B3
BIO2	BIO2.12	8B.12	Sludge treatment type: Income treated as negative expenditure	£m	B3
BIO2	BIO2.13	8B.13	Sludge treatment type: Discharge consents	£m	B3
BIO2	BIO2.14	8B.14	Sludge treatment type: Bulk discharge	£m	B3
BIO2	BIO2.15	8B.15	Sludge treatment type: Renewals expensed in year (Infrastructure)	£m	B3
BIO2	BIO2.16	8B.16	Sludge treatment type: Renewals expensed in year (Non-Infrastructure)	£m	B3
BIO2	BIO2.17	8B.17	Sludge treatment type: Other operating expenditure excluding renewals	£m	B3
BIO2	BIO2.18	8B.18	Sludge treatment type: Total functional expenditure	£m	B3
BIO2	BIO2.19	8B.19	Sludge treatment type: Local authority and Cumulo rates	£m	B3
BIO2	BIO2.20	8B.20	Sludge treatment type: Total operating expenditure (excluding 3rd party)	£m	B3
BIO2	BIO2.21	8B.21	Sludge disposal route: Power	£m	B3
BIO2	BIO2.22	8B.22	Sludge disposal route: Income treated as negative expenditure	£m	B3
BIO2	BIO2.23	8B.23	Sludge disposal route: Discharge consents	£m	B3
BIO2	BIO2.24	8B.24	Sludge disposal route: Bulk discharge	£m	B3
BIO2	BIO2.25	8B.25	Sludge disposal route: Renewals expensed in year (Infrastructure)	£m	B3
BIO2	BIO2.26	8B.26	Sludge disposal route: Renewals expensed in year (Non-Infrastructure)	£m	B3
BIO2	BIO2.27	8B.27	Sludge disposal route: Other operating expenditure excluding renewals	£m	B3

Table	Line	APR Line	Description	Units	PR24 Forecast Confidence Grade
BIO2	BIO2.28	8B.28	Sludge disposal route: Total functional expenditure	£m	B3
BIO2	BIO2.29	8B.29	Sludge disposal route: Local authority and Cumulo rates	£m	B3
BIO2	BIO2.30	8B.30	Sludge disposal route: Total operating expenditure (excluding 3rd party)	£m	B3
BIO3a	BIO3a.1	8C.1	Energy consumption - bioresources	MWh	B4
BIO3a	BIO3a.2	8C.2	Energy generated by and used in bioresources control	MWh	B4
BIO3a	BIO3a.3	8C.3	Energy generated by bioresources and used in network plus control	MWh	B4
BIO3a	BIO3a.4	8C.4	Energy generated by bioresources and exported to the grid or third party	MWh	B4
BIO3a	BIO3a.5	8C.5	Energy generated by bioresources that is unused	MWh	B4
BIO3a	BIO3a.6	8C.6	Energy bought from grid or third party and used in bioresources control	MWh	B4
BIO3a	BIO3a.7	8C.1	Energy consumption - bioresources	£m	C4
BIO3a	BIO3a.8	8C.2	Energy generated by and used in bioresources control	£m	C4
BIO3a	BIO3a.9	8C.3	Energy generated by bioresources and used in network plus control	£m	C4
BIO3a	BIO3a.10	8C.4	Energy generated by bioresources and exported to the grid or third party	£m	C4
BIO3a	BIO3a.11	8C.6	Energy bought from grid or third party and used in bioresources control	£m	C4
BIO3a	BIO3a.12	8C.18	Energy consumption - bioresources	MWh	C4
BIO3a	BIO3a.13	8C.19	Energy generated by and used in bioresources control	MWh	B4
BIO3a	BIO3a.14	8C.20	Energy generated by bioresources and used in network plus control	MWh	B4
BIO3a	BIO3a.15	8C.21	Energy generated by bioresources and exported to the grid or third party	MWh	B4
BIO3a	BIO3a.16	8C.22	Energy generated by bioresources that is unused	MWh	B4
BIO3a	BIO3a.17	8C.23	Energy bought from grid or third party and used in bioresources control	MWh	B4
BIO3a	BIO3a.18	8C.18	Energy consumption - bioresources	£m	C4
BIO3a	BIO3a.19	8C.19	Energy generated by and used in bioresources control	£m	C4
BIO3a	BIO3a.20	8C.20	Energy generated by bioresources and used in network plus control	£m	C4
BIO3a	BIO3a.21	8C.21	Energy generated by bioresources and exported to the grid or third party	£m	C4
BIO3a	BIO3a.22	8C.23	Energy bought from grid or third party and used in bioresources control	£m	C4
BIO3b	BIO3b.1	8C.7	Income claimed from Renewable Energy Certificates (ROCs)	£m	B4

Table	Line	APR Line	Description	Units	PR24 Forecast Confidence Grade
BIO3b	BIO3b.2	8C.8	Income claimed from Renewable Heat Incentives (RHIs)	£m	B4
BIO3b	BIO3b.3	8C.9	Income claimed from Green Gas Certs (RGGO's)	£m	B4
BIO3b	BIO3b.4	8C.10	Income claimed from [other renewable energy subsidy (2)]	£m	B4
BIO3b	BIO3b.5	8C.11	Income claimed from [other renewable energy subsidy (3)]	£m	B4
BIO3b	BIO3b.6	8C.12	Total income claimed from renewable energy subsidies	£m	B4
BIO3b	BIO3b.7	8C.13	% of total number of renewable energy subsidies due to expire in the next 2 financial years	%	A2
BIO3b	BIO3b.8	8C.14	This year's value of renewable energy subsidies due to expire in the next 2 financial years	£m	B4
BIO3b	BIO3b.9	8C.15	BOD load of liquor or partially treated liquor returned from bioresources to network plus	kg/d	C4
BIO3b	BIO3b.10	8C.16	Ammonia load of liquor or partially treated liquor returned from bioresources to network plus	kg Amm-N/d	C4
BIO3b	BIO3b.11	8C.17	Recharge to Bioresources by network plus for costs of handling and treating bioresources liquors	£m	C5
BIO3b	BIO3b.12	8C.24	Percentage of bioresources energy consumption that is metered	%	B3
BIO4	BIO4.1	8D.1	% Sludge - untreated	%	B3
BIO4	BIO4.2	8D.2	% Sludge treatment process - raw sludge liming	%	B3
BIO4	BIO4.3	8D.3	% Sludge treatment process - conventional AD	%	B3
BIO4	BIO4.4	8D.4	% Sludge treatment process - advanced AD	%	B3
BIO4	BIO4.5	8D.5	% Sludge treatment process - incineration of raw sludge	%	B3
BIO4	BIO4.6	8D.6	% Sludge treatment process - other (specify)	%	B3
BIO4	BIO4.7	8D.7	% Sludge treatment process - Total	%	B3
BIO4	BIO4.8	8D.8	% Sludge disposal route - landfill, raw	%	C3
BIO4	BIO4.9	8D.9	% Sludge disposal route - landfill, partly treated	%	C3
BIO4	BIO4.10	8D.10	% Sludge disposal route - land restoration/ reclamation	%	C3
BIO4	BIO4.11	8D.11	% Sludge disposal route - sludge recycled to farmland	%	C3
BIO4	BIO4.12	8D.12	% Sludge disposal route - other (specify)	%	C3
BIO4	BIO4.13	8D.13	% Sludge disposal route - Total	%	C3

Table	Line	APR Line	Description	Units	PR24 Forecast Confidence Grade
BIO5	BIO5.1	N/A	Tonnes of dry solids treated via main sludge treatment	ttds/yr	N/A
BIO5	BIO5.2	N/A	Tonnes of dry solids undertaking thickening/dewatering	ttds/yr	B3
BIO5	BIO5.3	N/A	Additional sludge storage - tank volume (pre-thickening/pre-dewatering/untreated sludge)	m3	N/A
BIO5	BIO5.4	N/A	Additional sludge storage - tank volume (thickened/dewatered/treated sludge)	m3	C4
BIO5	BIO5.5	N/A	Additional sludge storage - cake pads/bays area or equivalent (cake)	m2	C5
BIO5	BIO5.6	N/A	Total number of sludge treatment schemes providing sludge storage	nr	A1
BIO5	BIO5.7	N/A	Total number of sludge treatment schemes providing sludge thickening and dewatering	nr	A1
BIO5	BIO5.8	N/A	Total number of sludge treatment schemes providing main sludge treatment enhancement	nr	N/A
BIO5	BIO5.9	N/A	Volume of sludge processed via thickening or dewatering	m3	B3
BIO5	BIO5.10	N/A	Landbank availability	%	C5
BIO5	BIO5.11	N/A	Additional Line 1; Sludge management/sludge treatment/Bioresources cost driver	%	A2

Figure 1: BIO Data Table Confidence Grades

Reliability Band	Description
A	Sound textual records, procedures, investigations, or analysis properly documented and recognised as the best method of assessment.

B	As A, but with minor shortcomings. Examples include old assessment, some missing documentation, some reliance on unconfirmed reports, some use of extrapolation.	
C	Extrapolation from limited sample for which Grade A or B data is available.	
D	Unconfirmed verbal reports, cursory inspections or analysis.	
Accuracy band	Accuracy to or within +/-	But outside +/-
1	1%	-
2	5%	1%
3	10%	5%
4	25%	10%
5	50%	25%
6	100%	50%
X	Accuracy outside +/- 100%, small numbers or otherwise incompatible	

Appendix A Compliance with reporting requirements

A.1 General

A.1.1 *UUW* has endeavoured to fully comply with all of the reporting requirements. In a small number of instances where this is not the case, we have fully explained this within the table commentaries with appropriate justification.

A.2 Ofwat query response ID-533

A.2.1 *UUW*, in response to query ID-533, has not trimmed our data to match Ofwat's defined number of decimal place requirements. For display purposes data will, however, always conform to the formatting rules as set within the Ofwat PR24 tables. We believe this to be fully aligned to the table requirements.

United Utilities Water Limited
Haweswater House
Lingley Mere Business Park
Lingley Green Avenue
Great Sankey
Warrington
WA5 3LP
unitedutilities.com



Water for the North West