Economic Impact Assessment – Water Quality Permit Charges

Impact on businesses from changes to charges for water quality permits

Date: January 2024

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Published by:

Environment Agency
Horizon House, Deanery Road,
Bristol BS1 5AH

www.gov.uk/environment-agency

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Executive summary

This report examines the likely impact on permit holders of our proposed changes to the water quality permit charges. These changes include in most cases increases in the charges for permits but also some reductions in others. In addition, some permit activities have been replaced, and these affect businesses applying for sewerage discharge permits. Sections 5 and 6 give a more in-depth review of likely impacts on the water and agricultural sectors.

We have collated data about all water quality permit holders and developed a spreadsheet model to analyse the impacts of proposed changes to our charges for these permits. We have used data from the following sources to inform our analysis:

- our customer database for the number of water quality permits held by customers
- our internal spreadsheet model for assessing the impacts of proposed changes to charges for water quality permits
- Companies House for data on turnover, gross profit, employment, and number and size of enterprises[1]
- Farm Business Survey for data to explore potential impacts on the agricultural industry

We are reporting the results in terms of acceptability of the impact as a percentage of turnover and gross profit. The boundary for acceptability is 0.5% of turnover and 10% of gross profit.

Our analysis of the impact on industrial sectors gives a reasonable overview, but there are likely to be many nuances not apparent at this level of detail. It appears that most industrial sectors will only be very marginally impacted by the proposed changes in water quality charges. The water sector is likely to face the highest impacts. This is due to the changes in the structure of charging, with new charges for sewage effluent discharges and different rates for other types of water quality permits. We have analysed the likely impacts of the proposed changes in more detail in sections 5 and

1 Accounts submitted to Companies House tend to use the term turnover for the amount of money generated by a company from its operations. Farm business survey data, used in section six, uses the term total output. This includes non-farming income such as support subsidies, environmental payments, and income from diversifications. In the report, this is referred to as turnover.

6 to better understand the potential impact on sewerage undertakers and the agricultural sector.

Modelling indicates that the proposed changes to charges will only have a modest impact on the turnover and gross profits of businesses in the water industry sector, particularly the major sewerage undertakers. The acceptability threshold may be marginally exceeded by major sewerage undertakers that have a higher than average number of licences and a lower than average annual turnover. However, the turnover of sewerage undertakers is forecast to grow between 2024 and 2029 which should offset some of the impacts. The impact on gross profit for both the wider water industry and the major sewerage undertakers is well within the acceptable range.

The proposed changes to charges for water quality permits will result in increased costs for less than 2% of agricultural businesses. Of these businesses, the proposed changes to charges are likely to lead to only a modest impact on both annual turnover and gross profits with proportional impacts within the acceptability thresholds. The scale of impact however depends on a combination of farm type, scale and the permit type being used by a business. Larger agricultural businesses, particularly cereal, general cropping, dairy and horticultural businesses, are likely to be less impacted than grazing livestock, mixed or specialist pig farms. Part of the reason is that these latter farm types have lower annual turnover and levels of profit. In some cases, for grazing livestock and mixed farms, particularly at small and part-time farms, the proportional impact is on losses rather than profits. This reflects the nature of the industry in which costs tend to be disproportionately higher for small agricultural businesses.

1. Background

The government and the Environment Agency have come under increased scrutiny regarding deterioration in water quality in England. As a result, we have reviewed our permitting and regulatory activity for the water quality activities we regulate and are transforming and modernising our approach. Permits for water discharge activities and groundwater activities are collectively known as water quality permits. This work will require additional funding from the permit holders we regulate. We have reviewed the charges that fund this work and are consulting on proposed changes to the current charging scheme.

We are aware that the proposed increases to some subsistence charges are significant and have carried out an analysis of the impacts on specific sectors. This document outlines our findings and provides additional information relevant to question 19 of the "Environment Agency charges consultation: water discharges." The proposed changes to water quality permit charges would provide the resources needed to build capacity, capability and resilience. The consultation document describes the proposed new charges in more detail alongside our ambition to deliver an efficient and effective service by recovering the costs of our permitting and regulatory work.

2. Use of data

2.1. Introduction

Our analytical approach examines the likely economic impact of proposed changes to the charges for water quality permits. We have used collections of data on:

- the specific regimes that have proposed changes to charges
- the impact of proposed changes to charges across different industrial sectors

We have developed a spreadsheet model for analysing the data and reporting on results. The method considers data on the following for the impacted permit holders:

- charging income
- number of licenses
- turnover
- gross profit
- employment
- number and size of enterprises.

2.2. Collection of data

A database of water quality permits holders was used to identify relevant businesses. In total, the database includes over 41,000 customers. Once the relevant data was selected, this left a total of 9,874 individual organisations. Of these, 91% were private businesses, others included charities, local authorities, and other public bodies.

To understand the likely impact on the water sector, data from Companies House was extracted for all the major sewerage undertakers and other businesses identified as having water quality permits. For these other businesses, a random sample was conducted. Non business organisations such as charities, local authorities and other public bodies were not sampled. From the sample, data on turnover, costs and number of employees were extracted from company accounts filed with Companies House. For most small and all micro companies no financial data was available.

In total, 161 businesses were sampled. Data was collected on their Standard Industrial Classification (SIC) codes and full-time equivalent (FTE) employees, enabling their classification into micro, small, medium, and large business sizes.

For impact assessments of regulation change, HM Treasury recommends using an alternative definition for medium sized businesses when conducting impact analysis.[2] Rather than the standard definition of a medium sized company (50 to 249 FTE), a revised HM Treasury alternative was used (50 to 499 FTE). This reclassification affects just over 11% of large companies who were reclassified as medium sized companies. The number and size of businesses sampled is given in table 2.1.

Within the sample, 84% had financial data reported in the submission of their annual accounts. Only businesses meeting a certain threshold are required to report gross profit and loss. Many small businesses do not meet the threshold; therefore, their financial data is not available for analysis. Table 2.1 shows that most of the available financial data was for large and medium sized businesses. A caveat in the analysis is that the financial data on small and micro businesses is underrepresented. No financial data is available for micro businesses. There are 2 reasons why there may be no micro sized businesses identified as holding a water quality permit:

- none were found to have water quality permits.

[2] Guidance Medium sized business regulatory exemption assessment: supplementary guidance, Updated 19 September 2023 (Medium sized business regulatory exemption assessment: supplementary guidance - GOV.UK (www.gov.uk))

- the number of micro businesses for the water discharge and groundwater activities is likely to be relatively small and none were picked up in the random sampling.

Table 2.1: Business with financial data available

Size of business	Total sample	Percentage of businesses with financial data
Large	68	100%
Medium	54	98%
Small	25	40%
Micro	0	0%
Unknown size	14	29%
All businesses	161	84%

2.3. Agricultural data

The water quality discharge customer database was used to identify potential agricultural businesses. These were matched with data from other sources (SIC data from Companies House, farm directories and Food Standards Agency data) to identify the most likely farm type. In total, 137 farm businesses were identified and categorised. Of these, 10 were arable, 22 were identified as mixed farms, 48 were grazing livestock, and 46 were dairy farms. Mapping the data allowed the analysis to match changes in specific water quality charges with a farm business type. Ideally a larger sample would be more robust as some farm types had limited observations (e.g. pigs, poultry, and horticulture).

The SIC data identifies farm businesses where turnover is reportable under Companies' House guidance. Therefore, as most farms are relatively small businesses, few report turnover and costs. This biases the sample towards larger and more diverse farm businesses. To overcome this bias, Farm Business Survey (FBS) data has also been used. This data reports turnover and costs for different farm types and sizes in England. Therefore, the use of this data gives a more nuanced assessment of the likely impact of changes to charges on the agricultural sector. To reduce volatility that can occur in farm data from year to year, a 5-year average of turnover and costs was used.

3. Modelling the impacts

3.1. Use of data in the model

A spreadsheet model was created to model the impacts of proposed changes to the charges for water quality permits.[3] The spreadsheet assesses the impacts of proposed changes to charges at the business level. A general sectorial level analysis is given followed by an in-depth analysis of the water and agricultural sectors.

Previous impact analysis found that there was no standard definition of what constitutes a typical business.[4] Indeed, an examination of turnover and number of permits per business identifies long-tailed distributions. That is, a very small number of businesses hold most permits (figure 3.1)[5] or have very high turnover (figure 3.2).

Long-tailed distributions present a challenge of how outliers affect means. For example, use of an arithmetic mean to describe the data would considerably over estimate the mean value of the data. This makes the use of simple averages erroneous as they will be biased towards the largest values. Instead, the geometric mean is used, which is suitable for describing this type of data as it is less sensitive to extreme values. In addition, the median was used when the geometric mean was not appropriate because of a small sample size. The use of geometric means and medians was a cautious approach as they use lower valued means compared to the arithmetic mean and therefore emphasise any potential impact of changes in charges.

[3] Some charges will be increasing while others are decreasing in value.

[4] For example, Kremezi, I. (2008) Annex 7 – EPR Regimes Economic Impact Assessment, Environment Agency.

[5] Note that the vertical axes are logarithmic to reduce the distorted effect of businesses with most permits or highest turnover.

Figure 3.1: Distribution of businesses with water quality permits.

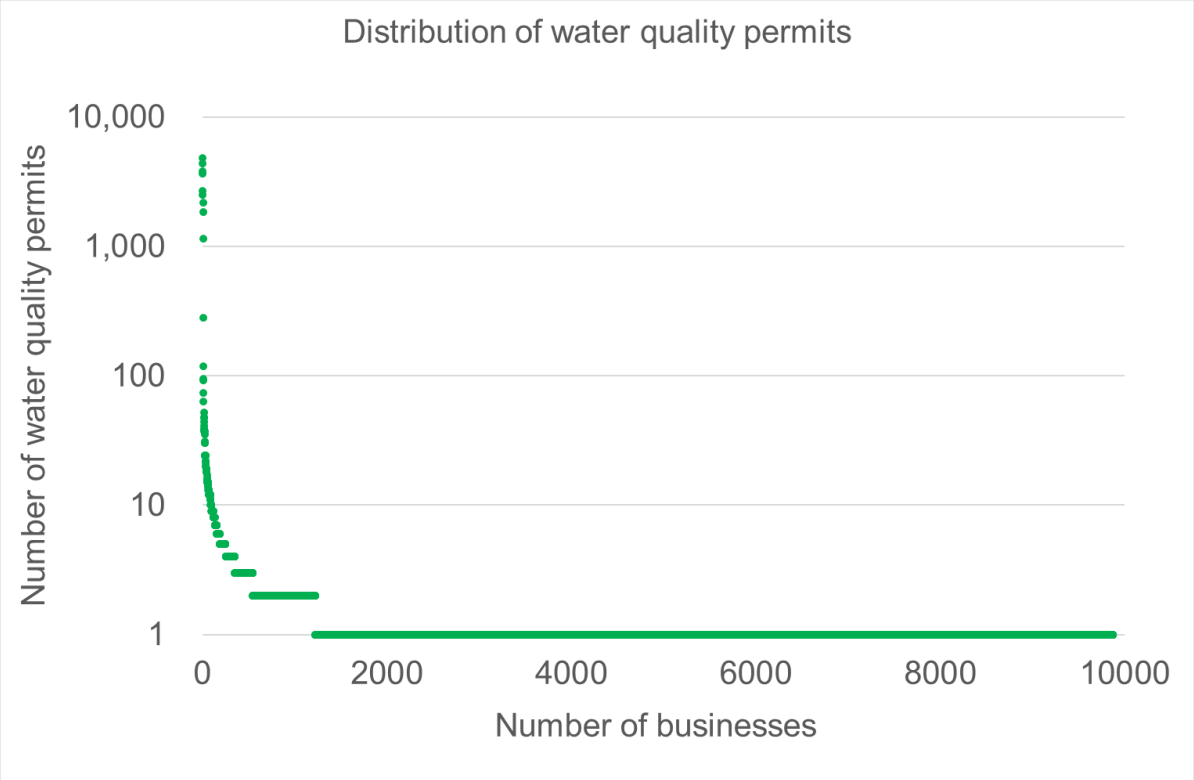
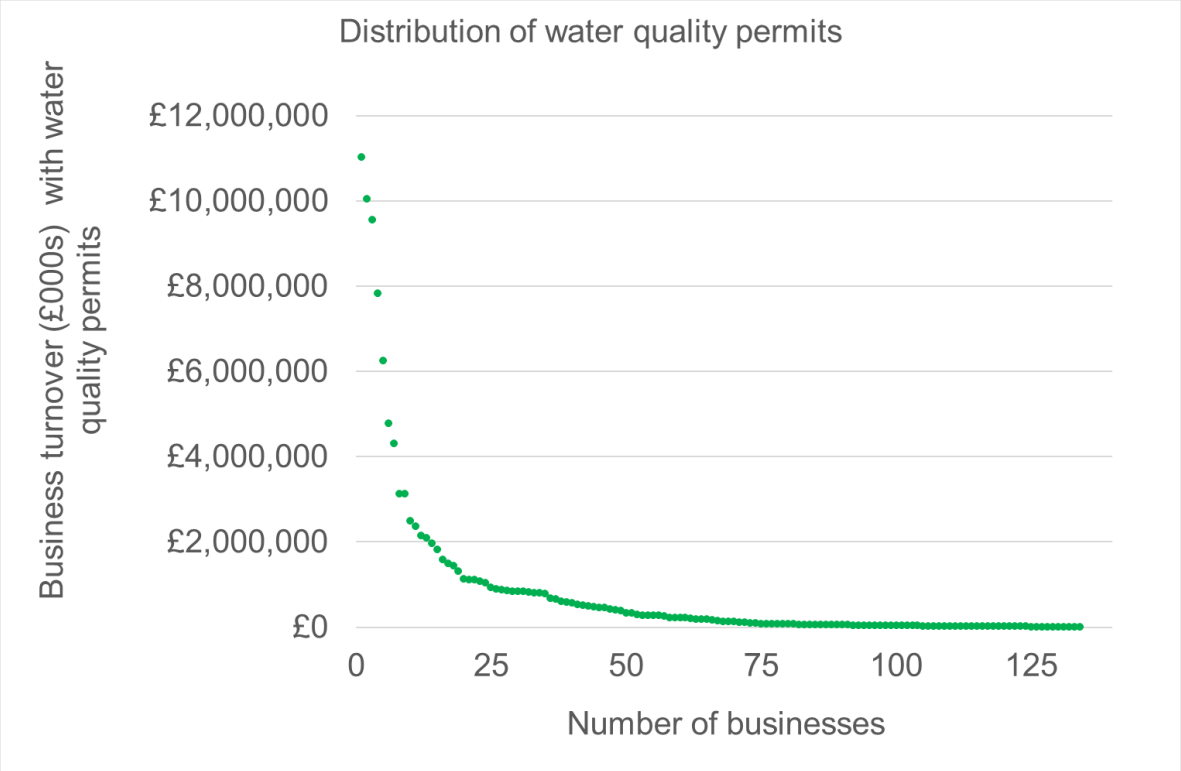


Figure 3.2: Turnover of businesses from financial data collected from companies' house.



3.2. Calculation of impact

A marginal analysis approach is taken to calculate the impact of changes to the prices and structure of the water quality permits. The water quality team modelled what they currently charge against their proposed future charges. However, it is not possible to match individual customers in specific charging activities to their financial data. Instead, the impact analysis uses an average charge from the modelling of the different charge activities. To overcome the potential bias of this approach, sensitivity analysis explores the maximum and minimum charges a regime might charge within an estimated range of impacts. These are referred to as an upper and lower boundary.

To estimate the impact, this analysis calculates the initial difference between present and proposed charges for each the regimes. Next, the number of permits per business is estimated and rounded up to ensure businesses have an integer number. The marginal change is calculated as a multiplication between these two.

Sensitivity analysis is conducted as part of the analysis. This is particularly crucial when dealing with long-tailed distributed data. Therefore, interquartile ranges are presented to assess how the top and bottom 25% of businesses perform at the business level scale.[6] At the sector scale, scenarios are used to understand the behaviour of specific sectors at the tails of the permits and the financial distributions. This provides insights into potential risks in terms of threshold impacts associated with businesses with a high or low number of permits.

3.3. Assessing the threshold of acceptability

The literature on impact thresholds is sparse. As such, this analysis relies heavily on a study conducted in 2002 by Vercaemst (see Table 3.1)[7]. The conclusions of Vercaemst were also drawn on in Rural Payments Agency's (RPA) previous work for Defra on the affordability of the Water Framework Directive Programme of Measures, which included a consultation with a broad range of industry and other stakeholders[8] and in the Environment Agency's 2018 Environmental Permitting Regulations (EPR) Regimes Economic Impact Assessment.

[6] If necessary, adjusted percentile ranges may be reported in sensitive cases and reported in the text.

[7] Vercaemst P. (2002): BAT: when do Best Available Techniques become Barely Affordable Technology? Paper for the European Workshop (DG Enterprise) 'Economic consequences of the IPPC Directive'

[8] RPA (2015): Assessing the affordability of WFD measures in England, Final Report to Defra, WT1520.

Table 3.1: Indicative reference values for the acceptability of changes to charges

Annual costs relative to:	Acceptable	Questionable	Unacceptable
Turnover	Less than 0.5%	0.5 to 5%	Greater than 5%
Gross profit	Less than 10%	10 to100%	Greater than 100%
Added Value	Less than 2%	2 to 50%	Greater than 50%

Source: Based on Vercaemst (2002) and as discussed in RPA (2015)

A set of rules has been established to act as the basis for the assessment at sector level. The key factors accounted for as criteria for assessing the impacts include:

- change in charges as a percentage of turnover
- change in charges as a percentage of gross profit
- level of uncertainty surrounding the likely impact

3.4. Limitations of approach

Many of the caveats have already been mentioned:

- the lack of financial data on small but particularly micro businesses
- the long-tailed nature of both the number of permits held by businesses and their financial data
- limited financial data on the agricultural sector
- the lack of literature on impact thresholds for changes in regulatory charges

Other limitations include difficulties in allocating businesses to specific SIC codes. For example, 9% of permits could not be allocated to a specific 2-digit or lettered SIC code because they operated across industries.

A further limitation is the high level of SIC codes used for industrial classification. In the UK, the SIC system uses letters in addition to numbers to represent a very broad classification of industries. This reduces the level of detail of the analysis. To a certain extent, this is overcome when examining the water industry in more depth, which is the focus of this report.

Finally, for some sectors the sample size in terms of SIC classification was very small. In particular, the sample of permits of agricultural businesses is very limited and therefore, the expected impact on agricultural business is speculative rather than absolute.

4. Overview of impact analysis

The impact analysis is divided into three sections:

- likely general overall impact
- likely impact on water industry
- potential impact on agricultural businesses

4.1. Distribution of permits by business size

The distribution of permits across different business sizes is illustrated in table 4.1. Large and medium sized businesses make up most of the sample (76%). However, in terms of number of permits held by businesses in the sample, 99% of permits were held by large companies. Furthermore, the major sewerage undertakers held 97% of the permits in the sample, compared to two-thirds in the whole of the water quality permits database. This bias towards sewerage undertakers was intentional since the changes to charges are likely to impact them the most.

Table 4.1: Number of businesses with permits within the sample

Size of business	Water quality permits (number)	Water quality permits (as a percentage)
Large	68	42%
Medium	54	34%
Small	25	16%
Micro	0	0%
Unknown	14	9%
Total	161	100%

4.2. Financial impact of proposed changes to permit charges by business size

The marginal impact of proposed changes in the charging structure for the water quality regime is given in figure 4.1. This shows that changes to the charges met the acceptability threshold in terms of impact on turnover for businesses of all sizes. Large businesses in this sector are affected the most. Sensitivity around the acceptability metric is greatest for large businesses holding many permits with a turnover in the lower quartile of the sampled businesses. For these companies, the upper limit of acceptability is 0.07%. For medium and small businesses, the acceptability of changes in charging is negligible because of the low number of permits they hold, and they are more likely to benefit from decreases rather

than rising charges. Note that the sensitivity of businesses with a low number of permits and a higher turnover are not shown in figure 4.1 as the impact on annual turnover is close to zero.

Our analysis indicates that the proposed changes to water quality charges are likely to have an acceptable impact on gross profit across businesses of all sizes. We estimate that the impact on gross profit will be 0.76% for large businesses and less than 0.03% for medium and small sized businesses. In terms of sensitivity, large businesses are the most affected. If a large business is in the top quartile for the number of permits held and the bottom quartile in terms of turnover, the acceptability metric increases to 7.49%, which is still within the 10% acceptability threshold for the impact of gross profit. A summary is shown in table 4.2.

Figure 4.1: Impact of increased charges on turnover by business size

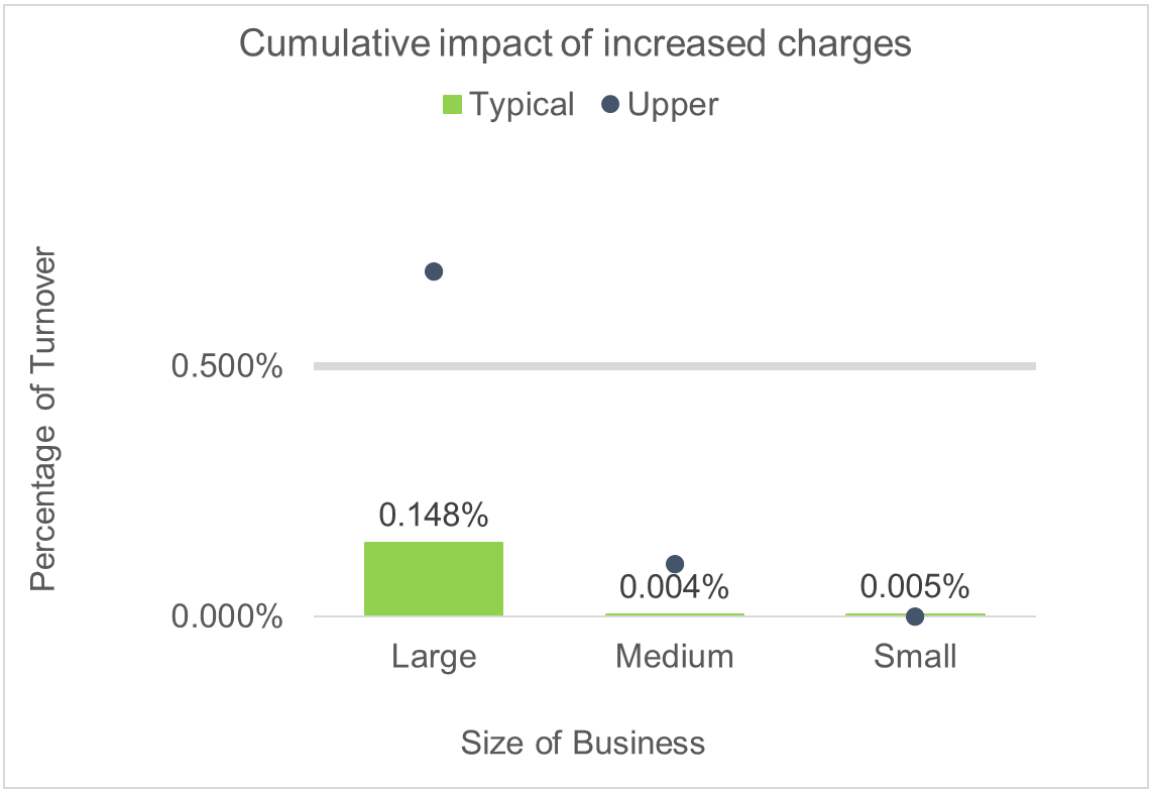


Table 4.2: Summary of the acceptability of impacts of proposed changes to permit charges in terms of reference values

Annual costs relative to:	Acceptable	Questionable	Unacceptable
Turnover of:	**less than 0.5%**	**0.5 to 5%**	**greater than 5%**
Large	✓		
Medium	✓		

Annual costs relative to:	Acceptable	Questionable	Unacceptable
Small	✓		
Gross profit of	**less than 10%**	**10 to 100%**	**greater than 100%**
Large	✓		
Medium	✓		
Small	✓		

4.3. Analysis of the impact on industrial sectors[9]

Tables 4.3 and 4.4 give the expected impact on turnover and gross profit of businesses from different sectors of the economy. At the high level of industrial classifications, it is unsurprising that the “water supply; sewerage” sector is most likely to be affected by the changes to charges. However, all sectors fall within the acceptable impact on turnover (see table 4.3) and gross profit (see table 4.4). Furthermore, most sectors remain within the acceptable band even when the impact is modelled for businesses in the top quartile for the number of permits held and the lowest quartile for turnover (see tables 4.3 and 4.4, upper boundary).

The exception is the sensitivity of the water supply, sewerage sector. This is not unexpected given that sewerage undertakers hold the most permits. In terms of turnover, when businesses in this sector have an above average number of permits and below average turnover, the impact becomes questionable. A more nuanced analysis of impacts, particularly on the main sewerage undertakers, is given in Section 5. However, the impact on gross profit with the sensitivity analysis remains within the acceptability threshold.

[9] Sectors with less than five businesses is the sample have been excluded from the analysis.

Table 4.3: Impact of increased charges on turnover by industrial sector

Percentage of: **Turnover of**	Expected **acceptable** impact **less than 0.5%**	Expected **question-able** impact **0.5 to 5%**	Expected **un-acceptable** impact **greater than 5%**	Upper **acceptable** boundary **less than 0.5%**	Upper **question-able** boundary **0.5 to 5%**	Upper **un-acceptable** boundary **greater than 5%**
Agriculture, forestry and fishing	0.00%			0.01%		
Mining and quarrying	0.01%			0.47%		
Manufacturing	0.00%			0.02%		
Electricity, gas, steam and air conditioning supply	0.01%			0.32%		
Water supply; sewerage	0.14%				1.94%	
Waste management and remediation	0.01%			0.10%		
Construction	0.00%			0.00%		
Wholesale and retail trade; repair of motor vehicles	0.00%			0.01%		
Transportation and storage	0.00%			0.03%		
Accommodation and food service activities	0.01%			0.07%		
Administrative and support service activities	0.00%			0.23%		

Table 4.4: Impact of increased charges on gross profit by industrial sector

Percentage of: **gross profit of**	Expected **acceptable** impact **less than 10%**	Expected **question-able** impact **10 to 100%**	Expected **un-acceptable** impact **greater than 100%**	Upper **acceptable** boundary **less than 10%**	Upper **question-able** boundary **10 to 100%**	Upper **un-acceptable** boundary **greater than 100%**
Agriculture, forestry and fishing	0.01%			0.06%		

Percentage of: **gross profit of**	Expected **acceptable** impact **less than 10%**	Expected **question-able** impact **10 to 100%**	Expected **un-acceptable** impact **greater than 100%**	Upper **acceptable** boundary **less than 10%**	Upper **question-able** boundary **10 to 100%**	Upper **un-acceptable** boundary **greater than 100%**
Mining and quarrying	0.04%			2.91%		
Manufacturing	0.00%			0.09%		
Electricity, gas, steam and air conditioning supply	0.06%			0.70%		
Water supply; sewerage	0.28%			3.35%		
Waste management and remediation	0.03%			0.76%		
Construction	0.00%			0.02%		
Wholesale and retail trade; repair of motor vehicles and	0.01%			0.04%		
Transportation and storage	0.00%			0.13%		
Accommodation and food service activities	0.27%			0.75%*		
Administrative and support service activities	0.03%			0.30%		

* This represents a 0.75% increase on loss rather than profit.

In conclusion, our analysis of the impact on industrial sectors gives a reasonable overview but there are likely to be many nuances that are not apparent at this level of detail. It appears that most industrial sectors will only be very marginally impacted by the proposed changes in water quality charges. The water sector is likely to face the highest impacts, and this reflects the changes in the structure of charging with new charges for sewerage discharges and lower rates for other types of water quality permits. We have analysed the likely impacts of the proposed changes in more detail in sections 5 and 6 to better understand the potential impact on sewerage undertakers and the agricultural sector.

5. Impact of proposed charge increases on the water sector

This section examines the impacts of proposed changes in charges and charging structure specifically on the water industry (supply and sewerage). As a purposeful random sampling approach was used in this analysis, all sewerage undertakers were sampled given that there are so few.

5.1. Water sector as a whole

The SIC classification code 36000 includes both the major sewerage undertakers that supply water and treat sewerage but also smaller businesses that operate, report to collect, treat and supply water. The first part of the analysis focuses on the whole of the industry with section 5.2 purely focusing on the top 10 sewerage undertakers.

The acceptability of impacts from the proposed changes to charges in terms of reference values on turnover of the whole water industry are given in table 5.1. This shows the level of acceptability lies between 1.85% and less than 0.01%. The average acceptability metric for the whole water industry is 0.61%, which is just over the acceptability threshold. However, this value should be treated with caution as the top 10 sewage undertakers bias the sample. If these are excluded, the percentage impact on turnover for companies in this sector is less than 0.01%. In terms of gross profit, table 5.2 gives the acceptability of impacts from the proposed changes to charges. All fall within the acceptability threshold for gross profit.

Table 5.1: Acceptability of impacts from proposed changes to permit charges in terms of reference values on turnover of water industry as a whole

Water industry as a whole percentage of turnover	Average acceptability metric	Upper boundary	Lower boundary
Acceptable (less than 0.5%)			0.01%
Questionable 0.5 to 5%	0.61%	1.85%	
Unacceptable greater than 5%			

Table 5.2: Acceptability of impacts from proposed changes to permit charges in terms of reference values on gross profit of water industry as a whole

Water industry as a whole percentage of gross profit	Average acceptability metric	Upper boundary	Lower boundary
Acceptable (less than 10%)	1.71%	3.19%	0.03%
Questionable 10 to 100%			
Unacceptable greater than 100%			

5.2. Top 10 sewerage undertakers

Analysis of the impacts from proposed charge increases on the top 10 sewerage undertakers gives a slightly more nuanced view. The acceptability of these impacts is within the acceptable threshold at 0.45% for turnover (see table 5.3). This is marginally lower than for the wider water industry as the 10 companies are more evenly matched in terms of turnover and the number of licences held. However, there are some differences. Those companies holding the most licences with relatively lower turnover can expect the impacts of increased charges to be just over 1% of their turnover. This is outside the acceptable threshold and within the questionable threshold. Conversely, sewerage undertakers with fewer licences and a higher level of turnover will be impacted less and are likely to fall within the acceptable threshold. While the impact on all sewerage undertakers is generally acceptable it is likely that some less well performing businesses may pay proportionally higher charges.

The acceptability of impacts from changes to charges on the top 10 sewerage undertakers' gross profits falls within the acceptable threshold (table 5.4). It is likely the impact will range between 0.24% and 2.62% of gross profit depending on the number of permits a company holds for the different activities and the level of gross profit the business is operating with.

Table 5.3: Acceptability of impacts from proposed changes to permit charges in terms of reference values on turnover of the top 10 sewerage undertakers only

Top 10 sewerage undertakers percentage of turnover	Average acceptability metric	Upper boundary	Lower boundary
Acceptable (less than 0.5%)	0.45%		0.10%
Questionable 0.5 to 5%		1.04%	
Unacceptable greater than 5%			

Table 5.4: Acceptability of impacts from proposed changes to permit charges in terms of reference values on gross profit of the top 10 sewerage undertakers only

Top 10 sewerage undertakers percentage of gross profit	Average acceptability metric	Upper boundary	Lower boundary
Acceptable (less than 10%)	1.07%	2.62%	0.24%
Questionable 10 to 100%			
Unacceptable greater than 100%			

5.3. Outlook and Summary

The IBISworld[10] outlook suggests that demand conditions for water service providers is likely to be favourable in the next five years because of a growing UK population and consistent demand from households. However, this prediction needs to be taken cautiously due to a higher uptake of water meters and greater environmental concerns which may reduce water consumption by the public.

The number of businesses is also expected to rise over the same period, giving the sewerage undertakers a larger customer pool particularly as industrial production is likely to increase and push up demand for water used in various operations. However, gross profit is likely to be affected by regulatory price reviews and price caps, and increased competition as a result of the Water Act 2014. It is therefore estimated that turnover in the water industry will increase by 2.2% between 2024 and 2029.

In summary, the turnover and gross profits of businesses in the water industry sector, particularly the major sewerage undertakers, are only modestly impacted by the modelling of proposed changes to charges for water quality permits. The acceptability threshold may be marginally exceeded by major sewerage undertakers that have a higher than average number of licences and a lower than average annual turnover. However, the turnover of sewerage undertakers is forecast to grow between 2024 and 2029 which should off-set some of the impacts. The impact on gross profit for both the wider water industry and the major sewerage undertakers is well within the acceptable range.

6. Impact of proposed permit charge increases on the agricultural sector

It is estimated that 5% of agricultural businesses will be impacted by proposed changes to charges for water quality permits.[11,12] For around two thirds of these businesses, there will be a beneficial impact as they hold permits in activity 2.3.60 where a charge decrease is proposed. Therefore, less than 2% of agricultural businesses will see a charge increase.

[10] IBISWorld (April, 2023) At a Glance - E36.000 Water Collection, Treatment & Supply in the UK - MyIBISWorld

[11] It is estimated that there are 52,500 farm businesses in England, Survey Details and Technical Notes - GOV.UK (www.gov.uk).

[12] At a maximum, 2796 water quality permits are assumed to be connected with agricultural businesses.

At a high level using SIC data, the impact on farms seems to be moderate. When we drill down into different farm types and sizes the impact is likely to be limited. To do this, we analysed a sample of 155 agricultural businesses and the associated charge activities (see table 6.1). Of these agricultural businesses, 137 could be matched to the FBS classification of farm type.[13] These included 10 arable farms, 46 dairy farms, 16 grazing livestock (lowland) farms, 32 grazing livestock (less favoured area (LFA)) farms[14] and 22 mixed farms. Other farm types (specialist pig and poultry farms, general cropping, and horticulture) only had very limited representation in the sample.

Businesses in the sample held water quality permits across 8 charge activities associated with agriculture, as described in table 6.1. Charge reference 2.3.60 (land spreading of up to and including 5m^3 a year of undiluted working strength waste or used sheep dip) was the most sampled permit representing 50% of the total permits held by agricultural businesses (77 of 155). This is likely to be an underestimation since the full dataset for water quality permits associated with agriculture businesses indicates that across the 8 charge activities in table 6.1, two thirds of these permits fall into activity 2.3.60. The estimated impact from the proposed increase to some charges is therefore likely to be overestimated.

Table 6.1: water quality permits held by agricultural businesses in our sample

Charge activity	Charge activity
2.3.47	Trade effluent and or non-sewage effluent discharge with a volume greater than 20m^3 a day and up to and including 100m^3 a day Specified discharge consisting of trade effluent or non-sewage effluent
2.3.49	Trade effluent and or non-sewage effluent discharge with a volume greater than 20m^3 a day and up to and including 100m^3 a day with no numeric permit conditions Specified discharge consisting of trade effluent or non-sewage effluent with no numeric permit conditions
2.3.53	Trade effluent and or non-sewage effluent discharge with a volume greater than 5m^3 a day and up to and including 20m^3 a day

[13] Agricultural businesses were identified using several different sources including Companies House, FSA database of dairy farms, livestock directories. Sources were also cross checked to assure robustness of the sample.

[14] Less Favoured Area farms are shortened to LFA.

Charge activity	Charge activity
2.3.55	Trade effluent and or non-sewage effluent discharge with a volume greater than 5m^3 a day and up to and including 20m^3 a day with no numeric permit conditions
2.3.58	Trade effluent and or non-sewage effluent discharge with a volume up to 5m^3 a day
2.3.59	Trade effluent and or non-sewage effluent discharge with a volume up to 5m^3 a day with no numeric permit conditions
2.3.60	Land spreading of up to and including 5m^3 a year of undiluted working strength waste and used sheep dip
2.3.70	Rainfall related discharges with no specific substances with a volume greater than 20m^3 a day and up to and including 1,000m^3 a day Specified discharge which is rainfall related Specified discharge which is rainfall related

In terms of farm type, the impact on turnover from all farm business enterprises is less than 0.05%, which is within the acceptability threshold. If we only consider turnover from agricultural enterprises, the maximum impact rises from 0.05% to 0.08% for both grazing livestock (lowland) and grazing livestock (LFA) farm types, both of which are within the acceptability threshold of 0.5%.

The impacts on farm gross profit of the changes in the charges for different water quality permit activities is also within the acceptability threshold of 10%. It is likely that specialist pig farms will be impacted the most, particularly if their water quality permits are in activity 2.3.47, with an impact on gross profits of 0.48%. The impact on the gross profits of both grazing livestock (lowland) and grazing livestock (LFA) farm types are also noteworthy with respective impacts of 0.32% and 0.21% if they hold permits under activity 2.3.53. The impact on gross profits of the reduction in the charge for activity 2.3.60 is positive between 0.01 and 0.03%.

Table 6.2 shows the likely impact of these changes assuming turnover is derived purely from agricultural enterprises (there is no additional income from diversification,

environmental payments, or subsidy payments).[15,16] The proportional impacts in the table are median and weighted values.[17] In terms of turnover the proportional impact is 0.05% or less for the median which falls to 0.01% or less when the relative weighting of the number of agricultural customers for each charge activity is accounted for. Therefore, the impact on turnover for different farm types is within the 0.5% acceptability threshold.

In terms of the impacts on gross profits for different farm types, all fall within the acceptability threshold of 10%. However, some farm types are likely to be marginally more impacted. These include grazing livestock farm types and specialist pig farms. In particular, the proposed increase for charge activity 2.3.53 is likely to impact grazing livestock farms, while the impact on specialist pig farms is likely to be influenced by the proposed increase for charge activity 2.3.47.

Table 6.2: Proportional impact on farm business deriving their turnover purely from agricultural enterprises.

	Proportional impact on agricultural turnover and gross profits			
	Turnover		Profit	
Farm Type	Median	Weighted	Median	Weighted
Cereal	0.03%	0.01%	0.44%	0.12%
General Cropping	0.01%	0.00%	0.23%	0.06%
Dairy	0.01%	0.00%	0.10%	0.03%
Grazing Livestock (Lowland)	0.08%	0.02%	0.68%	0.19%
Grazing Livestock (LFA)	0.08%	0.02%	0.50%	0.14%
Specialist Pig	0.01%	0.00%	1.03%	0.29%
Specialist Poultry	0.01%	0.00%	0.12%	0.03%
Mixed	0.02%	0.01%	0.65%	0.18%
Horticulture	0.02%	0.00%	0.21%	0.06%

The distribution across different farm sizes suggests that large farms will be impacted the least by the proposed increases in charges in terms of both agricultural turnover and profit

[15] By excluding diversification, environmental payments and subsidy payments from the analysis assumes that farm businesses are solely reliant on income from agricultural enterprises. This assumption, therefore, ensures the worst-case scenario for agricultural businesses from changes in charges.

[16] For clarity, the proportional values in tables 6.2 and 6.4 use absolute values. Therefore, if a farm profit is negative, that is making a loss, the proportional impacts is likely to add to those losses.

[17] The weighted value is weighted using the number of permits in each charge activity that affect farm businesses.

(see tables 6.3 and 6.4). For example, a large cereal farm is likely to have its turnover impacted by just over 0% whereas a part-time cereal farm in the same charge activities will have a 0.02% impact on agricultural turnover. Small and part-time farms are likely to be impacted most by the proposed changes to charges, although these impacts are likely to be extremely marginal in proportion to their turnover. If individual charge activities are considered, then the maximum likely impact is connected to part-time specialist pig businesses that use permit charge activity 2.3.47. The proportion of turnover impacted by this scenario is likely to be 0.32%, which is within the 0.5% acceptability threshold.

The impact on farm gross profits is more nuanced because many farm types, particularly small and part-time farms, tend to be loss making. Table 6.4 gives the proportional impact on farm businesses deriving their gross profit purely from agricultural enterprises for different farm sizes. It is likely this impact will vary between a minimum of 0.2% for large cereal, general cropping, dairy and specialist poultry farms to 1.71% of gross profit for part-time specialist pig farms. While these are within the gross profit acceptability threshold of 10%, for many small and part-times farms, including the specialist pigs, grazing livestock (lowland and LFA) and mixed farms, the impacts are likely to increases losses.

If we consider the permit activity charges that are likely to have a negative impact on agricultural profit, activity 2.3.47 is likely to have largest impact particularly on small and part-time specialist pig farms. For example, a part-time specialist pig farm might see a 15.8% proportional impact on their already loss-making enterprise, which has questionable acceptability. However, putting this into context, the probability of this occurring is very small. Only 0.5% of all farm businesses use permitting charge activity 2.3.47 and these are much more likely to be the larger farm businesses given that this activity is for volumes of greater than 20m^3 and less than 100m^3 a day.

Table 6.3: Proportional impact on farm business deriving their turnover purely from agricultural enterprises for different farm sizes.

	Proportional impact on turnover by farm type (weighted by number of permits in each activity)			
Farm Type	**Large**	**Medium**	**Small**	**Part time**
Cereal	**0.00%**	**0.00%**	**0.01%**	**0.02%**
General Cropping	**0.00%**	**0.01%**	**0.01%**	**0.02%**
Dairy	**0.00%**	**0.01%**	**0.01%**	**no data**
Grazing Livestock (Lowland)	**0.01%**	**0.01%**	**0.02%**	**0.05%**
Grazing Livestock (LFA)	**0.01%**	**0.02%**	**0.04%**	**0.06%**
Specialist Pig	**0.00%**	**0.01%**	**0.01%**	**0.03%**
Specialist Poultry	**0.00%**	**0.00%**	**0.01%**	**0.01%**
Mixed	**0.00%**	**0.01%**	**0.01%**	**0.02%**
Horticulture	**0.00%**	**0.02%**	**0.01%**	**0.02%**

Table 6.4: Proportional impact on farm business deriving their gross profit purely from agricultural enterprises for different farm sizes.

	Proportional impact on gross profit by farm type (weighted by number of permits in each activity)			
Farm Type	**Large**	**Medium**	**Small**	**Part time**
Cereal	**0.02%**	**0.11%**	**0.10%**	**1.14%**
General Cropping	**0.02%**	**0.10%**	**0.12%**	**no data**
Dairy	**0.02%**	**0.12%**	**0.20%**	**no data**
Grazing Livestock (Lowland)	**0.42%**	**0.80%**	**0.17%**	**0.15%**
Grazing Livestock (LFA)	**0.08%**	**0.15%**	**0.15%**	**0.27%**
Specialist Pig	**0.16%**	**0.05%**	**0.15%**	**1.70%**
Specialist Poultry	**0.02%**	**0.25%**	**0.06%**	**0.23%**
Mixed	**0.14%**	**0.46%**	**0.14%**	**0.13%**
Horticulture	**0.03%**	**0.29%**	**0.14%**	**0.21%**

Sensitivity analysis suggests that there is little variation and the impact on both agricultural turnover and most farm profits are within the acceptability threshold for all farm types of different sizes. Where acceptability thresholds become questionable is when farm profits are marginal. In this scenario, a marginal impact on very small profits (or losses) becomes questionable because even a small increase in charges on a small profit becomes a large proportional change. For example, the minimum farm gross profit was a cereal farm that made only £100 between 2017 and 2022. Therefore, an average increase in charges of £59 has a 59% proportional impact on this farm type. This illustrates a limitation of the analysis when gross profits or losses are close to zero, the proportional impact is accentuated.

In summary, 5% of agricultural businesses will be impacted by the proposed changes to permit charges. For two thirds of these, there will be a beneficial impact as the proposal is to decrease charges for activity 2.3.60. Therefore, less than 2% of agricultural businesses will see a charge increase. Furthermore, all other proposed changes to charges are likely to lead to only a modest impact on both annual turnover and gross profits with proportional impacts within the acceptability thresholds. The scale of impact however depends on a combination of farm type, scale and the charge activity being used by a business. Larger agricultural businesses, particularly cereal, general cropping, dairy and horticultural businesses, are likely to be less impacted than grazing livestock, mixed or specialist pig farms. Part of the reason is that for these latter farm types both annual turnover and the level of profit is lower. In some cases, for grazing livestock and mixed farms, particularly small and part-time farms, the proportional impact is on losses rather than profits. This reflects the nature of the industry in which costs tend to be disproportionately higher for small agricultural businesses.

7. Summary

Our analysis of the impact on industrial sectors gives a reasonable overview but there are likely to be many nuances that are not apparent at this level of detail. It appears that most industrial sectors will only be very marginally impacted by the proposed changes in water quality charges. The water sector is likely to face the highest impacts, and this reflects the changes in the structure of charging with new charges for sewerage discharges and lower rates for other types of water quality permits.

The turnover and gross profits of businesses in the water industry sector, particularly the major sewerage undertakers, are only modestly impacted by the proposed changes to charges for the water quality regime. The acceptability threshold may be marginally exceeded by the impact of proposed changes on major sewerage undertakers that have a higher than average number of licences and a lower than average annual turnover. However, the turnover of sewerage undertakers is forecast to grow between 2024 and 2029 which should offset some of the impacts. The impact on gross profit for both the wider water industry and the major sewerage undertakers is well within the acceptable range.

Five percent of agricultural businesses will be impacted by changes to permit charges (increase or decrease). Agricultural businesses tend to hold water quality permits within 8 permit charge activities. The water quality permit activity 2.3.60 (67% of all farms) will benefit from a marginal decrease in the charge for this activity. Furthermore, all other proposed changes to charges are likely to lead to only a modest impact on both annual turnover and gross profits with proportional impacts within the acceptability thresholds. The scale of impact however depends on a combination of farm type, scale and the water quality permit being used by a business. Larger agricultural businesses, particularly, cereal, general cropping, dairy and horticultural businesses, are likely to be less impacted than grazing livestock, mixed or specialist pig farms. Part of the reason is that, for these latter farm types, both annual turnover and the level of profit is lower. In some cases, for grazing livestock and mixed farms, particularly the small and part-time farms, the proportional impact is on losses rather than profits. This reflects the nature of the industry in which costs tend to be disproportionately higher for small agricultural businesses. Finally, it is worth noting that proposed increases to water quality permit charges are expected to only impact a maximum of 2% of all agricultural businesses.

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