

# Chapter 17.1

## Sewerage service explanatory factors

Covering:

- Table 17a - Disaggregated sewerage service explanatory factors
- Table 17b - Sewage treatment works: large works
- Table 17c - Sewage treatment works: numbers
- Table 17d - Sewage treatment works: loads
- Table 17f - Sewage treatment works: costs
- Table 17g - Sludge treatment and disposal

## Chapter 17.1

### Sewerage service explanatory factors

The information in these tables is used in operating efficiency studies. Because of the restricted number of companies providing sewerage services, information is required on a more detailed basis than at a company-wide level.

To overcome this problem of lack of comparators, information is required in three ways:

- for a number of areas within each company's region for the sewerage network (referred to as *disaggregated sewerage information*);
- on an individual sewage treatment works (STW) level for large sewage works. These are defined as those receiving a pollution load greater than 1500kg of BOD<sub>5</sub> per day (approximately equivalent to a population of 25,000); and
- split into a number of bands by size for small STWs (defined as those receiving loads of ≤1500kg BOD<sub>5</sub> per day).

It is necessary to obtain information on sewerage sub-areas and sewage treatment works to provide the necessary data points to confirm or reject relationships between costs and operating environments. Without such information it would not be possible to make robust judgements about relative performance at the company level.

**Explanatory factors** are defined as those aspects of a company's operating environment (including its inheritance) that influence costs but which are, over the relevant time scale, beyond managerial control. Considerable attention has been given to the identification and definition of such factors. The coverage achieved by the selected explanatory factors may not be exhaustive. Considerations of quantification and consistency have played a part in the selection process. The company's views on omitted factors, and (quantified) evidence as to their impact would be welcomed.

### Completion of tables

**Confidence grades:** Confidence grades should be applied to the data in each cell as indicated in the databases and tables. Problems with individual items of data should be described in the commentary.

The company should follow the guidance given below, as well as that accompanying the individual tables. Where a piece of information is reported elsewhere (such as totals for sewerage areas), the definitions are consistent. Where indicated, cost data must reconcile with table 22 of the Annual Information return. The company should ensure that they report consistent information.

The company should also provide data relating to services provided by its PPP wastewater contractor operated works. These data should be included in both the existing table and the separate PPP table as indicated.

### Sewerage explanatory factors

Guidance on how the company should divide their regions to produce sufficient areas for the modelling is given in the commentary to table 17a.

**Sewerage** is here defined as in RAG 4.01. ***Specifically, all cost and other data associated with sea outfalls should be excluded.***

### Sewage treatment explanatory factors

These tables cover:

- **Large sewage treatment works (table 17b):** For each large treatment works details required include works size and load, treatability of influent, treatment categories, consent standards and performance trends.
- **Sewage treatment works numbers (table 17c):** The identification of the number of treatment works and the degree of treatment received across the range of treatment works sizes.
- **Sewage treatment works loads (table 17d):** The total load received by each sewage treatment works category within the range of treatment works sizes.
- **Sewage treatment works costs (table 17f):** The total direct costs associated with all sewage treatment works categories within the range of treatment works sizes.

### Sludge treatment explanatory factors

Table 17g covers the costs associated with the treatment and disposal of sewage sludge via eight possible disposal routes. The definitions for disposal routes are given in the commentary to table 17g.

## Common definitions

The definition of **sewerage**, **sewage treatment**, and **sludge treatment and disposal** are as detailed in RAG 4.01.

A **works** is defined as an individual location that receives raw sewage for treatment, and which does not pass on partially treated sewage for further treatment.

### Treatment works size

For the purpose of these tables, STW size is defined by the load received by the works, expressed as mass (i.e. kilograms [kg]) of BOD<sub>5</sub> per day. In calculating the size of a works, the company should assume that resident connected population contribute 60g BOD<sub>5</sub>/head/day and add the trade effluent load (total COD) using a conversion factor of COD:BOD of 2:1.

**No allowance should be made for non-resident population when classifying the size band of a works.** However the company should comment on whether this is significant for an individual works, particularly where it might cause an increase in the size classification of the works.

The company must include non-resident population when reporting loads and costs.

Under this classification scheme, **large works** are defined as those with an average daily loading >1500kg BOD<sub>5</sub>/day, and **small works** are those with an average loading ≤1500kg BOD<sub>5</sub>/day.

For tables 17c, 17d, and 17f, the size bands are defined as:

#### *Small works*

- size band 1 ≤ 15kg BOD<sub>5</sub>/day (population equivalent: 0 - 250)
- size band 2 >15 but ≤ 30kg BOD<sub>5</sub>/day (population equivalent: 250 - 500)
- size band 3 >30 but ≤ 120kg BOD<sub>5</sub>/day (population equivalent: 500 – 2,000)
- size band 4 >120 but ≤ 600kg BOD<sub>5</sub>/day (population equivalent: 2,000 – 10,000)
- size band 5 >600 but ≤ 1500kg BOD<sub>5</sub>/day (population equivalent: 10,000 – 25,000)

#### *Large works*

- size band 6 > 1500kg BOD<sub>5</sub>/day.

These bands may be abbreviated to 15 - 30kg BOD<sub>5</sub>/day (etc.) in the following definitions.

## Treatment works classification

The tables permit the classification of sewage treatment methods. These definitions are intended to agree (where they overlap) with those used in the Urban Waste Water Treatment Directive, i.e. primary treatment requires the removal of at least 50% of suspended solids from the sewage entering the works and a reduction of at least 20% in BOD. Innovative processes are to be classified according to equivalence of effluent quality.

**Preliminary:** This is treatment that involves more than simple screening but is not sufficient to be classed as primary treatment. Note that maceration of sewage is not, on its own, regarded as a preliminary treatment as the breakdown of gross solids (with no removal) does not reduce BOD and could lead to an increase in the BOD of effluent.

**Primary:** Include works whose treatment methods are restricted to primary treatment (screening, comminution, maceration, grit and detritus removal, pre-aeration and grease removal, storm tanks, plus primary sedimentation, including where assisted by the addition of chemicals e.g. Clariflow).

**Secondary activated sludge:** As primary, plus works whose treatment methods include activated sludge (including diffused air aeration, coarse bubble aeration, mechanical aeration, oxygen injection, submerged filters) and other equivalent techniques including deep shaft process, extended aeration (single, double and triple ditches) and biological aerated filters as secondary treatment.

**Secondary biological:** As primary, plus works whose treatment methods include rotating biological contactors and biological filtration (including conventional filtration, high rate filtration, alternating double filtration and double filtration), root zone treatment (where used as a secondary treatment stage).

Works with **Tertiary treatment stages** are divided into four categories:

- **Tertiary A1:** Works with a secondary activated sludge process whose treatment methods also include prolonged settlement in conventional lagoons or raft lagoons, irrigation over grassland, constructed wetlands, root zone treatment (where used as a tertiary stage), drum filters, microstrainers, slow sand filters, tertiary nitrifying filters, wedge wire clarifiers or Clariflow installed in humus tanks, where used as a tertiary treatment stage;
- **Tertiary A2:** Works with a secondary activated sludge process whose treatment methods also include rapid-gravity sand filters, moving bed filters, pressure filters, nutrient control using physico-chemical and biological methods, disinfection, hard COD and colour removal, where used as a tertiary treatment stage;
- **Tertiary B1:** Works with a secondary stage biological process whose treatment methods also include prolonged settlement in conventional lagoons or raft lagoons, irrigation over grassland, constructed wetlands, root zone treatment (where used as a tertiary stage), drum filters, microstrainers, slow sand filters, tertiary nitrifying filters, wedge wire clarifiers or Clariflow installed in humus tanks, where used as a tertiary treatment stage; and
- **Tertiary B2:** Works with a secondary biological process whose treatment methods also include rapid gravity sand filters, moving bed filters, pressure filters, nutrient control using physico-chemical and biological methods, disinfection, hard COD and colour removal, where used as a tertiary treatment stage.

**Sea outfalls:** The load being discharged via sea outfall which receives the level of treatment specified under the column heading, i.e. preliminary treatment, screening only or no screening (and no treatment).

## Guidance to Reporters

Reporters should comment on the methodology adopted to estimate the various components within the tables, ensure that all assumptions are clearly revealed and comment briefly on the company's confidence grade assessment. Reporters should focus particularly on the cost information supplied by the company, its accuracy and whether it is consistent with the information reported in the Annual Information return reporting requirements and definitions manual 2008  
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Information return. Reporters should comment if there is any doubt over the classification of sewage treatment works by size or treatment category.

## **CHANGE CONTROL SHEET**

### **CHAPTER 17.1**

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