Code Subsidiary Document No. 0207:

Charge Calculation, Allocation and Aggregation

Table of Contents

Definitions

Unless expressly stated otherwise, for the purposes of this CSD:

(a) terms defined in the Wholesale-Retail Code Part 1 (Objectives, Principles and Definitions) shall apply; and
(b) capitalised terms relating to the titles of Data Items or Data Transactions described in CSD 0301 (Data Catalogue) shall have the meaning attributed therein.

For the purposes of this CSD only, the following capitalised terms shall have the following meaning:

Definitions used in this CSD	
TERM	DEFINITION
False	the logical value False
True	the logical value True
None	the value of an undefined variable
Active Meter	has the meaning given in Appendix A.1
Block Tariff Price function	is the function defined in Appendix B.3
Block Standby Capacity Charge function	is the function defined in Appendix B.4
Complex Period	has the meaning given in Appendix E.1.7
Component Chargeable Period	has the meaning given in Section 3.1.2
Component Invoice Period	has the meaning given in Section 3.1.3
Days in the Year	has the meaning given in Appendix F.3
Derived Actual Daily Volume	has the meaning given in Appendix A.6.5
Derived Estimated Daily Volume	has the meaning given in Appendix A.6.5
Domestic Allowance Included	has the meaning given in Section 4.7.24
Domestic Allowance Split	has the meaning given in Appendix A.7.8
DPID Chargeable Period	has the meaning given in Section 4.7.1
DPID Invoice Chargeable Period	has the meaning given in Section 4.7.4
Heaviside function	is the function defined in Appendix B.7
Highways Drainage Fixed Charges Active	has the meaning given in Section 4.6.26
Highways Drainage Meter Fixed Charges Active	has the meaning given in Appendix 4.6.25

Industry Level Estimate	the estimate of Volume through a meter made in accordance with Appendix A.3.3
Industry Level Estimate Table	the table of Industry Level Estimates defined in Appendix F.1
Tariff Band Lookup function	is the function defined in Appendix B.1
Maximum function	is the function defined in Appendix B.9
Meter Active	has the meaning given in Section 3.2.14
Meter Active Period	has the meaning given in Appendix A.1
Meter Advance Period	the days between two (2) consecutive Meter Reads of the same meter which shall start on the day on which the first Meter Read is taken and shall end on the Settlement Day prior to the day on which the second Meter Read is taken;
Meter Advance Volume	has the meaning given in Appendix A.4.2
Meter Chargeable Period	has the meaning given in Section 3.2.3
Meter Fixed Charges Active	has the meaning given in Section 3.2.15
Meter Post-Advance Period	for a meter which has a Meter Advance Period, the entire period of time after the last Meter Advance Period and within the Meter Active Period;
Meter Pre-Advance Period	the period of time after the first Meter Read for a meter which has only a single Meter Read
Minimum function	is the function defined in Appendix B.10
Monthly Volume	has the meaning given in Section 3.2.18
Period	a set of days
Ramp function	is the function defined in Appendix B.8
Sewerage Derived Actual Daily Volume	has the meaning given in Appendix A.7.10
Sewerage Derived Daily Volume	has the meaning given in Appendix A.7.9
Sewerage Derived Estimated Daily Volume	has the meaning given in Appendix A.7.10
Sewerage Meter Active	has the meaning given in Section 4.2.6
Sewerage Meter Fixed Charges Active	has the meaning given in Section 4.2.20
Sewerage Monthly Volume	has the meaning given in Section 4.2.23
Sewerage Supply Point Fixed Charges Active	has the meaning given in Section 4.2.21

Simple Period	has the meaning given in Appendix E.1.6
SPID Chargeable Period	has the meaning given in Section 2.1.8
SPID Deregistration Date	has the meaning given in Section 2.1.7
SPID Invoice Chargeable Period	has the meaning given in Section 2.1.11
Sub-Period	a subset of a Period
Supply Point Fixed Charges Active	has the meaning given in Section 3.2.16
Surface Water Fixed Charges Active	has the meaning given in Section 4.5.26
Surface Water Meter Fixed Charges Active	has the meaning given in Section 4.5.27
Tariff Band function	is the function defined in Appendix B.2
Tariff Invoice Period	has the meaning given in Section 3.1.5
Temporary Disconnection Charging function	is the function defined in Appendix B.6
Total Fixed Charging Days	has the meaning given in Section 3.2.17
Total Sewerage Fixed Charging Days	has the meaning given in Section 4.2.22
Vacancy Charging function	is the function defined in Appendix B.5

1 Purpose and Scope

1.1 Introduction

1.1.1 The purpose of this document is to provide details of how the Market Operator will calculate the Primary Charges for Water Services and Sewerage Services and allocate them to the relevant Wholesalers and Retailers for the Planned Settlement Runs (P1, R1, R2, R3, R4 and RF).

1.1.2 For each Planned Settlement Run, the process will always be a complete calculation of all the charges for Supply Points which are Registered within the Central Systems. The calculation will be based upon the data submitted by the Trading Parties, processed by the Central Systems and as it is held within the Central Systems at the time the Settlement Run is carried out. The process assumes that the data has been correctly submitted by the Trading Parties, and does not necessarily fully describe situations where either incomplete or inconsistent data has been submitted by the Trading Parties.

1.1.3 The process also supports Unplanned Settlement Runs, including Corrective Settlement Runs, Post RF Settlement Runs and Dispute Settlement Run. Corrective Settlement Runs will be a complete recalculation in respect of all the Supply Points; Post RF Settlement Runs and Dispute Settlement Runs are specific to the set of combinations of Supply Points and Service Components which are to be re-calculated.

1.2 Overview of Settlement

1.2.1 This process details the computation, allocation and aggregation of the Primary Charges for the following Service Categories and Service Components shown in the table below.

1.2.2 The Market Operator shall compute all the components of Primary Charges for Water Services and Primary Charges for Sewerage Services. This calculation will take into account all the SPID Data, Service Component Data and Meter Data which has been submitted and processed by the Central Systems at the time the Settlement Run is carried out, as well as all the relevant Wholesaler Tariff Data.

1.2.3 For the avoidance of doubt, the Market Operator shall not compute any Non-Primary Charges.

Overview of Wholesale Charges Components	
SERVICE CATEGORY	SERVICE COMPONENT
Water Services	
	Metered Potable Water
	Metered Non-Potable Water
	Assessed Water
	Unmeasured Water
	Charge Adjustment
Sewerage Services	
	Metered Sewerage
	Assessed Sewerage
	Unmeasured Sewerage
	Surface Water Drainage Services
	Highway Drainage Services
	Trade Effluent Services
	Charge Adjustment

Service Categories and Components

2 Common Processes

2.1 General

2.1.1 The following calculations in Sections 2, 3 and 4 are carried out for each Supply Point which is or has been Tradable when the Settlement Run is carried out, but excluding any Supply Points which have been Erased.

2.1.2 For the avoidance of doubt, this includes

(a) Supply Points which are currently Tradable (including those which are Temporarily Disconnected), and

(b) Supply Points which are Deregistered, but which have been Tradable

but excludes

(a) Supply Points which are Erased, and

(b) Supply Points which are Deregistered but were New, Partial or Rejected when they were Deregistered.

2.1.3 Where a Post RF Settlement Run or a Dispute Settlement Run is carried out, the set of Supply Points and Service Components on which the calculation is based out will be further limited to those specified Supply Points and Service Components.

2.1.4 The appendices to this CSD include specific interpretation for the calculation method described in this CSD, including

(a) Appendix A Meter Volume estimation;
(b) Appendix B Functions;
(c) Appendix C Computational requirements;
(d) Appendix D Interpretation; and
(e) Appendix E Periods.

In particular, the equations for Volumes and charges in this CSD make extensive use of the derivation of Volumes in Appendix A, the functions defined in Appendix B and the definitions and operations on Periods in Appendix E. All of these Appendices must appropriately be consulted.

2.1.5 All Settlement Runs (including both Planned Settlement Runs and Unplanned Settlement Runs) are carried out for an Invoice Period of a calendar Month. The quantum of settlement is the calendar day d.

2.1.6 An Invoice Period (P^{IP}) is the set of days in the calendar Month over which the Settlement Run is carried out. It can be represented by a pair of days (D_l^{IP}, D_u^{IP}) such that the Invoice Period comprises the set of days (d) such that $D_l^{IP} \leq d < D_u^{IP}$. Note that the lower bound day D_l^{IP} is included, but the upper bound day D_u^{IP} is not. For example, the first Invoice Period of the Year 2017-2018 (April 2017) is represented by the pair of days (D_l^{IP}, D_u^{IP}):

$$D_l^{IP} = \text{1st April 2017}$$
$$D_u^{IP} = \text{1st May 2017}$$

2.1.7 Define the date ('the SPID Deregistration Date') as the date on which:

(a) If the Supply Point has been Permanently Disconnected, the date on which the Permanent Disconnection took place;

(b) If the Supply Point has been Deregistered, the date on which the Deregistration took effect;

(c) Otherwise, and only for the purposes of the charge calculation in this CSD, the 31st December 9999.

2.1.8 Define the SPID Chargeable Period (P^S) as the continuous Period for which the Supply Point is potentially in charge, from the Supply Point Effective From Date to the day before the SPID Deregistration Date inclusive. Here, 'potentially' refers to the conditions in Section 2.1.1 above that the SPID is or has been Tradable, and that the SPID has not been Erased.

The SPID Chargeable Period P^S is therefore defined by a pair of days (D_l^S, D_u^S) where

$$D_l^S = \text{the Supply Point Effective From Date}$$
$$D_u^S = \text{the SPID Deregistration Date}$$

and the Supply Point is potentially chargeable for all days d where $D_l^S \leq d < D_u^S$. As above, the lower bound day is included while the upper bound day is not. If $D_l^S \geq D_u^S$ then there are no chargeable days.

2.1.9 For the avoidance of doubt the SPID Chargeable Period includes any Periods when the Supply Point is either vacant or Temporarily Disconnected. Appropriate adjustments to Primary Charges are made in the settlement process in respect of both vacancy and Temporary Disconnection.

2.1.10 Further information about the representation of Periods within this CSD is given in Appendix E.

2.1.11 For each Supply Point, establish the SPID Invoice Chargeable Period (P^{IC}) represented by (D_l^{IC}, D_u^{IC}). This is the Period for which the SPID Chargeable Period intersects the Invoice Period, and is given by

$$P^{IC} = P^S \cap P^{IP}$$

2.1.12 If the Period (P^{IC}) is empty, then the Supply Point does not have a SPID Invoice Chargeable Period for the Settlement Run and no charges are computed for this Supply Point for the Settlement Run. Section 3 in respect of Primary Charges for

Water Services and Section 4 in respect of Primary Charges for Sewerage Services are only applicable to Supply Points for which charges will be computed.

2.2 Settlement - General Preliminary Steps

2.2.1 The Market Operator shall ensure that while the Settlement Runs are being carried out, no changes are made to any data which could affect any of the settlement calculations. For the avoidance of doubt, this does not require that all Data Transactions submitted by the Trading Parties have been processed by the Market Operator at the time the Settlement Run is carried out, nor that all Data Transaction processing should be halted. Instead, it is to ensure that there are no changes to any SPID Data which could affect the calculations during the Settlement Run. This allows the Market Operator to identify a set of stable SPID Data which represents the state of the Supply Points at the time the Settlement Run is carried out, and on which the calculation may be reproduced.

2.2.2 The sole exception to the requirement that no changes are made to any data which could affect any of the settlement calculations in Section 2.2.1 is the generation of estimated Meter Reads by the Central Systems at the preliminary stage of Final Settlement Runs described in Section 2.3 below. While these estimated reads are generated, no Data Transactions should be processed or any other changes made to SPID Data which could affect the Settlement Run. This allows the generation of the estimated Meter Reads to be reproduced.

2.2.3 With the exception of the preliminary stage for the Final Settlement Run there are no other differences in the calculation procedure in respect of any Settlement Run types except in respect of the choice of the Invoice Period.

2.3 Settlement - RF Specific Preliminary Step

2.3.1 Define the Invoice Period for the Final Settlement Run by a pair of days (D_l^{IP}, D_u^{IP}) as in Section 2.1.6 above.

2.3.2 For each Active Meter[1] K label the meter's N reads $i = 1 \ldots N$, with each Meter Read, Rollover Flag pair $(R_i, \textit{flag}_i)$ being taken on a distinct day D_i such that $D_i < D_{i+1}$ for all i: $1 < i \leq N - 1$[2]. In this Section 2.3 and throughout this CSD 0207 the

[1] By definition, each Active Meter must have at least one Meter Read

[2] Meter Read validation ensures that each meter has only a single Meter Read with the Meter Settlement Flag set to *True* per day

algorithms only take account of Meter Reads which have the Meter Settlement Flag set to *True*. The most recent read date, Meter Read, Rollover Flag triple will be (D_N, R_N, $\textit{flag}_N$).

2.3.3 If $D_N < D_u^{IP}$ and D_N is not a Final Read, the Market Operator shall calculate the Central System Generated Read and Rollover Flag for the date D_u^{IP} as:

$$R_{D_u^{IP}} = \left(R_N + \left\lfloor \sum_{d=D_N}^{D_u^{IP}-1} \textit{DV}_d \right\rfloor \right) \bmod 10^n$$

$$\textit{flag}_{D_u^{IP}} = \left(R_N + \left\lfloor \sum_{d=D_N}^{D_u^{IP}-1} \textit{DV}_d \right\rfloor \right) \geq 10^n$$

where n is the number of digits on the meter register, and the Volumes $\textit{DV}_d$ are calculated using the processes defined in Appendix A below.[3] [4]

2.3.4 The Market Operator shall then store the date, the estimated Meter Read, and estimated Rollover Flag triple (D_u^{IP}, $R_{D_u^{IP}}$, $\textit{flag}_{D_u^{IP}}$) together with all the other Meter Reads for the Active Meter K as a Central Systems Generated Read with read type 'G'. The Meter Settlement Flag shall be set to *True* for this Central System Generated Read and the Meter Read Method to Estimated.

2.3.5 The Market Operator shall then notify the Wholesaler and Retailer (including the Wholesaler and Retailer of any paired Sewerage Service Supply Point) of the Central System Generated Read using the Data Transaction T105.M (Notify Meter Read) within one (1) Business Day of storing the Central System Generated Read.

2.3.6 The Market Operator shall then proceed with the Final Settlement Run using all the Meter Reads in the Central Systems, including any Central System Generated Reads.

[3] $\lfloor x \rfloor$ is the floor function: $\lfloor x \rfloor = m$ where m is the unique integer such that $m \leq x < m + 1$

[4] mod is modulo function

3 Primary Charges for Water Services

3.1 General

3.1.1 The following charge calculations are carried out for each Water Services Supply Point which has a SPID Invoice Chargeable Period for the Settlement Run.

3.1.2 For each of the Service Components for Water Services described in the table in Section 1.2.1 above, establish the Component Chargeable Period (P^{CC}) which is a Complex Period over which each of these Service Components is active.[5] The Component Chargeable Period comprises (a possibly empty) set of Sub-Periods: [($D_l^{CC_1}$, $D_u^{CC_1}$), ($D_l^{CC_2}$, $D_u^{CC_2}$), . . .] where

(a) the Service Component is active for all days d where $D_l^{CC_i} \leq d < D_u^{CC_i}$

(b) the Service Component Sub-Periods i may be contiguous, but are non-overlapping. Thus $D_u^{CC_i} \leq D_l^{CC_{i+1}}$ for all i

(c) each Service Component Sub-Period i is associated with a unique Tariff

and, for the avoidance of doubt, each pair of continguous Sub-Periods should be associated with different Tariffs.

3.1.3 Then establish the Component Invoice Period (P^{CI}) which comprises (a possibly empty) set of Sub-Periods: [($D_l^{CI_1}$, $D_u^{CI_1}$), ($D_l^{CI_2}$, $D_u^{CI_2}$), . . .] and

$$P^{CI} = P^{IC} \cap P^{CC}$$

Each such Sub-Period is associated with a unique Tariff. Any empty Sub-Period may be removed from the representation of the Period.

3.1.4 If the Service Component does not have a Component Invoice Period P^{CI}, then no Primary Charges are computed for the Supply Point for that Service Component for the Settlement Run in question.

3.1.5 Then for each of the Service Components with a Component Invoice Period P^{CI} establish the Tariffs (T) associated with P^{CI}, and for each such Tariff T establish the Tariff Invoice Period (P^{TI}) which is the subset of P^{CI} which is associated with the Tariff T. It is not necessary for any Sub-Periods which make up a Tariff Invoice

[5] The reader is reminded that Periods and operations on Periods are defined in Appendix E.

Period to be contiguous. For each Service Component, the union of all the Tariff Invoice Periods P^{TI} will be the Component Invoice Period P^{CI}.

3.1.6 Then for each Tariff T so associated with a non-empty Component Invoice Period, the settlement process described below in this Section 3 is carried out for the Service Components.

3.1.7 Note, that the Charging Elements available for Metered Potable Water and Metered Non-Potable Water are identical. The description below in Section 3.2 is therefore a generic description which covers both of these Service Components. The calculations for each of these two Service Components are completely independent.

3.2 Metered Water

Metered Water - Meter Fixed Charges

3.2.1 Where the metered water Tariff has a metered fixed Charging Element and the Tariff element Metered Water Meter Fixed Charges (*MWMFC*) is not *None*, then the metered water fixed charges are computed as follows.

3.2.2 For the avoidance of doubt in establishing Volumes and charges for metered water, Potable Water Meters are associated with the Metered Potable Water Service Component, and Non-Potable Water Meters are associated with the Metered Non-Potable Water Service Component. Private Water Meters are only taken into account in the calculations where they are a Sub Meter of a Potable Water Meter or a Non-Potable Water Meter.

3.2.3 For each water meter K associated with the applicable Service Component C in respect of the Tariff T [6] establish the Meter Active Period $P_K^A = (D_{Kl}^A, D_{Ku}^A)$ in accordance with Appendix A.1 and the Meter Chargeable Period P_K^{MC} as

$$P_K^{MC} = P_K^A \cap P^{TI}$$

Since the Meter Chargeable Period is a Sub Period of the Tariff Invoice Period, the Meter Chargeable Period is therefore a Complex Period.

[6] i.e. each water meter with Meter Type 'Potable Water Meter' or 'Non-Potable Water Meter' as applicable

3.2.4 For each water meter (K) associated with the applicable Service Component (C) and in respect of each day in the Meter Chargeable Period P_K^{MC} establish the Water Chargeable Meter Size (WCMS_{Kd}).

3.2.5 Then the metered water fixed charges for the day d are [7] [8]

$$\mathcal{TL}(\mathit{WCMS}_{Kd}, \mathit{MWMFC}) \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) \times \mathit{SAF}_d^c \,/\, \mathit{DIY}$$

3.2.6 The Market Operator will then allocate the metered water fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.2.7 The metered water fixed charges and the metered water volumetric charges (Section 3.2.11 below) shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code PotMW_M or NonPotMW_M depending on whether this calculation was carried out for Potable Water or Non-Potable Water. The metered water fixed charges will be shown with separate lines for each meter and Volumetric Adjustment.

Metered Water - Supply Point Fixed Charge

3.2.8 Where the metered water Tariff has a Supply Point fixed Charging Element and the Tariff element Metered Water Supply Point Fixed Charges (*MWSPFC*) is not *None*, then the Supply Point fixed charges for the day d are computed as follows.

$$\mathit{MWSPFC} \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) \times \mathit{SAF}_d^c \,/\, \mathit{DIY}$$

3.2.9 The Market Operator will then allocate the Supply Point fixed charge to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

[7] The reader is reminded that functions such as $\mathcal{TL}()$, $\mathcal{V}^e()$ and $\mathcal{T}^e()$ are defined in Appendix B

[8] The reader is reminded that return type of the Tariff Lookup function $\mathcal{TL}()$ is given by the type of the Tariff Lookup Table. In this case the function and the table *MWMFC* takes meter sizes in mm and returns charges in £/a

3.2.10 The Supply Point Fixed Charge will be identified with the code PotMW_SPFC or Non-PotMW_SPFC depending on whether this calculation was carried out for Potable Water or Non-Potable Water.

Metered Volumetric Water Charges

3.2.11 For the avoidance of doubt references below to block Tariffs include the case of a simple linear Tariff.

3.2.12 Where the metered water Tariff has a block Tariff Charging Element and the Tariff element Metered Water Block Tariff (*MWBT*) is not *None*, then the metered water volumetric charges are computed as follows:

3.2.13 For each water meter K associated with the applicable Service Component C [9] establish the Meter Active Period $P_K^A = (D_{Kl}^A, D_{Ku}^A)$ in accordance with Appendix A.1 and the Meter Chargeable Period in accordance with Section 3.2.3.

3.2.14 Then define Meter Active (MA_{Kd}) for each water meter K

$$MA_{Kd} = \begin{cases} 1 & \text{if there exists an } i \text{ such that } D_{Kl}^{MC_i} \leq d < D_{Ku}^{MC_i} \\ 0 & \text{otherwise} \end{cases}$$

i.e. MA_{Kd} has the value of 1 when d is within a Meter Chargeable Period P_K^{MC}.

3.2.15 Then for each day d in the Tariff Invoice Period P^{TI} define Meter Fixed Charges Active ($MFCA_{TI,d}$) as

$$MFCA_{TI,d} = \begin{cases} \max_K(MA_{Kd}) \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) & \text{if the set of meters } K \text{ is non-empty} \\ 0 & \text{otherwise} \end{cases}$$

where the maximum is over all meters K associated with the Service Component C, and the Charging Element e in respect of the Vacancy Function $\mathcal{V}^e$ and Temporary Disconnection Function $\mathcal{T}^e$ refers to the meter fixed Charging Element.

[9] i.e. each water meter with Meter Type 'Potable Water Meter' or 'Non-Potable Water Meter' as applicable

3.2.16 For each day d in the Tariff Invoice Period P^{TI} define Supply Point Fixed Charges Active ($SPFCA_{TI,d}$) as

$$SPFCA_{TI,d} = \begin{cases} \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) & \text{if } MWSPFC \text{ is not } None; \\ 0 & \text{otherwise} \end{cases}$$

where the Charging Element e in respect of the Vacancy Function $\mathcal{V}^e$ and Temporary Disconnection Function $\mathcal{T}^e$ refers to the Supply Point fixed Charging Element.

3.2.17 Compute the Total Fixed Charging Days (*TFCD*) as

$$TFCD = \sum_{d \in P^{TI}} \max(MFCA_{TI,d}, SPFCA_{TI,d})$$

3.2.18 The Monthly Volume (*MV*) for the Water Services Supply Point Component C for the Tariff T is then[10][11]

$$MV = 0 + \sum_{K,d \in P^{TI}} DDV_{Kd} + \sum_{v,d \in P^{TI}} DDV_{vd}$$

3.2.19 The metered water block Tariff price (*MWBTP*) is[12]

$$MWBTP = \mathcal{BTP}(MV, MWBT, TFCD)$$

3.2.20 The volumetric charges for each meter K for the day d are

$$MWBTP \times DDV_{Kd} \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

3.2.21 The volumetric charges for each Volumetric Adjustment v for the day d are

$$MWBTP \times DDV_{vd} \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

3.2.22 The Market Operator will allocate the metered water volumetric charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each

[10] A zero (0) written in the sum to emphasise that even if the sets of meters and Volumetric Adjustments are empty, that a zero result should be returned for *MV*

[11] The reader is reminded that the derivation of the Metered Volumes DDV_{Kd} and Volumes associated with Volumetric Adjustments DDV_{vd} is given in Appendix A

[12] The reader is reminded that the function $\mathcal{BTP}$ returns a price in £/m^3.

day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.2.23 The metered water fixed charges (Section 3.2.1 above) and the metered water volumetric charges shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code PotMW_M or NonPotMW_M depending on whether this calculation was carried out for Potable Water or Non-Potable water. The charges will be shown with separate lines for each meter and Volumetric Adjustment.

Metered Water - Standby Capacity Charges

3.2.24 Where the metered water Tariff has a standby Charging Element and the Tariff element Metered Water Capacity Charge (*MWCapChg*) is not *None*, then the standby capacity charges for the day d are computed as

$$\mathcal{BSCC}(\mathit{MWCap}_d, \mathit{MWCapChg}) \times \mathit{MWCap}_d \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) \times \mathit{SAF}_d^c \,/\, \mathit{DIY}$$

where Metered Water Capacity (MWCap_d) is the standby capacity reserved for day d and *MWCapChg* is a Tariff table of standby capacity charges.[13]

3.2.25 The Market Operator will then allocate the standby capacity charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.2.26 Depending on whether this calculation was carried out for Potable Water or Non-Potable Water, the standby charges will be identified with the codes PotMW_SCC or NonPotMW_SCC.

[13] The function $\mathcal{BSCC}$ returns a value in the same units as *MWCapChg* which is in £/a per cubic metres/day.

Metered Water - Standby Usage Charges

3.2.27 Where the metered water Tariff has a standby Charging Element and *MWCapChg* is not *None*, then the standby usage charges are computed as follows.

3.2.28 The Monthly Volume *MV* is determined in accordance with Section 3.2.18

3.2.29 The monthly capacity *MWMonCap* which will be charged at standard rates is:

$$MWMonCap = \sum_{d \in P^{TI}} MWCap_d \times PremTolFactor$$

where *PremTolFactor* is a factor which provides for any allowance relative to the reserved capacity above which premium volume rates are chargeable.

3.2.30 The proportion of the Daily Volume which will be charged at standard rates is:

$$DPROP = \begin{cases} 1 & \text{if } MV < MWMonCap\text{; else} \\ MWMonCap \,/\, MV & \text{otherwise} \end{cases}$$

3.2.31 Then the standby usage which is charged at standard rates is

$$MWSUV_d = DPROP \times \Big(\sum_K DDV_{Kd} + \sum_v DDV_{vd} \Big)$$

and the standby usage which is charged at premium rates is

$$MWPUV_d = (1 - DPROP) \times \Big(\sum_K DDV_{Kd} + \sum_v DDV_{vd} \Big)$$

3.2.32 Then the standby usage standard charges are computed as:

$$MWSUV_d \times MWDSUVC \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

and the standby usage premium charges are computed as:

$$MWPUV_d \times MWDPUVC \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

where *MWDSUVC* is the Tariff price for the usage charged at standard prices, and *MWDPUVC* is the Tariff price for the usage charged at premium prices.

3.2.33 The Market Operator will then allocate the standby usage charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.2.34 Depending on whether this calculation was carried out for Potable Water or Non-Potable Water, the standby usage standard charges will be identified with the codes PotMW_SUSC or NonPotMW_SUSC. The standby usage premium charges will be identified with the codes PotMW_SUPC or NonPotMW_SUPC. The charges will be shown with separate lines for each meter and Volumetric Adjustment.

Metered Water - Maximum Demand Charges

3.2.35 Where the metered water Tariff has a maximum demand Charging Element and the Tariff element Metered Water Maximum Demand Tariff (*MWMDT*) is not *None*, then the metered water maximum demand charge for the day d is

$$MWMD_d \times MWMDT \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c \,/\, DIY$$

where $MWMD_d$ is the maximum demand in cubic metres per day as notified by the Wholesaler on the day, and *MWMDT* is the price

3.2.36 The Market Operator will then allocate the maximum demand charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.2.37 The maximum demand charges will be identified with the code PotMW_MD or Non-PotMW_MD depending on whether this calculation was carried out for Potable Water or Non-Potable Water.

3.3 Assessed Water

Assessed Water - Fixed Charges

3.3.1 Where the Assessed Water Tariff has a fixed Charging Element and the Tariff element *AWFixedCharge* is not *None*, then the fixed charge for the day d will be:

$$\textit{AWFixedCharge} \times \mathcal{V}^{e}(\textit{VAC}_d) \times \mathcal{T}^{e}(\textit{TDISC}_d) \times \textit{SAF}_d^c \,/\, \textit{DIY}$$

3.3.2 The Market Operator will allocate the fixed charge to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.3.3 The Assessed Water fixed charges will be identified with the code AW_FC.

Assessed Water - Assessed Meter Fixed Charges

3.3.4 Where the Assessed Water Tariff has an Assessed Water meter fixed charge Charging Element and the Tariff element Assessed Water Meter Fixed Charges *AWMFC* is not *None*, then the assessed water meter fixed charges are

$$\mathcal{TL}(\textit{AWMS}_d, \textit{AWMFC}) \times \mathcal{V}^{e}(\textit{VAC}_d) \times \mathcal{T}^{e}(\textit{TDISC}_d) \times \textit{SAF}_d^c \,/\, \textit{DIY}$$

where $\textit{AWMS}_d$ is the Assessed Water Meter Size and *AWMFC* is the Tariff table which maps assessed water meter sizes to annual fixed charges.

3.3.5 The Market Operator will then allocate the assessed water meter fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.3.6 The Assessed Water meter fixed charges and the Assessed Water volumetric charges (Section 3.3.7) shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code AW_FVC.

Assessed Water - Assessed Volumetric Charges

3.3.7 Where the Assessed Water Tariff has an Assessed Water volumetric rate Charging Element and the Tariff element Assessed Water Volumetric Charge (*AWVCharge*) is not *None*, then the assessed water volumetric charges are

$$\mathit{AWVRate}_d \times \mathit{AWVCharge} \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) \times \mathit{SAF}_d^c \,/\, \mathit{DIY}$$

where $\mathit{AWVRate}_d$ is the water volumetric rate applicable on the day d and *AWVCharge* is the annual charge per unit volume.

3.3.8 The Market Operator will then allocate the assessed water volumetric charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.3.9 The Assessed Water meter fixed charges (Section 3.3.4 above) and the Assessed Water volumetric charges shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code AW_FVC.

Assessed Water - Assessed Water Banded Charge

3.3.10 Where the Assessed Water Tariff has a banded Charging Element and the Tariff element Assessed Water Band Charge (*AWBandCharge*) is not *None*, then the assessed water banded charge for the day d will be

$$\mathcal{TB}(\mathit{AWBand}_d, \mathit{AWBandCharge}) \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) \times \mathit{SAF}_d^c \,/\, \mathit{DIY}$$

where *AWBandCharge* is the Tariff table which maps the bands to the annual charges and AWBand_d is the band applicable on the day.

3.3.11 The Market Operator will then allocate the assessed water banded charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.3.12 The Assessed Water banded charges will be identified with the code AW_BAND.

3.4 Unmeasured Water

Unmeasured Water - Fixed Charge

3.4.1 Where the Unmeasured Water Tariff has a fixed Charging Element and the Tariff element Unmeasured Water Fixed Charge (*UWFixedCharge*) is not *None*, then the unmeasured water fixed charge for the day d will be:

$$\mathit{UWFixedCharge} \times \mathcal{V}^{e}(\mathit{VAC}_{d}) \times \mathcal{T}^{e}(\mathit{TDISC}_{d}) \times \mathit{SAF}^{c}_{d} \,/\, \mathit{DIY}$$

3.4.2 The Market Operator will allocate the unmeasured water fixed charge to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.4.3 The Unmeasured Water fixed charge will be identified with the code UW_FC.

Unmeasured Water - Rateable Value Charge

3.4.4 Where the Unmeasured Water Tariff has a Rateable Value Charging Element and the Tariff element Unmeasured Water RV Poundage (*UWRVPoundage*) is not *None*, then the Rateable Value charge for the day is:

$$\begin{aligned} \mathit{max}(\mathit{min}(\mathit{UWRVPoundage} \times \mathcal{H}(\mathit{RV} - \mathit{UWRVThresh}) \times \mathit{RV}, \mathit{UWRVMaxCharge}), \\ \mathit{UWRVMinCharge}) \times \mathcal{V}^{e}(\mathit{VAC}_{d}) \times \mathcal{T}^{e}(\mathit{TDISC}_{d}) \times \mathit{SAF}^{c}_{d} \,/\, \mathit{DIY} \end{aligned}$$

where the threshold Rateable Value at which Rateable Value charges are applied is *UWRVThresh*, the annual charge in £ per £ of RV is *UWRVPoundage*, *UWRVMaxCharge* is an optional maximum annual charge, and *UWRVMinCharge* is an optional minimum annual charge for this Charging Element.

3.4.5 The Market Operator will then allocate the Unmeasured Water Rateable Value charge to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and Volumes, and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.4.6 The Unmeasured Water Rateable Value charge will be identified with the code UW_RV.

Unmeasured Water - Miscellaneous Charges

3.4.7 Where the unmeasured water Tariff has any miscellaneous Charging Elements and there is at least one Tariff element Unmeasured Water Miscellaneous Type A Charge, Unmeasured Water Miscellaneous Type B Charge, ..., Unmeasured Water Miscellaneous Type H Charge (*UWMiscCharge*$^{\mathcal{C}}$ for $\mathcal{C}$ in $[A \ldots H]$) which is not *None*, then for each type $\mathcal{C}$ in the list of miscellaneous Charging Elements for which the corresponding annual Tariff charge *UWMiscCharge*$^{\mathcal{C}}$ is not *None* establish the Unmeasured Water Item $\mathcal{C}$ Count (*UWMiscCount*$^{\mathcal{C}}$) of items chargeable on a day d.

3.4.8 Then the miscellaneous charge for the day d for Unmeasured Water Type $\mathcal{C}$ will be:

$$\textit{UWMiscCount}^{\mathcal{C}} \times \textit{UWMiscCharge}^{\mathcal{C}} \times \mathcal{V}^{e}(\textit{VAC}_d) \times \mathcal{T}^{e}(\textit{TDISC}_d) \times \textit{SAF}^{c}_{d} \,/\, \textit{DIY}$$

3.4.9 The Market Operator will allocate the unmeasured water miscellaneous charge for each Unmeasured Water Type $\mathcal{C}$ to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report the charges for each Unmeasured Water Type $\mathcal{C}$ for which *UWMiscCount*$^{\mathcal{C}} > 0$ for any day d in the Component Invoice Period in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.4.10 The unmeasured water miscellaneous Charging Elements will be identified with the codes UW_Misc_$\mathcal{C}$ where each different miscellaneous type which is being reported will be identified on a separate line in the Disaggregated Settlement Report, and $\mathcal{C}$ will take the appropriate value in $[A \ldots H]$).

Unmeasured Water - Pipe Size Fixed Charges

3.4.11 Where the unmeasured water Tariff has a pipe sized fixed Charging Element and the Tariff element Unmeasured Water Pipe Fixed Charges (*UWPFC*) is not *None*, then the unmeasured water pipe fixed charges for the day d are computed as follows:

$$\mathcal{TL}(\textit{PS}_d, \textit{UWPFC}) \times \mathcal{V}^{e}(\textit{VAC}_d) \times \mathcal{T}^{e}(\textit{TDISC}_d) \times \textit{SAF}^{c}_{d} \,/\, \textit{DIY}$$

where *PS*$_d$ is the size of the water pipe supplying the Premises.

3.4.12 The Market Operator will then allocate the unmeasured water pipe fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in

respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.4.13 The unmeasured water pipe fixed charges will be identified with the code UW_PC.

3.5 Water - Charge Adjustment

Water - Section 154A

3.5.1 Where the water Charge Adjustment Tariff has a Section 154A Charging Element and the Tariff element Section 154A Value *Sec154AValue* is not *None*, then the amount to be paid by the Wholesaler to the Retailer for the day d is:

$$\mathcal{WO}nly(d) \times \mathit{Sec154ACount} \times \mathit{Sec154AValue} \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) / \mathit{DIY}$$

3.5.2 For the avoidance of doubt, the Tariff element *Sec154AValue* should be specified as a positive number in the Tariff. The value of the Tariff element should be the total amount due per dwelling unit for the premises, while *Sec154ACount* is the number of Section 154A dwelling units at the premises. Note that similar remarks apply to the Tariff element *Sec154AValue* in Section 4.8. The calculations in this CSD 0207 split the amount such that the full amount is attributable to the Sewerage Services Supply Point (and none to the Water Services Supply Point) except in the case of an unpaired Water Services Supply Point, where the full amount is attributed to the Water Services Supply Point. The charge which will be aggregated in the Settlement Reports will be the negative of the amount derived above.

3.5.3 The Market Operator will allocate the water Section 154A charge (being the negative of the amount calculated above) to the Wholesaler and to the Retailer to which the SPID was Registered in respect of each Settlement Day. It will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

3.5.4 Section 154A Charges will be identified with the code W_Sec154A.

4 Primary Sewerage Charges

4.1 General

4.1.1 The following charge calculations are carried out for each Sewerage Services Supply Point which has a SPID Invoice Chargeable Period for the Settlement Run.

4.1.2 For each of the Service Components for Sewerage Services described in the table in Section 1.2.1 above apart from the Trade Effluent Services Service Components which are considered separately in Section 4.7 below, then as in Section 3.1.2 above, establish the Component Chargeable Period P^{CC} which is a Complex Period over which each of these Service Components is active. The Component Chargeable Period comprises (a possibly empty) set of Sub-Periods: [($D_l^{CC_1}$, $D_u^{CC_1}$), ($D_l^{CC_2}$, $D_u^{CC_2}$), ...] where

(a) the Service Component is active for all days d where $D_l^{CC_i} \leq d < D_u^{CC_i}$

(b) the Service Component Sub-Periods i may be contiguous, but are non-overlapping. Thus $D_u^{CC_i} \leq D_l^{CC_{i+1}}$ for all i

(c) each Service Component Sub-Period i is associated with a unique Tariff.

4.1.3 Then establish the Component Invoice Period P^{CI}, as in Section 3.1.3 above, which comprises (a possibly empty) set of Sub-Periods: [($D_l^{CI_1}$, $D_u^{CI_1}$), ($D_l^{CI_2}$, $D_u^{CI_2}$), ...] and

$$P^{CI} = P^{IC} \cap P^{CC}$$

Each such Sub-Period is associated with a unique Tariff. Any empty Sub-Periods may be removed from the representation of the Period.

4.1.4 If the Service Component does not have a Component Invoice Period P^{CI}, then no charges are computed for the Supply Point for that Service Component for the Settlement Run.

4.1.5 Then for each Service Components with a Component Invoice Period P^{CI} establish the Tariffs T associated with the P^{CI}, and for each such Tariff T establish the Tariff Invoice Period P^{TI} which is the subset of P^{CI} which is associated with the Tariff T. It is not necessary for any Sub-Periods which make up a Tariff Invoice Period to be contiguous. For each Component, the union of all the Tariff Invoice Periods P^{TI} will be the Component Invoice Period P^{CI}.

4.1.6 Then for each Tariff T so associated with a non-empty Component Invoice Period, the settlement process described below is carried out for the Service Components.

4.1.7 Note, unlike charges for Water Services Supply Points, there is only a single Sewerage Services Metered Service Component.

4.2 Metered Sewerage

Metered Sewerage - Meter Fixed Charges

4.2.1 Where the metered sewerage Tariff has a metered fixed Charging Element and the Tariff element Metered Sewerage Meter Fixed Charges (*MSMFC*) is not *None*, then the metered sewerage fixed charges are computed as follows.

4.2.2 The meters K which are always associated with the metered sewerage Service Component are Potable Water meters, Non-Potable Water meters, Private Water Meters, Sewerage Meters and Cross Border Meters.

4.2.3 Private Trade Effluent Meters K are only associated with the metered sewerage Service Component when the Meter DPID Association $MDASSOC_{KTd} = 1$, (see Appendix A.7.6 below) and the Sewerage Volume Adjustment Method $SVAM_T$ for the Trade Effluent DPID T has the value 'SUBTRACT'. In such cases, and only in such cases, will sewerage Volumes and charges be computed for the Private Trade Effluent Meter, and both Volumes and charges reported in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.2.4 For each meter K associated with the metered sewerage Service Component C establish the Meter Active Period P_K^A = (D_{Kl}^A, D_{Ku}^A) in accordance with Appendix A.1

4.2.5 For each meter K associated with the metered sewerage Service Component C and in respect of the Tariff T establish the Meter Chargeable Period P_K^{MC} (as in Section 3.2.3 above) as

$$P_K^{MC} = P_K^A \cap P^{TI}$$

4.2.6 Then define Sewerage Meter Active (SMA_{Kd}) in accordance with Appendix A.7.4 and Appendix A.7.5 below.

4.2.7 Then the metered sewerage fixed charges for the day d are[14]

$$\mathcal{TL}(SCMS_{Kd}, MSMFC) \times SMA_{Kd} \times \mathcal{V}^{e}(VAC_{d}) \times \mathcal{T}^{e}(TDISC_{d}) \times SAF_{d}^{c} \,/\, DIY$$

4.2.8 The Market Operator will then allocate the metered sewerage fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.2.9 The metered sewerage fixed charges and the metered sewerage volumetric charges (Section 4.2.13 below) shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code MS_M. The charges will be shown with separate lines for each meter and Volumetric Adjustment.

Metered Sewerage - Supply Point Fixed Charge

4.2.10 Where the metered sewerage Tariff has a Supply Point fixed Charging Element and the Tariff element Metered Sewerage Supply Point Fixed Charges (*MSSPFC*) is not *None*, then the Supply Point fixed charges for the day d are computed as follows.

$$MSSPFC \times \mathcal{V}^{e}(VAC_{d}) \times \mathcal{T}^{e}(TDISC_{d}) \times SAF_{d}^{c} \,/\, DIY$$

4.2.11 The Market Operator will then allocate the Supply Point fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.2.12 The Suppy Point Fixed Charge will be identified with the code MS_SPFC.

Metered Sewerage - Volumetric Charges

4.2.13 For the avoidance of doubt references below to block Tariffs include the case of a simple linear Tariff.

[14] The reader is reminded that return type of the function $\mathcal{TL}()$ is given by the type of the Tariff Lookup Table. In this case the function and the table *MSMFC* takes meter sizes in mm and returns charges in £/a

4.2.14 Where the metered sewerage Tariff has a block Tariff Charging Element and the Tariff element Metered Sewerage Block Tariff (*MSBT*) is not *None*, then the metered sewerage volumetric charges are computed as follows.

4.2.15 The meters K which are always associated with the metered sewerage Service Component are Potable Water meters, Non-Potable Water meters, Private Water Meters, Sewerage Meters and Cross Border Meters.

4.2.16 Private Trade Effluent Meters K are only associated with the metered sewerage Service Component when the Meter DPID Association $\mathit{MDASSOC}_{KTd} = 1$, (see Appendix A.7.6 below) and the Sewerage Volume Adjustment Method SVAM_T for the Trade Effluent DPID T has the value 'SUBTRACT'. In such cases, and only in such cases, will sewerage Volumes and charges be computed for the Private Trade Effluent Meter, and both Volumes and charges reported in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.2.17 For each meter K associated with the metered sewerage Service Component C establish the Meter Active Period P_K^A = (D_{Kl}^A, D_{Ku}^A) in accordance with Appendix A.1

4.2.18 For each meter K associated with the metered sewerage Service Component C and in respect of the Tariff T establish the Meter Chargeable Period P_K^{MC} (as in Section 3.2.3 above) as

$$P_K^{MC} = P_K^A \cap P^{TI}$$

4.2.19 Then define Sewerage Meter Active (SMA_{Kd}) in accordance with Appendix A.7.4 and Appendix A.7.5 below.

4.2.20 Then for each day d in the Tariff Invoice Period P^{TI} define Sewerage Meter Fixed Charges Active ($\mathit{SMFCA}_{TI,d}$) as

$$\mathit{SMFCA}_{TI,d} = \begin{cases} \max_K(\mathit{SMA}_{Kd}) \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) & \text{if the set of meters } K \text{ is non-empty} \\ 0 & \text{otherwise} \end{cases}$$

where the maximum is over all meters K associated with the Service Component C, and the Charging Element e in respect of the Vacancy Function $\mathcal{V}^e$ and Temporary Disconnection Function $\mathcal{T}^e$ refers to the metered sewerage meter fixed Charging Element.

4.2.21 For each day d in the Tariff Invoice Period P^{TI} define Sewerage Supply Point Fixed Charges Active as ($SSPFCA_{TI,d}$) as

$$SSPFCA_{TI,d} = \begin{cases} \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) & \text{if } MSSPFC \text{ is not } None; \\ 0 & \text{otherwise} \end{cases}$$

where the Charging Element e in respect of the Vacancy Function $\mathcal{V}^e$ and Temporary Disconnection Function $\mathcal{T}^e$ refers to the metered sewerage supply point fixed Charging Element.

4.2.22 Compute the Total Sewerage Fixed Charging Days (*TSFCD*) as

$$TSFCD = \sum_{d \in P^{TI}} \max(SMFCA_{TI,d}, SSPFCA_{TI,d})$$

4.2.23 The Sewerage Monthly Volume (*SMV*) for the metered sewerage Service Component C for the Tariff T is then

$$SMV = 0 + \sum_{K,d \in P^{TI}} SDDV_{Kd} + \sum_{v,d \in P^{TI}} SDDV_{vd}$$

$$SMV = 0 + \sum_{K,d \in P^{TI}} SDDV_{Kd} + \sum_{v,d \in P^{TI}} SDDV_{vd} + \sum_{s,d \in P^{TI}} SDDV_{sd}$$

4.2.24 The metered sewerage block Tariff price *MSBTP* is

$$MSBTP = \mathcal{BTP}(SMV, MSBT, TSFCD)$$

4.2.25 The metered sewerage volumetric charges for each meter K for the day d are[15]

$$MSBTP \times SDDV_{Kd} \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

4.2.26 The metered sewerage volumetric charges for each Volumetric Adjustment v for the day d are

$$MSBTP \times SDDV_{vd} \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

[15] The reader is reminded that the function $\mathcal{BTP}$ returns a price in £/m^3.

4.2.27 The metered sewerage volumetric charges associated with each Calculated Discharge s where the Sewerage Volume Adjustment Method $SVAM_{Td}$ for the Trade Effluent DPID T has the value 'SUBTRACT' for each day d are

$$MSBTP \times SDDV_{sd} \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

4.2.28 The Market Operator will allocate the metered sewerage volumetric charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.2.29 The metered sewerage fixed charges (Section 4.2.1 above) and the metered sewerage volumetric charges shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code MS_M. The charges will be shown with separate lines for each meter and Volumetric Adjustment.

4.3 Assessed Sewerage

Assessed Sewerage - Fixed charge

4.3.1 Where the Assessed Sewerage Tariff has a fixed Charging Element and the Tariff element *ASFixedCharge* is not *None*, then the Assessed Sewerage fixed charge for the day d will be:

$$ASFixedCharge \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c \,/\, DIY$$

4.3.2 The Market Operator will allocate the assessed sewerage fixed charge to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.3.3 The Assessed Sewerage fixed charges will be identified with the code AS_FC.

Assessed Sewerage - Assessed Meter Fixed Charge

4.3.4 Where the Assessed Sewerage Tariff has an assessed sewerage meter fixed Charging Element and the Tariff element Assessed Sewerage Meter Fixed Charge (*ASMFC*)

is not *None*, then the assessed sewerage meter fixed charges are

$$\mathcal{TL}(ASMS_d, ASMFC) \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c \,/\, DIY$$

where $ASMS_d$ is the Assessed Sewerage Meter Size and *ASMFC* is the Tariff table which maps assessed sewerage meter sizes to annual fixed charges.

4.3.5 The Market Operator will then allocate the Assessed Sewerage meter fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.3.6 The Assessed Sewerage meter fixed charges and the Assessed Sewerage volumetric charges (Section 4.3.7) shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code AS_FVC.

Assessed Sewerage - Assessed Volumetric Rate

4.3.7 Where the Assessed Sewerage Tariff has an Assessed Sewerage volumetric rate Charging Element and the Tariff element Assessed Sewerage Volumetric Charge (*ASVCharge*) is not *None*, then the assessed sewerage volumetric charges charges are

$$ASVRate_d \times ASVCharge \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c \,/\, DIY$$

where $ASVRate_d$ is the sewerage volumetric rate applicable on the day d and *ASVCharge* is the annual charge per unit volume.

4.3.8 The Market Operator will then allocate the assessed sewerage volumetric charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.3.9 The Assessed Sewerage meter fixed charges (Section 4.3.3 above) and the Assessed Sewerage volumetric charges shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code AS_FVC.

Assessed Sewerage - Banded Charge

4.3.10 Where the Assessed Sewerage Tariff has a Banded Charging Element and the Tariff element Assessed Sewerage Band Charge (*ASBandCharge*) is not *None*, then the banded charge for the day d will be

$$\mathcal{TB}(\mathit{ASBand}_d, \mathit{ASBandCharge}) \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) \times \mathit{SAF}_d^c \,/\, \mathit{DIY}$$

where *ASBandCharge* is the Tariff table which maps the bands to the annual charges and ASBand_d is the band applicable on the day.

4.3.11 The Market Operator will then allocate the assessed banded charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.3.12 The Assessed Sewerage banded charges will be identified with the code AS_BAND.

4.4 Unmeasured Sewerage

Unmeasured Sewerage - Fixed Charge

4.4.1 Where the Unmeasured Sewerage Tariff has a Fixed Charging Element and the Tariff element Unmeasured Sewerage Fixed Charge (*USFixedCharge*) is not *None*, then the Fixed charge for the day d will be:

$$\mathit{USFixedCharge} \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) \times \mathit{SAF}_d^c \,/\, \mathit{DIY}$$

4.4.2 The Market Operator will allocate the fixed charge to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.4.3 The Unmeasured Sewerage Fixed Charge will be identified with the code US_FC.

Unmeasured Sewerage - Rateable Value Charge

4.4.4 Where the Unmeasured Sewerage Tariff has a Rateable Value Charging Element and the Tariff element Unmeasured Sewerage RV Poundage (*USRVPoundage*) is

not *None*, then the Rateable Value charge for the day is:

$$max(min(\mathit{USRVPoundage} \times \mathcal{H}(\mathit{RV} - \mathit{USRVThresh}) \times \mathit{RV}, \mathit{USRVMaxCharge}), \mathit{USRVMinCharge}) \times \mathcal{V}^{e}(\mathit{VAC}_{d}) \times \mathcal{T}^{e}(\mathit{TDISC}_{d}) \times \mathit{SAF}_{d}^{c} / \mathit{DIY}$$

where the threshold Rateable Value at which Rateable Value charges are applied is *USRVThresh*, the annual charge in £ per £RV is *USRVPoundage*, *USRVMaxCharge* is an optional maximum annual charge, and *USRVMinCharge* is an optional minimum annual charge for this Charging Element.

4.4.5 The Market Operator will then allocate the Unmeasured Sewerage Rateable Value charge to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and Volumes, and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.4.6 The Unmeasured Sewerage Rateable Value Charge will be identified with the code US_RV.

Unmeasured Sewerage - Miscellaneous Charges

4.4.7 Where the unmeasured sewerage Tariff has any miscellaneous Charging Elements and there is at least one Tariff element Unmeasured Sewerage Miscellaneous Type A Charge, Unmeasured Sewerage Miscellaneous Type B Charge, ..., Unmeasured Sewerage Miscelleanous Type H Charge ($\mathit{USMiscCharge}^{\mathcal{C}}$ for $\mathcal{C}$ in $[A \ldots H]$) which is not *None*, then for each type $\mathcal{C}$ in the list of miscellaneous Charging Elements for which the corresponding annual Tariff charge $\mathit{USMiscCharge}^{\mathcal{C}}$ is not *None* establish the Unmeasured Sewerage Type $\mathcal{C}$ Count ($\mathit{USMiscCount}^{\mathcal{C}}$) of items chargeable on a day d.

4.4.8 Then the miscellaneous charge for the day d for Unmeasured Sewerage Type $\mathcal{C}$ will be:

$$\mathit{USMiscCount}^{\mathcal{C}} \times \mathit{USMiscCharge}^{\mathcal{C}} \times \mathcal{V}^{e}(\mathit{VAC}_{d}) \times \mathcal{T}^{e}(\mathit{TDISC}_{d}) \times \mathit{SAF}_{d}^{c} / \mathit{DIY}$$

4.4.9 The Market Operator will allocate the unmeasured sewerage miscellaneous charge for each Unmeasured Sewerage Type $\mathcal{C}$ to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator

will then aggregate these charges and report the charges for each Unmeasured Sewerage Item $\mathcal{C}$ Count for which $\mathit{USMiscCount}^{\mathcal{C}} > 0$ for any day d in the Component Invoice Period in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.4.10 The unmeasured sewerage miscellaneous Charging Elements will be identified with the codes US_Misc_$\mathcal{C}$ where each different miscellaneous type which is being reported will be identified on a separate line in the Disaggregated Settlement Report, and $\mathcal{C}$ will take the appropriate value in $[A \ldots H]$) where each different miscellaneous type which is being reported will be identified on a separate line in the Disaggregated Settlement Report.

Unmeasured Sewerage - Pipe Size Fixed Charges

4.4.11 Where the unmeasured sewerage Tariff has a pipe sized fixed Charging Element and the Tariff element Unmeasured Sewerage Pipe Fixed Charges (*USPFC*) is not *None*, then the unmeasured sewerage pipe fixed charges for the day d are computed as follows:

$$\mathcal{TL}(\mathit{PS}_d, \mathit{USPFC}) \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) \times \mathit{SAF}_d^c \,/\, \mathit{DIY}$$

where PS_d is the size of the water pipe supplying the Premises.

4.4.12 The Market Operator will then allocate the unmeasured sewerage pipe fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.4.13 The unmeasured sewerage pipe fixed charges will be identified with the code US_PC.

4.5 Surface Water

Surface Water - Area Based Charges

4.5.1 Where the Surface Water Tariff has an area based Charging Element and the Tariff element Surface Water Area Band (*SWAreaBand*) is not *None*, then the Tariff band

SWAreaDrainedBand$_d$ for the charges is

$$\textit{SWAreaDrainedBand}_d = \begin{cases} \mathcal{TL}(\textit{AreaDrained}_d, \textit{SWAreaBand}) & \text{if } \textit{SWComConcession}_d \text{ is } \textit{False} \text{ or } \textit{None} \\ \textit{SWComBand} & \text{if } \textit{SWComConcession}_d \text{ is } \textit{True} \end{cases}$$

where *AreaDrained*$_d$ is the Area Drained, *SWAreaBand* is the Tariff lookup table which maps the Area Drained to the charge band, and the flag *SWComConcession*$_d$ indicates whether a Supply Point should pay reduced charges in accordance with the provisions of the section 43 of the Flood and Water Management Act 2010. The Community Concessionary Band *SWComBand* is set within the Tariff.

4.5.2 Then the Surface Water area based charges for the day d will be:

$$\mathcal{TB}(\textit{SWAreaDrainedBand}_d, \textit{SWBandCharge}) \times \textit{SWDF}_d \times \mathcal{V}^e(\textit{VAC}_d) \times \mathcal{T}^e(\textit{TDISC}_d) \times \textit{SAF}_d^c \,/\, \textit{DIY}$$

where *SWBandCharge* is the Tariff table which maps the bands to the annual charges and *SWDF*$_d$ is a factor which further allows charges to be adjusted depending on the volume of surface water draining to a public sewer in respect of the Area Drained.

4.5.3 The Market Operator will allocate the Surface Water area based charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting). Where an exception was raised during the calculation, an error will be reported to the Wholesaler and the Retailer indicating that the either the charge band could not be determined or was invalidly specified.

4.5.4 The Surface Water area based charges will be identified with the code SW_ABC.

Surface Water - Fixed Charges

4.5.5 Where the Surface Water Tariff has a fixed Charging Element and Tariff element Surface Water Fixed Charge (*SWFixedCharge*) is not *None* then the Surface Water fixed charge for the day d will be:

$$\textit{SWFixedCharge} \times \textit{SWDF}_d \times \mathcal{V}^e(\textit{VAC}_d) \times \mathcal{T}^e(\textit{TDISC}_d) \times \textit{SAF}_d^c \,/\, \textit{DIY}$$

where $SWDF_d$ is a factor which allows charges to be adjusted depending on the volume of surface water draining to a public sewer.

4.5.6 The Market Operator will allocate the Surface Water fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.5.7 The Surface Water fixed charges will be identified with the code SW_FC.

Surface Water - Rateable Value Charge

4.5.8 Where the Surface Water Tariff has a Rateable Value Charging Element and the Tariff element Surface Water RV Poundage (*SWRVPoundage*) is not *None*, then the Surface Water Rateable Value charge for the day is:

$$max(min(SWRVPoundage \times \mathcal{H}(RV - SWRVThresh) \times RV, SWRVMaxCharge), SWRVMinCharge) \times SWDF_d \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c \,/\, DIY$$

where the threshold Rateable Value at which Rateable Value charges are applied is *SWRVThresh*, the annual charge in £ per £RV is *SWRVPoundage*, *SWRVMaxCharge* is an optional maximum annual charge, and *SWRVMinCharge* is an optional minimum annual charge for this Charging Element and $SWDF_d$ is a factor which allows charges to be adjusted depending on the volume of surface water draining to a public sewer.

4.5.9 The Market Operator will allocate the Surface Water Rateable Value charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.5.10 The Surface Water Rateable Value charges will be identified with the code SW_RV.

Surface Water - Meter Fixed Charges

4.5.11 Where the Surface Water Tariff has a (foul sewerage based) metered fixed Charging Element and the Tariff element Surface Water Meter Fixed Charges (*SWMFC*) is not *None*, then the Surface Water meter fixed charges are computed as follows.

4.5.12 The meters K associated with the Surface Water metered fixed Charging Element are Potable Water meters, Non-Potable Water meters, Private Water Meters, Sewerage Meters and Cross Border Meters.

4.5.13 For each meter K associated with the Surface Water metered fixed Charging Element establish the Meter Active Period P_K^A = (D_{Kl}^A, D_{Ku}^A) in accordance with Appendix A.1

4.5.14 For each meter K associated with the Surface Water metered fixed Charging Element and in respect of the Tariff T establish the Meter Chargeable Period P_K^{MC} (as in Section 3.2.3 above) as

$$P_K^{MC} = P_K^A \cap P^{TI}$$

4.5.15 Then define Sewerage Meter Active (SMA_{Kd}) in accordance with Appendix A.7.4 and Appendix A.7.5 below.

4.5.16 Then the Surface Water meter fixed charges for the day d are

$$\mathcal{TL}(SCMS_{Kd}, SWMFC) \times SMA_{Kd} \times SWDF_d \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c \,/\, DIY$$

where $SWDF_d$ is a factor which allows charges to be adjusted depending on the volume of surface water draining to a public sewer.

4.5.17 The Market Operator will then allocate the Surface Water meter fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.5.18 The Surface Water meter fixed charges and the Surface Water (foul sewerage based) volumetric charges (Section 4.5.19 below) shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code SW_M. The charges will be shown with separate lines for each meter and Volumetric Adjustment.

Surface Water - Foul Sewerage Volumetric Charges

4.5.19 For the avoidance of doubt references below to block Tariffs include the case of a simple linear Tariff.

4.5.20 Where the Surface Water has a (foul sewerage based) volumetric block Tariff Charging Element and the Tariff element Surface Water Block Tariff (*SWBT*) is not *None*, then the Surface Water (foul sewerage based) volumetric charges are computed as follows.

4.5.21 The meters K associated with the Service Component are Potable Water meters, Non-Potable Water meters, Private Water Meters, Sewerage Meters and Cross Border Meters.

4.5.22 Private Trade Effluent Meters K are only associated with the Service Component when the Meter DPID Association $\mathit{MDASSOC}_{KTd} = 1$, (see Appendix A.7.6 below) and the Sewerage Volume Adjustment Method SVAM_T for the Trade Effluent DPID T has the value 'SUBTRACT'. In such cases, and only in such cases, will sewerage Volumes and charges be computed for the Private Trade Effluent Meter, and both Volumes and charges reported in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.5.23 For each meter K associated with the Service Component C establish the Meter Active Period P_K^A = (D_{Kl}^A, D_{Ku}^A) in accordance with Appendix A.1.

4.5.24 For each meter K associated with the Service Component C and in respect of the Tariff T establish the Meter Chargeable Period P_K^{MC} (as in Section 3.2.3 above) as

$$P_K^{MC} = P_K^A \cap P^{TI}$$

4.5.25 Then define Sewerage Meter Active (SMA_{Kd}) in accordance with Appendix A.7.4 and Appendix A.7.5 below.

4.5.26 Then for each day d in the Tariff Invoice Period P^{TI} define Surface Water Meter Fixed Charges Active ($\mathit{SWMFCA}_{TI,d}$) as

$$\mathit{SWMFCA}_{TI,d} = \begin{cases} \max_K(\mathit{SMA}_{Kd}) \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) & \text{if the set of meters } K \text{ is non-empty} \\ 0 & \text{otherwise} \end{cases}$$

where the maximum is over all meters K associated with the Service Component C, and the Charging Element e in respect of the Vacancy Function $\mathcal{V}^e$ and Temporary Disconnection Function $\mathcal{T}^e$ refers to the surface water meter fixed Charging Element.

4.5.27 For each day d in the Tariff Invoice Period P^{TI} define Surface Water Fixed Charges Active ($SWFCA_{TI,d}$) as

$$SWFCA_{TI,d} = \begin{cases} \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) & \text{if } SWFixedCharge \text{ is not } None; \\ 0 & \text{otherwise} \end{cases}$$

where the Charging Element e in respect of the Vacancy Function $\mathcal{V}^e$ and Temporary Disconnection Function $\mathcal{T}^e$ refers to the surface water fixed Charging Element.

4.5.28 Compute the Total Surface Water Fixed Charging Days (*TSWFCD*) as

$$TSWFCD = \sum_{d \in P^{TI}} \max(SWMFCA_{TI,d}, SWFCA_{TI,d})$$

4.5.29 The Sewerage Monthly Volume (*SMV*) is also derived in similar manner to Section 4.2.23 above as

$$SMV = 0 + \sum_{K,d \in P^{TI}} SDDV_{Kd} + \sum_{v,d \in P^{TI}} SDDV_{vd}$$

$$SMV = 0 + \sum_{K,d \in P^{TI}} SDDV_{Kd} + \sum_{v,d \in P^{TI}} SDDV_{vd} + \sum_{s,d \in P^{TI}} SDDV_{sd}$$

where the sum is over the Tariff Invoice Period P^{TI} in respect of this Service Component.

4.5.30 The surface water block Tariff price *SWBTP* is[16]

$$SWBTP = \mathcal{BTP}(SMV, SWBT, TSWFCD)$$

where *SWBT* is the applicable block Tariff.

4.5.31 The volumetric charges for each meter K for the day d are

$$SWBTP \times SDDV_{Kd} \times SWDF_d \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

where $SWDF_d$ is a factor which allows charges to be adjusted depending on the volume of surface water draining to a public sewer.

[16] The reader is reminded that the function $\mathcal{BTP}$ returns a price in £/m^3.

4.5.32 The volumetric charges for each Volumetric Adjustment v for the day d are

$$SWBTP \times SDDV_{vd} \times SWDF_d \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

where $SWDF_d$ is a factor which allows charges to be adjusted depending on the volume of surface water draining to a public sewer.

4.5.33 The volumetric charges for each Calculated Discharge s where the Sewerage Volume Adjustment Method $SVAM_{Td}$ for the Trade Effluent DPID T has the value 'SUBTRACT' for the day d are

$$SWBTP \times SDDV_{sd} \times SWDF_d \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

where $SWDF_d$ is a factor which allows charges to be adjusted depending on the volume of surface water draining to a public sewer.

4.5.34 The Market Operator will allocate the Surface Water (foul sewerage based) volumetric charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.5.35 The Surface Water meter fixed charges (Section 4.5.11 above) and the Surface Water (foul sewerage based) volumetric charges shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code SW_M. The charges will be shown with separate lines for each meter and Volumetric Adjustment.

4.6 Highway Drainage

Highway Drainage - Area Based Charges

4.6.1 Where the Highway Drainage Tariff has an area based Charging Element and the Tariff element Highway Drainage Area Band (*HDAreaBand*) is not *None*, then the

Tariff band $HDAreaPropBand_d$ for the charges is

$$HDAreaPropBand_d = \begin{cases} \mathcal{TL}(AreaProp_d, HDAreaBand) & \text{if } HDComConcession_d \text{ is } False \text{ or } None \\ HDComBand & \text{if } HDComConcession_d \text{ is } True \end{cases}$$

where the flag $HDComConcession_d$ indicates whether a Supply Point should pay reduced charges, $AreaProp_d$ is the Area of the Property and *HDAreaBand* is the Tariff lookup table which maps the Area of the Property to the charge band. The Community Concessionary Band ($HDComConcession_d$) is set within the Tariff.

Then the Highway Drainage area based charges for the day d will be:

$$\mathcal{TB}(HDAreaPropBand_d, HDBandCharge) \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c \,/\, DIY$$

where *HDBandCharge* is the Tariff table which maps the bands to the annual charges.

4.6.2 The Market Operator will allocate the Highway Drainage area based charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting). Where an exception was raised during the calculation, an error will be reported to the Wholesaler and the Retailer indicating that the either the charge band could not be determined or was invalidly specified.

4.6.3 The Highway Drainage area based charges will be identified with the code HD_ABC.

Highway Drainage - Fixed Charges

4.6.4 Where the Highway Drainage Tariff has a fixed Charging Element and Tariff element Highway Drainage Fixed Charge (*HDFixedCharge*) is not *None* then the fixed charge for the day d will be:

$$HDFixedCharge \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c \,/\, DIY$$

4.6.5 The Market Operator will allocate the Highway Drainage fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each

day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.6.6 The Highway Drainage fixed charges will be identified with the code HD_FC.

Highway Drainage - RV Based Charges

4.6.7 Where the Highway Drainage Tariff has a Rateable Value Charging Element and the Tariff element Highway Drainage RV Poundage (*HDRVPoundage*) is not *None*, then the Rateable Value charge for the day is:

$$max(min(\mathit{HDRVPoundage} \times \mathcal{H}(\mathit{RV} - \mathit{HDRVThresh}) \times \mathit{RV}, \mathit{HDRVMaxCharge}), \mathit{HDRVMinCharge}) \times \mathcal{V}^{e}(\mathit{VAC}_{d}) \times \mathcal{T}^{e}(\mathit{TDISC}_{d}) \times \mathit{SAF}_{d}^{c} \,/\, \mathit{DIY}$$

where the threshold Rateable Value at which Rateable Value charges are applied is *HDRVThresh*, the annual charge in £ per £RV is *HDRVPoundage*, *HDRVMaxCharge* is an optional maximum annual charge, and *HDRVMinCharge* is an optional minimum annual charge for this Charging Element.

4.6.8 The Market Operator will allocate the Highway Drainage Rateable Value charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.6.9 The Highway Drainage Rateable Value Charges will be identified with the code HD_RV.

Highway Drainage - Metered Fixed Charges

4.6.10 Where the Highway Drainage Tariff has a metered fixed Charging Element and the Tariff element Highway Drainage Meter Fixed Charges (*HDMFC*) is not *None*, then the meter fixed charges are computed as follows.

4.6.11 The meters K associated with the Service Component are Potable Water meters, Non-Potable Water meters, Private Water Meters, Sewerage Meters and Cross Border Meters.

4.6.12 For each meter K associated with the Service Component C establish the Meter Active Period P_K^A = (D_{Kl}^A, D_{Ku}^A) in accordance with Appendix A.1

4.6.13 For each meter K associated with the Service Component C and in respect of the Tariff T establish the Meter Chargeable Period P_K^{MC} as

$$P_K^{MC} = P_K^A \cap P^{TI}$$

4.6.14 Then define Sewerage Meter Active (SMA_{Kd}) in accordance with Appendix A.7.4 and Appendix A.7.5 below.

4.6.15 Then the meter fixed charges for the day d are

$$\mathcal{TL}(SCMS_{Kd}, HDMFC) \times SMA_{Kd} \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c \,/\, DIY$$

4.6.16 The Market Operator will then allocate the meter fixed charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.6.17 The Highway Drainage Meter Fixed Charges and the Highway Drainage (foul sewerage based) volumetric charges (Section 4.6.18 below) shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code HD_M. The charges will be shown with separate lines for each meter and Volumetric Adjustment.

Highway Drainage - Foul Sewerage Volumetric Charges

4.6.18 For the avoidance of doubt references below to block Tariffs include the case of a simple linear Tariff.

4.6.19 Where the Highway Drainage has a (Foul Sewerage) Volumetric block Tariff Charging Element and the Tariff element Highway Drainage Block Tariff (*HDBT*) is not *None*, then the metered volumetric charges are computed as follows:

4.6.20 The meters K associated with the Service Component are Potable Water meters, Non-Potable Water meters, Private Water Meters, Sewerage Meters and Cross Border Meters.

4.6.21 Private Trade Effluent Meters K are only associated with the Service Component when the Meter DPID Association $\mathit{MDASSOC}_{KTd} = 1$, (see Appendix A.7.6 below) and the Sewerage Volume Adjustment Method SVAM_T for the Trade Effluent DPID T has the value 'SUBTRACT'. In such cases, and only in such cases, will sewerage Volumes and charges be computed for the Private Trade Effluent Meter, and both Volumes and charges reported in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.6.22 For each meter K associated with the Service Component C establish the Meter Active Period P_K^A = (D_{Kl}^A, D_{Ku}^A) in accordance with Appendix A.1.

4.6.23 For each meter K associated with the Service Component C and in respect of the Tariff T establish the Meter Chargeable Period P_K^{MC} (as in Section 3.2.3 above) as

$$P_K^{MC} = P_K^A \cap P^{TI}$$

4.6.24 Then define Sewerage Meter Active (SMA_{Kd}) in accordance with Appendix A.7.4 and Appendix A.7.5 below.

4.6.25 Then for each day d in the Tariff Invoice Period P^{TI} define Highway Drainage Meter Fixed Charges Active ($\mathit{HDMFCA}_{TI,d}$) as

$$\mathit{HDMFCA}_{TI,d} = \begin{cases} \max_K(\mathit{SMA}_{Kd}) \times \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) & \text{if the set of meters } K \text{ is non-empty} \\ 0 & \text{otherwise} \end{cases}$$

where the maximum is over all meters K associated with the Service Component C, and the Charging Element e in respect of the Vacancy Function $\mathcal{V}^e$ and Temporary Disconnection Function $\mathcal{T}^e$ refers to the highway drainage meter fixed Charging Element.

4.6.26 For each day d in the Tariff Invoice Period P^{TI} define Highway Drainage Fixed Charges Active ($\mathit{HDFCA}_{TI,d}$) as

$$\mathit{HDFCA}_{TI,d} = \begin{cases} \mathcal{V}^e(\mathit{VAC}_d) \times \mathcal{T}^e(\mathit{TDISC}_d) & \text{if } \mathit{HDFixedCharge} \text{ is not } \mathit{None}; \\ 0 & \text{otherwise} \end{cases}$$

where the Charging Element e in respect of the Vacancy Function $\mathcal{V}^e$ and Temporary Disconnection Function $\mathcal{T}^e$ refers to the highway drainage fixed Charging Element.

4.6.27 Compute the Total Highway Drainage Fixed Charging Days (*THDFCD*) as

$$THDFCD = \sum_{d \in P^{TI}} \max(HDMFCA_{TI,d}, HDFCA_{TI,d})$$

4.6.28 The Sewerage Monthly Volume (*SMV*) is also derived in similar manner to Section 4.2.23 above as

$$SMV = 0 + \sum_{K,d \in P^{TI}} SDDV_{Kd} + \sum_{v,d \in P^{TI}} SDDV_{vd}$$

$$SMV = 0 + \sum_{K,d \in P^{TI}} SDDV_{Kd} + \sum_{v,d \in P^{TI}} SDDV_{vd} + \sum_{s,d \in P^{TI}} SDDV_{sd}$$

where the sum is over the Tariff Invoice Period P^{TI} in respect of this Service Component.

4.6.29 The highway drainage block Tariff price *HDBTP* is[17]

$$HDBTP = \mathcal{BTP}(SMV, HDBT, THDFCD)$$

where *HDBT* is the applicable block Tariff.

4.6.30 The volumetric charges for each meter K for the day d are

$$HDBTP \times SDDV_{Kd} \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

4.6.31 The volumetric charges for each Volumetric Adjustment v for the day d are

$$HDBTP \times SDDV_{vd} \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

4.6.32 The volumetric charges for each Calculated Discharge s where the Sewerage Volume Adjustment Method $SVAM_{Td}$ for the Trade Effluent DPID T has the value 'SUBTRACT' for the day d are

$$HDBTP \times SDDV_{sd} \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

[17] The reader is reminded that the function $\mathcal{BTP}$ returns a price in £/m^3.

4.6.33 The Market Operator will allocate the Highway Drainage (foul sewerage based) volumetric charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report the in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.6.34 The Highway Drainage meter fixed charges (Section 4.6.4 above) and the Highway Drainage (foul sewerage based) volumetric charges shall be shown together on the same line of the Disaggregated Settlement Report described in CSD 0201 (Settlement Timetable and Reporting). The lines will be identified with the code HD_M. The charges will be shown with separate lines for each meter and Volumetric Adjustment.

4.7 Trade Effluent

4.7.1 For each Trade Effluent Discharge Point T establish the DPID Chargeable Period (P^D) as the continuous period for which the Discharge Point is in charge. The DPID Chargeable Period is a Simple Period (D_l^D, D_u^D). In accordance with the standard convention used in this CSD, if the Discharge Point has been terminated then D_u^D is the date on which the Discharge Point was terminated, otherwise it is taken as 31st December 9999.

4.7.2 If the Discharge Point does not have an Effective From Date or the Discharge Point has been removed using Data Transaction TCORR179.W (Erase DPID) then the DPID Chargeable Period will be empty.

4.7.3 The DPID Chargeable Period may also be described as a Complex Period comprising a set of Sub-Periods: [$(D_l^{D_1}, D_u^{D_1})$, $(D_l^{D_2}, D_u^{D_2})$, . . .] where

(a) the DPID is chargeable for all days d where $D_l^{D_i} \leq d < D_u^{D_i}$

(b) the Sub-Periods i are all contiguous [18], but are non-overlapping. Thus $D_u^{D_i} = D_l^{D_{i+1}}$ for all i

(c) each Sub-Period i is associated with a single Tariff

4.7.4 Then establish the DPID Invoice Period P^{DI} which comprises (a possibly empty) set of Sub-Periods: [$(D_l^{DI_1}, D_u^{DI_1})$, $(D_l^{DI_2}, D_u^{DI_2})$, . . .] and

$$P^{DI} = P^{IC} \cap P^D$$

[18] Compare the component Sub-Periods which are not necessarily continuguous

Each such Sub-Period is associated with a unique Tariff. Any empty Sub-Periods may be removed from the representation of the Period.

4.7.5 If the DPID does not have a DPID Invoice Period, then no charges are computed for the DPID for the Settlement Run.

4.7.6 Then establish the distinct Tariffs T associated with P^{DI}, and for each Tariff T establish the Tariff Invoice Period P^{TI} which is associated with the Tariff T. It is not necessary for any Sub-Periods which make up a Tariff Invoice Period to be contiguous. The union of all the Tariff Invoice Periods P^{TI} is the DPID Invoice Period P^{DI}.

4.7.7 Then for each Tariff T so associated with a non-empty DPID Invoice Period, the settlement process described below is carried out for each DPID.

Trade Effluent - Fixed Charge

4.7.8 Where the Trade Effluent Tariff has a Fixed Charging Element and the Tariff element Trade Effluent Fixed Charge (*TEFixedCharge*) is not *None*, then the Fixed charge for the day d will be:

$$\mathit{TEFixedCharge} \times \mathcal{V}^{e}(\mathit{VAC}_d) \times \mathcal{T}^{e}(\mathit{TDISC}_d) \times \mathit{SAF}^{c}_{d} \,/\, \mathit{DIY}$$

4.7.9 The Market Operator will allocate the fixed charge to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.7.10 The Trade Effluent Fixed Charge will be identified with the code TE_FC.

Trade Effluent - Banded Charge

4.7.11 Where the Trade Effluent Tariff has a banded Charging Element and *TEBandCharge* is not *None*, then the banded charge for the day d will be

$$\mathcal{TB}(\mathit{TEBand}_d, \mathit{TEBandCharge}) \times \mathcal{V}^{e}(\mathit{VAC}_d) \times \mathcal{T}^{e}(\mathit{TDISC}_d) \times \mathit{SAF}^{c}_{d} \,/\, \mathit{DIY}$$

where *TEBandCharge* is the Tariff table which maps the bands to the annual charges and TEBand_d is the band applicable on the day.

4.7.12 The Market Operator will then allocate the Trade Effluent banded charges to the Wholesaler and to the Retailer to which the DPID was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.7.13 The Trade Effluent banded charge will be identified with the code TE_BAND.

Trade Effluent Availability Charges

4.7.14 Where the Trade Effluent Tariff has an availability Charging Element, the Trade Effluent availability charges are computed as follows.

4.7.15 For the Discharge Point determine the Treatment Indicators

RTI_d	Reception Treatment Indicator
PTI_d	Primary Treatment Indicator
MTI_d	Marine Treatment Indicator
BTI_d	Biological Treatment Indicator
STI_d	Sludge Treatment Indicator
ATI_d	Ammonia Treatment Indicator
XTI_d	Trade Effluent Component 'X' Treatment Indicator
YTI_d	Trade Effluent Component 'Y' Treatment Indicator
ZTI_d	Trade Effluent Component 'Z' Treatment Indicator

which each take the value 0 or 1 and indicate whether the corresponding terms in the Mogden formula should be applied.

4.7.16 The Market Operator shall then calculate the Trade Effluent availability charge as

$$\Big[\big[(RTI_d \times Ra) + (PTI_d \times Va) + (BTI_d \times Bva) + (MTI_d \times Ma)\big] \times CDV_d + (BTI_d \times Ba \times cCOD\ell_d) + (STI_d \times Sa \times cSS\ell_d) + (ATI_d \times Aa \times cAN\ell_d) + (XTI_d \times Xa \times cX\ell_d) + (YTI_d \times Ya \times cY\ell_d) + (ZTI_d \times Za \times cZ\ell_d)\Big] \times SF_d \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

where the Treatment Indicators are as determined in Section 4.7.15 above, and the following parameters are derived from the Discharge Point. For clarity, the subscript T has been dropped from the above equation. Thus, in particular, it has been dropped

from the Chargeable Daily Volume CDV_{Td}, nor is it included in any of the availability data such as $cCOD\ell_d$.

CDV_d =	Chargeable Daily Volume (m^3/day)
$cCOD\ell_d$ =	Chargeable Chemical Oxygen Demand Load (kg/day) (or other parameter as may be determined by the Wholesaler)
$cSS\ell_d$ =	Chargeable Suspended Solids Load (kg/day) (or other parameter as may be determined by the Wholesaler)
$cAN\ell_d$ =	Chargeable Ammoniacal Nitrogen Load (kg/day)
$cX\ell_d$ =	Trade Effluent Component 'X' Chargeable Load (kg/day)
$cY\ell_d$ =	Trade Effluent Component 'Y' Chargeable Load (kg/day)
$cZ\ell_d$ =	Trade Effluent Component 'Z' Chargeable Load (kg/day)
SF_d =	Seasonal factor (percentage)

The following availability terms are derived from the Tariff:

Ra =	Reception Capacity Charging Component (£/m^3per day)
Va =	Volumetric Capacity Charging Component in (£/m^3per day)
Bva =	Additional Volumetric Capacity Charging Component if there is biological treatment (£/m^3per day)
Ma =	Marine Capacity Charging Component where effluent is discharged to sea (£/m^3per day)
Ba =	Biological Capacity Charging Component (£/kg per day)
Sa =	Sludge Capacity Charging Component (£/kg per day)
Aa =	Ammonia Capacity Charging Component (£/kg per day)
Xa =	Trade Effluent Component 'X' Capacity Charging Component (£/kg per day)
Ya =	Trade Effluent Component 'Y' Capacity Charging Component (£/kg per day)
Za =	Trade Effluent Component 'Z' Capacity Charging Component (£/kg per day)

4.7.17 The Market Operator will allocate the Trade Effluent availability charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.7.18 The Trade Effluent availability charge will be identified with the code TE_AVAIL.

Trade Effluent Operational Charges

4.7.19 Where the Trade Effluent Tariff has an operational Charging Element, the Trade Effluent operational charges are computed as follows.

4.7.20 The Market Operator shall use the following procedure for calculating the daily Volume Discharged (DVD_d).

4.7.21 Each Discharge Point T may be associated with zero, one or more meters. This association can be described by a variable $MDASSOC_{KTd}$ which will take the value 1 when there is an association, and take the value 0 when there is no association. Each meter-DPID association has a related meter-DPID Volume ($MDVOL_{KTd}$) which represents the fraction[19] of a specific meter's volume which is associated with a DPID.

4.7.22 For the avoidance of doubt, if there is no association, i.e. $MDASSOC_{KTd} = 0$, then $MDVOL_{KTd}$ will also be taken to be 0. However, it is possible to have $MDASSOC_{KTd} = 1$ but $MDVOL_{KTd} = 0$. Note that Volume is only reported for a meter K where $MDVOL_{KTd} > 0$.

4.7.23 For each Meter K define the variable Private Trade Effluent Meter ($PTEM_K$) as

$$PTEM_K = \begin{cases} 1 & \text{if the meter } K \text{ is a Private Trade Effluent Meter} \\ 0 & \text{otherwise} \end{cases}$$

noting that a meter K has a constant Meter Treatment over its entire history.

4.7.24 Then define the term Domestic Allowance Included ($DAINC_{Td}$) in the sewerage calculations as

$$DAINC_{Td} = \begin{cases} 1 & \text{if } \sum_K MDVOL_{KTd} \times (1 - PTEM_K) > 0 \\ 0 & \text{if } \sum_K MDVOL_{KTd} \times (1 - PTEM_K) = 0 \end{cases}$$

[19] Expressed as a percentage in Central Systems but used here and elsewhere in this CSD as a fraction

4.7.25 Then the daily Volume Discharged DVD_{Td} is

$$DVD_{Td} = (1 - PA_{Td}) \times \Bigg[\sum_{K} \left(DDV_{Kd} \times MDVOL_{KTd} \right) - \left(\frac{max(0, DA_{Td}) \times DAINC_{Td}}{DIY} + \frac{FA_{Td}}{DIY} \right) \times \left(1 - VAC_d\right) \times \left(1 - TDISC_d\right) \Bigg] + \sum_{v} TEDDV_{Tvd} + \sum_{s} TEDDV_{Tsd}$$

where PA_{Td} is the Percentage Allowance[20], FA_{Td} is the Fixed Allowance and DIY is the number of days in the Year. The Temporary Disconnection state $TDISC_d$ refers to the Temporary Disconnection status (*True* or *False*) of the paired Water Services Supply Point. Where there is no paired Water Services Supply Point which is Tradable, $TDISC_d$ shall be taken to be *False*. The vacancy state VAC_d is as determined in Section A.2.4 below.

4.7.26 The Trade Effluent operational charge (OPc_d) is

$$DVD_d \times \Big[(RTI_d \times Ro) + (PTI_d \times Vo) + (BTI_d \times Bvo) + (MTI_d \times Mo) + (BTI_d \times Bo \times \frac{Ot_d}{Os}) + (STI_d \times So \times \frac{St_d}{Ss}) + (ATI_d \times Ao \times \mathcal{R}(\frac{At_d - Am}{As})) + (XTI_d \times Xo \times \mathcal{R}(\frac{Xt_d - Xm}{Xs})) + (YTI_d \times Yo \times \mathcal{R}(\frac{Yt_d - Ym}{Ys})) + (ZTI_d \times Zo \times \mathcal{R}(\frac{Zt_d - Zm}{Zs})) \Big] \times \mathcal{V}^e(VAC_d) \times \mathcal{T}^e(TDISC_d) \times SAF_d^c$$

where the Treatment Indicators are as determined in Section 4.7.15 above, and the following parameters are derived from the Discharge Point. For clarity, the subscript T has been dropped from the above equation. Thus, in particular, it has been dropped from the Daily Volume Discharged DVD_{Td}, nor is it included in any of the operational parameters such as Ot_d.

Ot_d = Chemical Oxygen Demand (COD) of the Trade Effluent or other parameter as may be determined by the Wholesaler (mg/l)

St_d = The suspended solids of the Trade Effluent or other parameter as may be determined by the Wholesaler (mg/l)

At_d = The ammoniacal nitrogen content of the Trade Effluent or other parameter as may be determined by the Wholesaler (mg/l)

[20] Expressed as a percentage in Central Systems, but used here and elsewhere in this CSD as a fraction

Xt_d = The Trade Effluent Component 'X' Content of the Trade Effluent where the 'X' component is determined by the Wholesaler (mg/l)

Yt_d = The Trade Effluent Component 'Y' Content of the Trade Effluent where the 'Y' component is determined by the Wholesaler (mg/l)

Zt_d = The Trade Effluent Component 'Z' Content of the Trade Effluent where the 'Z' component is determined by the Wholesaler (mg/l)

The following operating terms are derived from the Tariff:

Ro = Reception charging component in £/m^3derived from the Tariff in Section 4.7.27 below

Vo = Volumetric Charging Component (£/m^3)

Bvo = Additional Volumetric Charging Component if there is biological treatment (£/m^3)

Mo = Marine Treatment Charging Component where effluent is discharged to sea (£/m^3)

Bo = Secondary Treatment Charging Component in £/m^3derived from the Tariff in Section 4.7.28 below

So = Sludge Treatment Charging Component (£/m^3)

Ao = Ammoniacal Nitrogen Charging Component (£/m^3)

Os = Chemical Oxygen Demand Base Value against which *Ot* is normalised for charging (mg/l)

Ss = Suspended Solids Base Value against which *St* is normalised for charging (mg/l)

As = Ammoniacal Nitrogen Base Value against which *At* is normalised for charging (mg/l)

Am = Minimum value of ammoniacal nitrogen content which is charged (mg/l)

Xs = Trade Effluent Component 'X' Base Value against which *Xt* is normalised for charging (mg/l)

Xm = Minimum value of Trade Effluent Component 'X' which is charged (mg/l)

Ys = Trade Effluent Component 'Y' Base Value against which *Xt* is normalised for charging (mg/l)

Ym = Minimum value of Trade Effluent Component 'Y' which is charged (mg/l)

Zs = Trade Effluent Component 'Z' Base Value against which *Xt* is normalised for charging (mg/l)

Zm = Minimum value of Trade Effluent Component 'Z' which is charged (mg/l)

and $\mathcal{H}$ is the Heaviside function defined in Appendix B

4.7.27 The reception charging price *Ro* is derived from a block Tariff table *RoBT*. Where the block Tariff is a simple linear Tariff (see Appendix B.3, the price *Ro* is the only value in the Tariff table. When there are multiple entries in the block Tariff table, the price is derived as:

$$Ro = \mathcal{BTP}(\sum_{d \in P^{TI}} DVD, RoBT, TRD)$$

where the total reception days *TRD* is given by:

$$TRD = \sum_{d \in P^{TI}} \mathcal{V}^{e}(VAC_d) \times \mathcal{T}^{e}(TDISC_d)$$

4.7.28 The secondary treatment charging price *Bo* is derived from a block Tariff table *BoBT*. Where the block Tariff is a simple linear Tariff (see Appendix B.3, the price *Bo* is the only value in the Tariff table. When there are multiple entries in the block Tariff table, the price is derived as:

$$Bo = \mathcal{BTP}(\sum_{d \in P^{TI}} DVD, BoBT, TRD)$$

where the total reception days *TRD* is given as in Section 4.7.27.

4.7.29 The Market Operator will allocate the Trade Effluent operational charges and Volumes to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and Volumes, and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.7.30 The Trade Effluent operational charges will be identified with the code TE_CHARGES. The charges will be shown with separate lines for each meter, each Volumetric Adjustment, each Calculated Discharge and a line for the allowances.

Trade Effluent Minimum Charges

4.7.31 Where the Trade Effluent Tariff has operational charges and has a minimum operational Charging Element, *TEMinCharge*, which is not *None*, then the minimum Trade Effluent daily operational charge, $TEMinDailyCharge_{Td}$, is:

$$TEMinDailyCharge_{Td} = TEMinCharge \times \mathcal{V}^{e}(VAC_d) \times \mathcal{T}^{e}(TDISC_d) / DIY$$

and the minimum Period operational charge is

$$\textit{TEMinPeriodCharge}_{T} = \sum_{d \in P^{TI}} \textit{TEMinDailyCharge}_{Td}$$

4.7.32 The Period operational charge is *TEPeriodCharge* where

$$\textit{TEPeriodCharge}_{T} = \sum_{d \in P^{TI}} \textit{OPc}_{Td}$$

4.7.33 If the Period shortfall (*TEPeriodShortfall*) satisfies:

$$\textit{TEPeriodShortfall}_{T} = \textit{TEMinPeriodCharge}_{T} - \textit{TEPeriodCharge}_{T} \leq 0$$

then the minimum charge requirements are met, and there a no additional charges to allocate, aggregate or report.

4.7.34 Otherwise determine the Trade Effluent daily shortfall $\textit{TEDailyShortfall}_{Td}$ for each of the days in the Period P as:

$$\textit{TEDailyShortfall}_{Td} = \max(\textit{TEMinDailyCharge}_{Td} - \textit{OPc}_{Td}, 0);$$

Then the Market Operator shall determine the Trade Effluent daily operational minimum daily addition *TEMDA* as:

$$\textit{TEMDA}_{Td} = \textit{TEDailyShortfall}_{Td} \times \textit{TEPeriodShortfall}_{T} \,/ \sum_{d \in P^{TI}} \textit{TEDailyShortfall}_{Td}$$

4.7.35 The Market Operator will allocate the Trade Effluent minimum daily addition charges to the Wholesaler and to the Retailer to which the Supply Point was Registered in respect of each day. The Market Operator will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.7.36 The Trade Effluent minimum charges will be identified with the code TE_MINDA.

4.8 Sewerage - Charge Adjustment

Sewerage - Section 154A

4.8.1 Where the sewerage Charge Adjustment Tariff has a Section 154A Charging Element and the Tariff element Section 154A Value *Sec154AValue* is not *None*, then the

amount to be paid by the Wholesaler to the Retailer for the day d is:

$$\textit{Sec154ACount} \times \textit{Sec154AValue} \times \mathcal{V}^e(\textit{VAC}_d) \times \mathcal{T}^e(\textit{TDISC}_d) / \textit{DIY}$$

4.8.2 For the avoidance of doubt, the Tariff element *Sec154AValue* should be specified as a positive number in the Tariff. The value of the Tariff element should be the total amount due per dwelling unit for the premises, while *Sec154ACount* is the number of Section 154A dwelling units at the premises. Note that similar remarks apply to the Tariff element *Sec154AValue* in Section 3.5. The calculations in this CSD 0207 split the amount such that the full amount is attributable to the Sewerage Services Supply Point (and none to the Water Services Supply Point) except in the case of an unpaired Water Services Supply Point, where the full amount is attributed to the Water Services Supply Point. The charge which will be aggregated in the Settlement Reports will be the negative of the amount derived above.

4.8.3 The Market Operator will allocate the sewerage Section 154A charge (being the negative of the amount calculated above) to the Wholesaler and to the Retailer to which the SPID was Registered in respect of each Settlement Day. It will then aggregate these charges and report them in accordance with CSD 0201 (Settlement Timetable and Reporting).

4.8.4 Section 154A Charges will be identified with the code S_Sec154A.

A Appendix - Meter Volume Estimation

A.1 Meter Reads and Meter Active Period

A.1.1 Throughout this CSD 0207 only Meter Reads which have the Meter Settlement Flag set to True are used in any of the volume estimation algorithms. Any reference to a Meter Read in this CSD 0207 refers only to such Meter Reads for which the Meter Settlement Flag is *True* whether or not this is explicitly stated.

A.1.2 Meters without any Meter Reads are not taken account of in the settlement calculation either in respect of meter fixed charges or in respect of volumetric charges.

A.1.3 Active Meters are meters which have at least one Meter Read and have not been removed from the settlement calculation by the Data Transaction TCORR174.W (Erase Meter).

A.1.4 All meters (whether pre-loaded prior to the Go Active Date or created by transaction after the Go Active Date by a Data Transaction) should have an Initial Read. The Meter Read with the earliest read date and only the Meter Read with the earliest read date should be an Initial Meter Read.

A.1.5 The Meter Active Period for an Active Meter is P_K^A = (D_{Kl}^A, D_{Ku}^A) where

$D_{Kl}^A =$ date of the Initial Read; and

$$D_{Ku}^A = \begin{cases} D & \text{where the meter has been removed from the SPID with a Final Meter Read on date } D \\ 9999\text{-}12\text{-}31 & \text{where the meter has not been removed from the SPID and does not have a Final Meter Read} \end{cases}$$

A.1.6 The Meter Active Period is empty for a meter which is not an Active Meter.

A.1.7 Meter volume calculations are only carried out for days within the Meter Active Period.

A.2 Supply Point Status

A.2.1 The equations for the derivation of Volume and charges depend on the connection state $CONN_d$, the vacancy state VAC_d and the Temporary Disconnection state

TDISC$_d$. Rules in respect of these variables which are derived from Data Transactions are set out below in this Appendix A.2.

A.2.2 The connection state *CONN*$_d$ for a SPID which is or has been Tradable is:

$$\textit{CONN}_d = \begin{cases} 1 & \text{if } D_l^S <= d < D_u^S, \text{ and} \\ 0 & \text{otherwise} \end{cases}$$

A.2.3 Where Volumes are being calculated in respect of a Sub Meter to calculate the Derived Daily Volume for a meter in accordance with Appendix A.6, the connection state which shall be applied to the calculations is the connection state of the Main SPID. For the avoidance of doubt, this applies even in cases where the Volume of a Sub Meter is being calculated for a day on which the Sub Meter - Meter relationship is not active. Calculations of Volumes for such days can be required as part of the calculation of the Volume for a day on which the Sub Meter - Meter relationship is active.

A.2.4 The vacancy state *VAC*$_d$ for a SPID is:

$$\textit{VAC}_d = \begin{cases} \textit{False} & \text{for Occupied Premises; or} \\ \textit{True} & \text{for Vacant Premises.} \end{cases}$$

Note that the Data Item Occupancy Status (D2015) which takes the values 'OCCUPIED' or 'VACANT' refers.

A.2.5 Where Volumes are being calculated in respect of a Sub Meter to calculate the Derived Daily Volume for a meter in accordance with Appendix A.6, the vacancy state which shall be applied to the calculations is the vacancy state of the Main SPID. For the avoidance of doubt, this applies even in cases where the Volume of a Sub Meter is being calculated for a day on which the Sub Meter - Meter relationship is not active. Calculations of Volumes for such days can be required as part of the calculation of the Volume for a day on which the Sub Meter - Meter relationship is active.

A.2.6 The Temporary Disconnection state *TDISC*$_d$ refers to the Temporary Disconnection status (*True* or *False*) of:

(a) the relevant Water Services Supply Point when calculations are being carried out in respect of Potable Water meters or Non-Potable Water meters (whether or not the Volume calculation is to be applied at the Water Services Supply Point or the Sewerage Services Supply Point);

(b) the Water Services Supply Point which is the Main SPID when a sub-meter calculation is being carried out as part of the Volume calculation at the Main SPID (whether or not the Volume calculation is to be applied at the Water Services Supply Point or the Sewerage Services Supply Point).

(c) The Sewerage Services Supply Point when calculations are being carried out in respect of Private Water meters, Sewerage Meters, Private Trade Effluent Meters or Cross Border Meters. In this case the Temporary Disconnection state will always be defined as *False*.

(d) The relevant Water Services Supply Point when the Temporary Disconnection function $\mathcal{T}()$ (Appendix B.6) is being evaluated for a Sewerage Services Supply Point. If there is no paired Water Services Supply Point which is Tradable, then $TDISC_d$ shall be taken to be *False*.

A.3 Meter Pre-Advance Periods

A.3.1 This calculation facilitates the computation of the Actual Daily Volume ADV_{Kd}, the Estimated Daily Volume EDV_{Kd} and the Daily Volume DV_{Kd} for a meter K if the day d is within a Meter Pre-Advance Period.[21]

A.3.2 For days within a Meter Pre-Advance Period compute the meter volume daily estimate $MVDE_{Kd}$ as

$$MVDE_{Kd} = \begin{cases} YVE_{Kd} \,/\, DIY & \text{if the meter } YVE_{Kd} \text{ is not } None\text{; else} \\ ILE_{Kd} \,/\, DIY & \text{otherwise} \end{cases}$$

For the avoidance of doubt, both YVE_{Kd} and ILE_{Kd} are annualised rates of advance (m^3/a) whereas $MVDE_{Kd}$ is a daily rate of advance. The subscripts K, d indicate that all of these values vary by meter and can vary by day d.

A.3.3 Where it is necessary to establish the Industry Level Estimate ILE_{Kd} for a meter K for the day d, the Market Operator shall first establish the Water Chargeable Meter Size $WCMS_{Kd}$.[22]

[21] Note - the terms 'Meter Pre-Advance Period', 'Meter Advance Period' and 'Meter Post-Advance Period' are all formally defined. However, non-normative diagrams describing each of these periods and informal descriptions of the algorithms in this appendix are provided in the Appendix H

[22] *WCMS* is always zero for Private Water Meters, Sewerage Meters and Private Trade Effluent Meters. When a Sewerage Wholesaler creates such a meter, the Sewerage Wholesaler must establish a YVE_{Kd}. This number can be updated by the Retailer

The Central Systems contains the Industry Level Estimate Table *ILET* (see Appendix F.1), comprising a series of monotonically increasing meter sizes and corresponding Industry Level Estimates. The Industry Level Estimate (ILE_{Kd}) for the meter K for day d is given by:

$$ILE_{Kd} = \mathcal{TL}(WCMS_{Kd}, ILET)$$

A.3.4 The Estimated Daily Volume EDV_{Kd} is calculated as

$$EDV_{Kd} = MVDE_{Kd} \times (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

and the connection state $CONN_d$, the SPID Chargeable Period (D_l^S, D_u^S), the vacancy state VAC_d and the Temporary Disconnection state $TDISC_d$ are defined as in Appendix A.2 above.

A.3.5 The Actual Daily Volume ADV_{Kd} is:

$$ADV_{Kd} = 0$$

and the Daily Volume DV_{Kd} is

$$DV_{Kd} = EDV_{Kd}$$

A.4 Meter Advance Periods

A.4.1 This calculation facilitates the computation of the Actual Daily Volume ADV_{Kd}, the Estimated Daily Volume EDV_{Kd} and the Daily Volume DV_{Kd} for a meter K if the day d is within a Meter Advance Period.

A.4.2 For each day d within a Meter Advance Period, the Meter Advance Volume (*MAV*) is given by $MAV = R_2 - R_1 + flag_2 \times 10^n$ where

D_1 is the first date of the Meter Advance Period;

R_1 is the corresponding read;

D_2 is the day after the last date of the Meter Advance Period.

R_2 is corresponding read;

$$flag_2 = \begin{cases} 1 & \text{if the Rollover Flag has been set for the Meter Read } R_2 \\ 0 & \text{it has not been set, and} \end{cases}$$

n is number of digits on the meter dial

A.4.3 Compute the meter advance chargeable days *MACD* as

$$MACD = \sum_{d=D_1}^{D_2-1} (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

where the connection state $CONN_d$, the vacancy state VAC_d and the Temporary Disconnection state $TDISC_d$ are determined as per Appendix A.2.

A.4.4 Then compute the Daily Volume DV_{Kd} as

$$DV_{Kd} = \begin{cases} \dfrac{MAV}{MACD} \times (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d & \text{if } MACD > 0 \\ \dfrac{MAV}{D_2 - D_1} \times CONN_d & \text{if } MACD = 0 \end{cases}$$

A.4.5 If either of the Meter Reads $(D_1, R_1, flag_1)$ or $(D_2, R_2, flag_2)$ has a Meter Read Method of Estimated, then the Market Operator shall set the Actual Daily Volume ADV_{Kd} and Estimated Daily Volume EDV_{Kd}:

$$ADV_{Kd} = 0$$
$$EDV_{Kd} = DV_{Kd}$$

If neither of the reads has a Meter Read Method of Estimated, the Market Operator shall set

$$ADV_{Kd} = DV_{Kd}$$
$$EDV_{Kd} = 0$$

A.5 Meter Post-Advance Periods

A.5.1 This calculation facilitates the computation of the Actual Daily Volume ADV_{Kd}, the Estimated Daily Volume $EDV\,Kd$ and the Daily Volume DV_{Kd} for a meter K if the day d is within a Meter Post-Advance Period.

A.5.2 For each meter K[23] label the meter's N reads $i = 1 \ldots N$ with each Meter Read, Rollover Flag pair $(R_i, flag_i)$ being taken on a distinct day D_i such that $D_i < D_{i+1}$ for

[23] As this subsection deals with estimation of volumes during a Meter Post-Advance Period, then the meter K must have at least two reads.

all $1 \leq i < N-1$ The most recent date, Meter Read, Rollover Flag triple will be (D_N, R_N,***flag***$_N$).

A.5.3 If the Meter Read with the most recent date (D_N, R_N,***flag***$_N$) is a Temporary Disconnection Read, then set the meter Daily Volume ***DV***$_{Kd}$, the Actual Daily Volume ***ADV***$_{Kd}$ the Estimated Daily Volume ***EDV***$_{Kd}$ as:

$$\textit{DV}_{Kd} = \textit{ADV}_{Kd} = \textit{EDV}_{Kd} = 0$$

A.5.4 If the Meter Read with the most recent date (D_N, R_N,***flag***$_N$) is not a Temporary Disconnection Read, but there is a Meter Read (D_m, R_m, ***flag***$_m$) which is a Temporary Disconnection Read and every Meter Read $i = m+1 \ldots N$ satisfies the requirements that

(a) the Meter Read i is not a Reconnection Read;
(b) the read value $R_i = R_m$; and
(c) the Rollover Flag ***flag***$_i$ is *False*

then set the meter Daily Volume ***DV***$_{Kd}$, the Actual Daily Volume ***ADV***$_{Kd}$ the Estimated Daily Volume ***EDV***$_{Kd}$ as:

$$\textit{DV}_{Kd} = \textit{ADV}_{Kd} = \textit{EDV}_{Kd} = 0$$

For the avoidance of doubt, it is immaterial whether the Rollover Flag ***flag***$_m$ is *True* or *False*.

A.5.5 In all other cases apart from those described in sections A.5.3 and A.5.4 then the Market Operator shall carry out the process described in the remainder of this Appendix A.5.

A.5.6 Establish the base Meter Read triple (D_b, R_b, ***flag***$_b$) such that:

$$b = \begin{cases} 1 & \text{if } D_N - D_1 \leq 365 \\ \max(i) \text{ such that } D_N - D_i \geq 365 & \text{if } D_N - D_1 > 365 \end{cases}$$

where i indexes the set of Meter Reads (D_i, R_i, ***flag***$_i$) which are in date order such that if $i < j$ then $D_i < D_j$.

A.5.7 Compute the meter advance chargeable days *MACD* as

$$MACD = \sum_{d=D_b}^{D_N-1} (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

where the connection state $CONN_d$, the vacancy state VAC_d and the temporary disconnection state $TDISC_d$ are determined as per Appendix A.2 and the Total Daily Volume TDV as:

$$TDV = \sum_{d=D_b}^{D_N-1} DV_d$$

A.5.8 Compute the meter volume daily estimate $MVDE_{Kd}$ as

$$MVDE_{Kd} = \begin{cases} YVE_{Kd} \,/\, DIY & \text{if the meter } YVE_{Kd} \text{ is not } None\text{; else} \\ ILE_{Kd} \,/\, DIY & \text{otherwise} \end{cases}$$

where as noted in Appendix A.3.2 above that YVE_{Kd} and ILE_{Kd} are annualised rates of advance (m^3/a) whereas $MVDE_{Kd}$ is a daily rate of advance.

A.5.9 The uncapped estimated daily volume ($UEDV_{Kd}$) is[24]

$$UEDV_{Kd} = \begin{cases} \dfrac{\max(0, TDV)}{MACD} & \text{if } MACD \geq 30 \\ \dfrac{\max(0, TDV)}{MACD} \times \dfrac{MACD}{30} + MVDE_{Kd} \times \dfrac{(30 - MACD)}{30} & \text{if } 1 \leq MACD \leq 30 \\ MVDE_{Kd} & \text{if } MACD = 0 \end{cases}$$

A.5.10 For days d in the Meter Post-Advance Period, the estimated daily volume cap ($EDVC_{Kd}$) is

$$EDVC_{Kd} = \begin{cases} Ycap \times \dfrac{YVE_{Kd}}{DIY} & \text{if the meter has a } YVE_{Kd}\text{; else} \\ Icap \times \dfrac{ILE_{Kd}}{DIY} & \text{otherwise} \end{cases}$$

where $Ycap$ are $Icap$ are set as in Appendix F.1, and ILE_{Kd} is determined as above in Appendix A.3.3.

[24] The $MACD$ in numerator and denominator of the equation is nugatory for the $1 \leq MACD \leq 30$ case, but clarifies the derivation of the expression and the weighting of the two terms

Then the Estimated Daily Volume EDV_{Kd} for days d in the Meter Post-Advance Period is

$$\min(EDVC_{Kd}, UEDV_{Kd}) \times (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

and the meter Actual Daily Volume ADV_{Kd} and Daily Volume DV_{Kd} are:

$$ADV_{Kd} = 0$$
$$DV_{Kd} = EDV_{Kd}$$

A.6 Derived Daily Volume

A.6.1 For each meter K, and day d, the Market Operator shall calculate the Derived Daily Volume DDV_{Kd}. The calculation of Derived Daily Volume depends on whether

(a) the meter is a Potable Water, a Non-Potable Water Meter, a Private Water Meter, a Sewerage Meter, a Private Trade Effluent Meter or a Cross Border Meter; and

(b) whether the calculation is to derive water, sewerage or Trade Effluent Volumes.

Potable and Non-Potable Meter - water calculation

A.6.2 Where the Main Meter is either a Potable Water Meter on a Non-Potable Water meter and the calculation is to derive Volumes for metered water, then

$$DDV_{Kd} = DV_{Kd} - \sum_{\substack{\text{Sub Meters } L \\ \text{where } L \text{ is not} \\ \text{a Private Meter}}} DV_{Ld}$$

where the sum is over all meters L which are Sub Meters of meter K for the day d and are not Private Water Meters. The derivation of the appropriate terms DV_{Ld} for each of the Sub Meters L is the same as for the meter K.

Potable and Non-Potable Meter - sewerage and Trade Effluent calculations

A.6.3 Where the Main Meter is either a Potable Water Meter on a Non-Potable Water meter and the calculation is to derive Volumes for either metered sewerage charges or Trade Effluent charges, then

$$DDV_{Kd} = DV_{Kd} - \sum_{\text{Sub Meters } L} DV_{Ld}$$

where the sum is over all meters L which are Sub Meters of meter K for the day d including Private Water Meters. The derivation of the appropriate terms DV_{Ld} for each of the Sub Meters L is the same as for the meter K.

Private Water Meters, Sewerage Meters, Trade Effluent Meters and Cross Border Meters

A.6.4 The Central Systems only supports meter networks for which a Potable Water Meter or a Non-Potable Water Meter is the Main Meter. In all other cases, where a Private Water Meter, a Sewerage Meter, a Trade Effluent Meters or a Cross Border Meter is the Main Meter, the Derived Daily Volume DDV_{Kd} is given by

$$DDV_{Kd} = DV_{Kd}$$

A.6.5 The Market Operator shall also calculate the Derived Actual Daily Volume $DADV_{Kd}$ and the Derived Estimated Daily Volume $DEDV_{Kd}$ are similarly given by

$$DADV_{Kd} = ADV_{Kd} - \sum_{L} ADV_{Ld}$$
$$DEDV_{Kd} = EDV_{Kd} - \sum_{L} EDV_{Ld}$$

where the applicable meters L are derived as above.

A.7 Sewerage Derived Daily Volume

A.7.1 This section explains the derivation of the Sewerage Derived Daily Volume ~~$SDDV$~~$SDDV_{Kd}$ for each meter K for the day d.

A.7.2 It should be noted that in the case of Sewerage Meters, that the Return to Sewer is always constrained such that $RTS_{Kd} = 1$.

A.7.3 In the case of Private Trade Effluent Meters, Sewerage Derived Daily Volume is not always calculated. It is only in the cases where the Sewerage Derived Daily Volume is calculated and charges are calculated, that Volumes and charges are reported.

A.7.4 Then define Sewerage Meter Active (SMA_{Kd}) for each meter K which is not a Private Trade Effluent Meter as

$$SMA_{Kd} = \begin{cases} 1 & \text{if } D^A_{Kl} <= d < D^A_{Ku} \text{ and } RTS_{Kd} > 0 \\ 0 & \text{otherwise} \end{cases}$$

where RTS_{Kd} is the Return to Sewer[25] for the meter K for the day d. For meters which are not Private Trade Effluent Meters, Volumes and charges are only reported when SMA_{Kd} = 1.

A.7.5 For each meter K which is a Private Trade Effluent Meter define Sewerage Meter Active (SMA_{Kd}) as

$$SMA_{Kd} = 0$$

A.7.6 Each Discharge Point T may be associated with a meter K. This association can be described by a variable $MDASSOC_{KTd}$ which will take the value 1 when there is an association, and take the value 0 when there is no association. Each meter-DPID association has a related meter-DPID Volume ($MDVOL_{KTd}$) which represents the fraction[26] of a specific meter's volume which is associated with a DPID. For the avoidance of doubt, if there is no association, i.e. $MDASSOC_{KTd} = 0$, then $MDVOL_{KTd}$ will also be taken to be 0.

A.7.7 Define the term Sewerage Volume Net Adjustment $SVNETA_{Kd}$ as

$$SVNETA_{Kd} = \begin{cases} 1 & \text{if } \sum_T (MDASSOC_{KTd} \times isSubtract(SVAM_{Td}) > 0 \\ 0 & \text{otherwise} \end{cases}$$

$$SVNETA_{Kd} = \begin{cases} 1 & \text{if } \sum_T (MDASSOC_{KTd} \times (1 - isNullTariff(T_d)) \\ & \qquad \times isSubtract(SVAM_{Td}) > 0 \\ 0 & \text{otherwise} \end{cases}$$

[25] Expressed as a percentage in Central Systems, but used here and elsewhere in this CSD as a fraction
[26] Expressed as a percentage in Central Systems but used here and elsewhere in this CSD as a fraction

A.7.8 Define the term Domestic Allowance Split ($DASPLIT_{Td}$) as

$$DASPLIT_{Td} = (1 - isNone(DA_{Td})) \times \sum_{K}(MDASSOC_{KTd} \times SMA_{Kd} \times (1 - SVNETA_{Kd}))$$

$$DASPLIT_{Td} = (1 - isNone(DA_{Td})) \times (1 - isNullTariff(T_d)) \times \sum_{K}(MDASSOC_{KTd} \times SMA_{Kd} \times (1 - SVNETA_{Kd}))$$

A.7.9 Then, the Sewerage Derived Daily Volume ~~($SDDV$)~~ $SDDV_{Kd}$ is

$$SDDV_{Kd} = \begin{cases} -\sum_{T}(MDVOL_{KTd} \times DDV_{Kd}) & \text{if } SVNETA_{Kd} = 1 \\ \frac{(1 - VAC_d) \times (1 - TDISC_d) \times SMA_{Kd}}{DIY} \times \sum_{\substack{T \text{ where} \\ DASPLIT_{Td} > 0}} \frac{MDASSOC_{KTd} \times DA_{Td} \times RTS_W}{DASPLIT_{Td}} & \\ \qquad \text{else if } \sum_{T}(MDASSOC_{KTd} \times DASPLIT_{Td}) > 0 & \\ DDV_{Kd} \times RTS_{Kd} & \text{otherwise} \end{cases}$$

where the sum is over Trade Effluent DPIDs T which are active on day d and RTS_W is the Wholesaler's default value of the Return to Sewer allowance.

A.7.10 The Sewerage Derived Estimated Daily Volume *SDEDV* and the Sewerage Derived Actual Daily Volume *SDADV* can be derived from the equation in the Appendix A.7.9 above, and the equations for *DDV*, *DADV* and *DEDV* in Appendix A.6. Where *SDDV* is derived in Appendix A.7.9 from the Domestic Allowance DA_{Td} of various Discharge Points T, then

$$SDADV_{Kd} = 0$$
$$SDEDV_{Kd} = SDDV_{Kd}$$

Where *SDDV* is derived in Appendix A.7.9 as $SDDV = DDV_{Kd} \times RTS_{Kd}$, then

$$SDADV_{Kd} = DADV_{Kd} \times RTS_{Kd}$$
$$SDEDV_{Kd} = DEDV_{Kd} \times RTS_{Kd}$$

A.8 Volumetric Adjustment Derived Daily Volume

A.8.1 This calculation facilitates the computation of the Actual Daily Volume ADV_{vd}, the Estimated Daily Volume EDV_{vd} and the Derived Daily Volume DDV_{vd} for a Volumetric Adjustment v associated with a metered water component if the day d is within the period P_v^V over which the Volumetric Adjustment was defined and has a total Adjustment Volume VAV_v.

A.8.2 Compute the Volumetric Adjustment chargeable days *VACD* as

$$VACD = \sum_{d=D_l^V}^{D_u^V-1} (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

where the connection state $CONN_d$, the vacancy state VAC_d and the temporary disconnection state $TDISC_d$ are those of the Water Services Supply Point. Then

$$DDV_{vd} = \begin{cases} \dfrac{VAV_v}{VACD} \times (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d & \text{if } VACD > 0 \\ \dfrac{VAV_v}{D_u^V - D_l^V} \times CONN_d & \text{if } VACD = 0 \end{cases}$$

The Market Operator shall set the Actual Daily Volume ADV_{vd} and Estimated Daily Volume EDV_{vd}:

$$ADV_{vd} = 0$$
$$EDV_{vd} = DDV_{vd}$$

A.9 Volumetric Adjustment Sewerage Derived Daily Volume

A.9.1 This calculation facilitates the computation of the Sewerage Derived Daily Volume $SDDV_{vd}$ for a Volumetric Adjustment v associated with the Metered Sewerage Service Component if the day d is within the Volumetric Adjustment Period P_v^V over which the Volumetric Adjustment is applicable and has a total Adjustment Volume VAV_v.

A.9.2 Compute the Volumetric Adjustment Chargeable Days *VACD* as

$$VACD = \sum_{d=D_l^V}^{D_u^V-1} (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

where the connection state $CONN_d$ and the vacancy state VAC_d are those of the Sewerage Services Supply Point, and the Temporary Disconnection state $TDISC_d$ is defined as *False*. Then

$$SDDV_{vd} = \begin{cases} \dfrac{VAV_v}{VACD} \times (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d & \text{if } VACD > 0 \\ \dfrac{VAV_v}{D_u^V - D_l^V} \times CONN_d & \text{if } VACD = 0 \end{cases}$$

A.10 Volumetric Adjustment Trade Effluent Derived Daily Volume

A.10.1 This calculation facilitates the computation of the Trade Effluent Derived Daily Volume $TEDDV_{vd}$ for a Volumetric Adjustment v associated with a Trade Effluent discharge T if the day d is within the Volumetric Adjustment Period P_v^V over which the Volumetric Adjustment is applicable and has a total Adjustment Volume VAV_v.

A.10.2 Compute the Volumetric Adjustment chargeable days *VACD* as

$$VACD = \sum_{d=D_l^V}^{D_u^V - 1} (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

where the connection state $CONN_d$ and the vacancy state VAC_d are those of the Sewerage Services Supply Point, and the Temporary Disconnection state $TDISC_d$ is defined as *False*. Then

$$TEDDV_{vd} = \begin{cases} \dfrac{VAV_v}{VACD} \times (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d & \text{if } VACD > 0 \\ \dfrac{VAV_v}{D_u^V - D_l^V} \times CONN_d & \text{if } VACD = 0 \end{cases}$$

A.11 Calculated Discharge Derived Daily Volume

A.11.1 This calculation facilitates the computation of the Trade Effluent Derived Daily Volume $TEDDV_{sd}$ for a Calculated Discharge s associated with a Trade Effluent Discharge Point T. The Volumes for a Calculated Discharge s are notified over successive Calculated Discharge Periods $P_s^{DS_i} = (D_{sl}^{DS_i}, D_{su}^{DS_i})$ for $i = 1 \ldots N_s$ which are contiguous and non-overlapping.

A.11.2 Volume calculations are only carried out for days for which the Calculated Discharge has not been discontinued.

A.11.3 In this section for the derivation of Trade Effluent Derived Daily Volumes for Calculated Discharges the connection state $CONN_d$, the vacancy state VAC_d are those of the Sewerage Service Supply Point and the Temporary Disconnection state $TDISC_d$ is taken to be *False*

No Volumes notified

A.11.4 If no Volumes have been notified for a Calculated Discharge, then the Trade Effluent Derived Daily Volume $TEDDV_{sd}$ for the Calculated Discharge is

$$TEDDV_{sd} = YVE_s \times (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d \,/\, DIY$$

where YVE_s is the Yearly Volume Estimate for the Calculated Discharge notified by the Wholesaler when the Calculated Discharge was associated with the DPID.

Day within a notified Period

A.11.5 If the day d is within the j^{th} period $P_s^{DS_j}$ for which the Volume has been notified and the notified Volume is VDS_{sj}, then compute the Calculated Discharge chargeable days $DSCD$ as

$$DSCD = \sum_{d \in P_s^{DS_j}} (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

.

A.11.6 Then

$$TEDDV_{sd} = \begin{cases} \dfrac{VDS_{sj}}{DSCD} \times (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d & \text{if } DSCD > 0 \\ \dfrac{VDS_{sj}}{D_{su}^{DS_j} - D_{sl}^{DS_j}} \times CONN_d & \text{if } DSCD = 0 \end{cases}$$

Day after the last notified Period

A.11.7 Where the day d is after the last period $P_s^{DS_N}$ for which a Volume has been notified (i.e. $d \geq D_u^{DS_N}$), then establish the set of Periods $P_s^{DS_b}, P_s^{DS_{b+1}}, \ldots P_s^{DS_N}$ such that

$$b = \begin{cases} 1 & \text{if } D_u^{DS_N} - D_l^{DS_1} \leq 365 \\ \max(i) \text{ such that } D_u^{DS_N} - D_l^{DS_i} \geq 365 & \text{if } D_u^{DS_N} - D_l^{DS_1} > 365 \end{cases}$$

where i indexes the set of Calculated Discharge notified Volumes which are in date order such that if $i < j$ then $D_l^{DS_i} < D_l^{DS_j}$.

A.11.8 Compute the Calculated Discharge chargeable days *DSCD* as

$$DSCD = \sum_{d=D_{sl}^{DS_b}}^{D_{su}^{DS_N}-1} (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

A.11.9 Compute the total notified Volume of Calculated Discharges *TVDS* as:

$$TVDS = \sum_{i=b}^{N} VDS_{si}$$

A.11.10 The uncapped Trade Effluent derived daily volume (*UTEDDV*) is[27]

$$UTEDDV = \begin{cases} \dfrac{\max(0, TVDS)}{DSCD} & \text{if } DSCD \geq 30 \\ \dfrac{\max(0, TVDS) \times DSCD}{DSCD \times 30} + \dfrac{YVE \times (30 - DSCD)}{DIY \times 30} & \text{if } 1 \leq DSCD \leq 30 \\ \dfrac{YVE_s}{DIY} & \text{if } DSCD = 0 \end{cases}$$

A.11.11 For days d after the last Period for which a Volume has been notified the Trade Effluent Derived Daily Volume Cap $TEDDVC_{sd}$ for the Calculated Discharge is

$$TEDDVC_{sd} = Ycap \times \frac{YVE_s}{DIY}$$

[27] The *DSCD* in numerator and denominator of equation is nugatory for $1 \leq DSCD \leq 30$ case, but clarifies derivation of expression

A.11.12 For days d after the last Period for which a Volume has been notified the Trade Effluent Derived Daily Volume $TEDDV_{sd}$ for the Calculated Discharge is

$$\min(TEDDVC_{sd}, UTEDDV) \times (1 - VAC_d) \times (1 - TDISC_d) \times CONN_d$$

A.12 Calculated Discharge Sewerage Derived Daily Volume

A.12.1 This section explains the derivation of the Sewerage Derived Daily Volume $SDDV_{sd}$ for each Calculated Discharge s where the Sewerage Volume Adjustment Method $SVAM_{Td}$ for the Trade Effluent DPID T has the value 'SUBTRACT' for each day d.

A.12.2 The Sewerage Derived Daily Volume $SDDV_{sd}$ is

$$SDDV_{sd} = -(isSubtract(SVAM_{Td})) \times TEDDV_{sd}$$

where the $isSubtract$ function in defined in Appendix B.12.

A.12.3 It should be noted that $SDDV_{sd}$ is calculated and reported only in the cases where the $isSubtract$ function is true.

A.12.4 The Market Operator shall set the Actual Daily Volume ADV_{sd} and the Estimated Daily Volume EDV_{sd} as

$$ADV_{sd} = SDDV_{sd}$$

$$EDV_{sd} = 0$$

B Appendix - Functions

B.1 Tariff Lookup function $\mathcal{TL}(V, LT)$

B.1.1 There are a number of Tariff Lookup Tables *LT* comprising an integer lower lookup value LLV_i and a result value $ResV_i$. The integer lower lookup values will all be non-negative, with the smallest such value being (normally) either 0 or 1[28] and satisfy $LLV_1 < LLV_2 < \ldots < LLV_{n_T}$ where there are n_T values in the table.

Tariff Lookup Table *LT*	
Lower Lookup Value	Result
LLV_1	$ResV_1$
LLV_2	$ResV_2$
LLV_{n_T}	$ResV_{n_T}$

B.1.2 The value LLV_1 should be chosen so that $LLV_1 \leq V$ for all valid values of V. In certain cases the lookup table may not have been defined. In these cases the table LT shall be said to have the value *None*. [29]. There may also be cases where the value V has not been set. In such cases V will be said to have the value *None*.

B.1.3 For the avoidance of doubt, the units and return types $ResV_i$ of the Tariff Lookup function may differ depending on the usage type of the table *LT*. For example,

(a) in Section 3.2.5 the function and the table *MWMFC* take meter sizes in mm and return charges in £/a

(b) in Section 4.5.1 the function and the table *SWAreaBand* take an area in m^2 and return an integer Tariff band.

The return type of the function may be determined from the list of variables in Appendix I.

[28] The value LLV_1 should be chosen so that $LLV_1 \leq V$ for all valid values of V

[29] For example, where the lookup table is optionally defined as part of a Tariff, the table may not be defined as it does not form part of the Tariff

B.1.4 An equivalent extended description of the Tariff Lookup Table is given by the extended Tariff Lookup Table *ELT* as follows:

B.1.5

Extended Tariff Lookup Table *ELT*		
Lower Lookup Value	Upper Lookup Value	Result
LLV_1	ULV_1	$ResV_1$
LLV_2	ULV_2	$ResV_2$
LLV_{n_T}	∞	$ResV_{n_T}$

In addition to the requirement that $LLV_1 < LLV_2 < \ldots < LLV_{n_T}$, the values in the extended lookup table should also satisfy $LLV_i = ULV_{i-1} + 1$ for $i = 2 \ldots n_T$

Then the Tariff Lookup function $\mathcal{TL}$ is defined as

$$\mathcal{TL}(V, LT) = \begin{cases} None & \text{if } V \text{ is } None \text{ or } LT \text{ is } None; \text{ else} \\ None & \text{if } V < LLV_1 \text{ ; else} \\ ResV_m & \text{where } m \text{ is the maximum value of } m \text{ such that } LLV_m <= V \end{cases}$$

.

B.2 Tariff Band function $\mathcal{TB}(b, TB)$

B.2.1 The Central Systems hold a number of Tariff Band Tables *TB* comprising an integer Tariff band b and charge value CV_i, for $1 \leq i \leq n_B$ where there are n_B bands in the table.

Tariff Band Table *TB*	
Band (b)	Charge
1	CV_1
2	CV_2
n_B	CV_{n_B}

Where a Tariff does not apply a specific Charging Element which depends upon a Tariff Band Table, then the Tariff Band Table will not be defined in the Tariff. In these cases the Tariff Band Table *TB* shall be said to have the value *None*.

Then the Tariff Band function $\mathcal{TB}$ is defined as

$$\mathcal{TB}(b, \mathit{TB}) = \begin{cases} \mathit{None} & \text{if } \mathit{TB} \text{ is } \mathit{None} \text{ or } b \text{ is } \mathit{None}; \text{ else} \\ \mathit{None} & \text{if } b \leq 0; \text{ else} \\ \mathit{None} & \text{if } b > n_B; \text{ else} \\ CV_b & \text{if } 1 \leq b \leq n_B \end{cases}$$

.

B.3 Block Tariff Price function $\mathcal{BTP}(V, BT, TD)$

B.3.1 Volumetric Tariffs can be either simple linear Tariffs or block Tariffs. In this CSD 0207, both linear Tariffs and block Tariffs are described by the block Tariff price function $\mathcal{BTP}(V, \mathit{BT}, \mathit{TD})$ and the Block Tariff Table *BT* described below.

Linear Tariff

B.3.2 For a linear Tariff the Block Tariff Table *BT* has only a single entry (and the number of blocks $n_B = 1$). There are no volume limits associated with the price B_1

Block Tariff Table *BT* For a linear Tariff	
Volume Limits m^3/a	Price £/m^3
∞	B_1

Block Tariff

B.3.3 For a block Tariff, the incremental price per unit volume depends on the level of consumption. The table *BT* describes the block Tariff and comprises an increasing series of volume knots V_1, V_2, V_{n_B-1} and prices B_1, B_2, ... B_{n_B-1}, B_{n_B} with $n_B > 1$. The price B_1 refers to consumption up to the volume V_1, the price B_2 refers to the marginal price for the consumption between volume V_1 and V_2, ... and the price B_{n_B} refers to the marginal price for all consumption over the volume V_{n_B-1}

Block Tariff Table *BT* For a block Tariff	
Volume m^3/a	Price £/m^3
V_1	B_1
...	...
V_{n_B-1}	B_{n_B-1}
∞	B_{n_B}

B.3.4 The volumes in the table *BT* refer to an annualised volume. Where charges are being computed pro-rata for periods of less than a year (as generally within this CSD)[30] the volumes V_i in the table *BT* must be pro-rated to find the proportional volume PV_i, so that:

$$PV_i = \begin{cases} 0 & \text{for } i = 0 \\ TD \times V_i \,/\, DIY & \text{for } i < n_B \end{cases}$$

[30] See the comment in Section G.1.4 about the implications of monthly settlement in respect of block Tariffs.

where Tariff days *TD* is the applicable number of days over which the Tariff is being pro-rated. For convenience, the value PV_0 is defined even though there is no equivalent value V_0 in the table *BT*.

B.3.5 Then the average volumetric price $\mathcal{BTP}(V, BT, TD)$ is:

$$\mathcal{BTP}(V, BT, TD) = \begin{cases} None & \text{if any of the function arguments are } None\text{; else} \\ B_{n_B} & \text{if } TD = 0\text{; else} \\ B_1 & \text{if } n_B = 1 \text{ or } V < PV_1\text{; else} \\ \Big(\sum_{i=1}^{n_B-1} (\max(\min(V, PV_i) - PV_{i-1}, 0)) \times B_i + & \\ \qquad (\max(V - PV_{n_B-1}, 0)) \times B_{n_B} \Big) / V & \text{otherwise} \end{cases}$$

B.4 Block Standby Capacity Charge function $\mathcal{BSCC}(V, SCBT)$

B.4.1 Standby Capacity Tariffs can be either simple linear Tariffs or block Tariffs. In this CSD 0207, both linear Tariffs and block Standby Capacity Charge Tariffs are described by the block Standby Capacity Charge function $\mathcal{BSCC}(V, SCBT)$ and the Standby Capacity Block Table *SCBT* described below.

Linear Tariff

B.4.2 For a linear Tariff the Standby Capacity Block Table *SCBT* has only a single entry (and the number of blocks $n_B = 1$). There are no volume limits associated with the price B_1

Standby Capacity Block Table *SCBT* For a linear Tariff	
Volume Limits m^3/day	Price £/a per m^3/day
∞	B_1

Block Tariff

B.4.3 For a block Standby Capacity Charge Tariff, the incremental price per daily unit volume depends on the level of consumption. The table *SCBT* describes the block Tariff and comprises an increasing series of volume knots V_1, V_2, V_{n_B-1} and prices B_1, B_2, ... B_{n_B-1}, B_{n_B} with $n_B > 1$. The price B_1 refers to consumption up to the volume V_1, the price B_2 refers to the marginal price for the consumption between volume V_1 and V_2, ... and the price B_{n_B} refers to the marginal price for all consumption over the volume V_{n_B-1}

Standby Capacity Block Table *SCBT* For a block Tariff	
Volume m^3/day	Price £/a per m^3/day
V_1	B_1
...	...
V_{n_B-1}	B_{n_B-1}
∞	B_{n_B}

B.4.4 Then the average volumetric price $\mathcal{BSCC}(V, SCBT)$ is:

$$\mathcal{BSCC}(V, SCBT) = \begin{cases} None & \text{if any of the function arguments are } None\text{; else} \\ B_1 & \text{if } n_B = 1 \text{ or } V < V_1\text{; else} \\ \Big(\sum_{i=1}^{n_B-1} (\max(\min(V, V_i) - V_{i-1}, 0)) \times B_i + & \\ \qquad (\max(V - V_{n_B-1}, 0)) \times B_{n_B} \Big) / V & \text{otherwise} \end{cases}$$

where V_0 while not defined in the table *SCBT* is taken to be 0.

B.5 Vacancy Charging function $\mathcal{V}^e(VAC_d)$

B.5.1 The Vacancy Charging function $\mathcal{V}^e(VAC_d)$ determines whether the Settlement Run calculates charges for a Charging Element in a Service Component whenever an

Eligible Premises is recorded as vacant. Charges are always computed whenever an Eligible Premises is occupied. The function returns the value 1 (*True*) when charges are computed, and the value 0 (*False*) when charges are not computed.

B.5.2 It is an explicit function of both the vacancy status VAC_d and the Charging Element e for a Supply Point on the day d. It is an implicit function for the Wholesaler for a Supply Point on the day d. The Wholesaler shall choose the function which will apply across all of the Wholesaler's Tariffs in accordance with CSD 0208 (Submission and Validation of Wholesaler Tariff Data).

B.5.3 Then define the function the $\mathcal{V}^e(VAC_d)$ as:

$$\mathcal{V}^e(VAC_d) = \begin{cases} 1 & \text{if } VAC_d \text{ is False; else} \\ \text{as per tables below} & \text{if } VAC_d \text{ is True} \end{cases}$$

$\mathcal{V}^e$ for Water Service Supply Points Value of $\mathcal{V}^e$ when VAC_d is True by Charging Element				
SERVICE COMPONENT	Charging Element (e)	vWA	vWB	vWC
Metered Potable	Meter Fixed Charges	1	0	0
Metered Potable	Supply Point Fixed Charges	1	0	0
Metered Potable	Volumetric Charges	1	0	1
Metered Potable	Standby Capacity Charges	1	0	0
Metered Potable	Standby Usage Charges	1	0	1
Metered Potable	Maximum Demand Charges	1	0	0
Metered Non-Potable	Meter Fixed Charges	1	0	0
Metered Non-Potable	Supply Point Fixed Charges	1	0	0
Metered Non-Potable	Volumetric Charges	1	0	1
Metered Non-Potable	Standby Capacity Charges	1	0	0
Metered Non-Potable	Standby Usage Charges	1	0	1
Metered Non-Potable	Maximum Demand Charges	1	0	0

$\mathcal{V}^e$ for Water Service Supply Points Value of $\mathcal{V}^e$ when VAC_d is True by Charging Element				
SERVICE COMPONENT	Charging Element (e)	vWA	vWB	vWC
Assessed Water	Fixed Charges	1	0	0
Assessed Water	Assessed Meter Fixed Charges	1	0	0
Assessed Water	Assessed Volumetric Charges	1	0	0
Assessed Water	Banded Charge	1	0	0
Unmeasured Water	Fixed Charge	1	0	0
Unmeasured Water	Rateable Value Charges	1	0	0
Unmeasured Water	Miscellaneous Charges	1	0	0
Unmeasured Water	Pipe Size Fixed Charges	1	0	0
Water Charge Adjustment	Section 154A	1	0	0

$\mathcal{V}^e$ for Sewerage Service Supply Points Value of $\mathcal{V}^e$ when VAC_d is True by Charging Element						
SERVICE COMPONENT	Charging Element (e)	vSA	vSB	vSC	vSD	vSE
Metered Sewerage	Meter Fixed Charges	1	0	0	0	0
Metered Sewerage	Supply Point Fixed Charges	1	0	0	0	0
Metered Sewerage	Volumetric Charges	1	0	1	0	1
Assessed Sewerage	Fixed Charges	1	0	0	0	0
Assessed Sewerage	Assessed Meter Fixed Charges	1	0	0	0	0

$\mathcal{V}^e$ for Sewerage Service Supply Points Value of $\mathcal{V}^e$ when VAC_d is True by Charging Element						
SERVICE COMPONENT	Charging Element (e)	vSA	vSB	vSC	vSD	vSE
Assessed Sewerage	Assessed Volumetric Charges	1	0	0	0	0
Assessed Sewerage	Banded Charge	1	0	0	0	0
Unmeasured Sewerage	Fixed Charge	1	0	0	0	0
Unmeasured Sewerage	Rateable Value Charge	1	0	0	0	0
Unmeasured Sewerage	Miscellaneous Charges	1	0	0	0	0
Unmeasured Sewerage	Pipe Sized Charges	1	0	0	0	0
Surface Water	Area Based Charges	1	0	0	1	1
Surface Water	Fixed Charges	1	0	0	1	1
Surface Water	Rateable Value Charges	1	0	0	1	1
Surface Water	Meter Fixed Charges	1	0	0	1	1
Surface Water	Foul Sewerage Based Volumetric Charges	1	0	1	1	1
Highway Drainage	Area Based Charges	1	0	0	1	1
Highway Drainage	Fixed Charges	1	0	0	1	1
Highway Drainage	Rateable Value Charges	1	0	0	1	1
Highway Drainage	Meter Fixed Charges	1	0	0	1	1
Highway Drainage	Foul Sewerage Based Volumetric Charges	1	0	1	1	1
Trade Effluent	Fixed Charges	1	0	0	0	0
Trade Effluent	Banded Charges	1	0	0	0	0
Trade Effluent	Availability Charges	1	0	0	0	0
Trade Effluent	Operational Charges	1	0	1	0	1
Trade Effluent	Minimum Charges	1	0	0	0	0

$\mathcal{V}^e$ for Sewerage Service Supply Points Value of $\mathcal{V}^e$ when *VAC*$_d$ is True by Charging Element						
SERVICE COMPONENT	Charging Element (e)	vSA	vSB	vSC	vSD	vSE
Sewerage Charge Adjustment	Section 154A	1	0	0	0	0

B.6 Temporary Disconnection Charging function $\mathcal{T}^e(TDISC_d)$

B.6.1 The Temporary Disconnection Charging function $\mathcal{T}^e(TDISC_d)$ determines whether the Settlement Run calculates charges for a Charging Element in a Service Component whenever an Eligible Premises is recorded as Temporarily Disconnected. Charges are always computed whenever an Eligible Premise is recorded as not being Temporarily Disconnected. The function returns the value 1 (*True*) when charges are computed, and the value 0 (*False*) when charges are not computed.

B.6.2 It is an explicit function of both the temporary disconnection status *TDISC*$_d$ and the Charging Element e, and an implicit function of the Wholesaler for a Supply Point on the day d. The value of *TDISC*$_d$ shall be determined by reference to Appendix A.2. The function is defined as:

$$\begin{cases} 1 & \text{if } TDISC_d \text{ is } False\text{; else} \\ \text{as per table below} & \text{if } TDISC_d \text{ is } True \end{cases}$$

$\mathcal{T}^e$ for Water Service Supply Points Value of $\mathcal{T}^e$ when *TDISC*$_d$ is True by Charging Element				
SERVICE COMPONENT	Charging Element (e)	tWA	tWB	tWC
Metered Potable	Meter Fixed Charges	1	0	0
Metered Potable	Supply Point Fixed Charges	1	0	0
Metered Potable	Volumetric Charges	1	0	1

$\mathcal{T}^e$ for Water Service Supply Points Value of $\mathcal{T}^e$ when *TDISC*$_d$ is True by Charging Element				
SERVICE COMPONENT	Charging Element (e)	tWA	tWB	tWC
Metered Potable	Standby Capacity Charges	1	0	0
Metered Potable	Standby Usage Charges	1	0	1
Metered Potable	Maximum Demand Charges	1	0	0
Metered Non-Potable	Meter Fixed Charges	1	0	0
Metered Non-Potable	Supply Point Fixed Charges	1	0	0
Metered Non-Potable	Volumetric Charges	1	0	1
Metered Non-Potable	Standby Capacity Charges	1	0	0
Metered Non-Potable	Standby Usage Charges	1	0	1
Metered Non-Potable	Maximum Demand Charges	1	0	0
Assessed Water	Fixed Charges	1	0	0
Assessed Water	Assessed Meter Fixed Charges	1	0	0
Assessed Water	Assessed Volumetric Charges	1	0	0
Assessed Water	Banded Charge	1	0	0
Unmeasured Water	Fixed Charge	1	0	0
Unmeasured Water	Rateable Value Charges	1	0	0
Unmeasured Water	Miscellaneous Charges	1	0	0
Unmeasured Water	Pipe Size Fixed Charges	1	0	0
Water Charge Adjustment	Section 154A	1	0	0

$\mathcal{T}^e$ for Sewerage Service Supply Points Value of $\mathcal{T}^e$ when *TDISC*$_d$ is True by Charging Element						
SERVICE COMPONENT	Charging Element (e)	tSA	tSB	tSC	tSD	tSE
Metered Sewerage	Meter Fixed Charges	1	0	0	0	0
Metered Sewerage	Supply Point Fixed Charges	1	0	0	0	0
Metered Sewerage	Volumetric Charges	1	0	1	0	1
Assessed Sewerage	Fixed Charges	1	0	0	0	0
Assessed Sewerage	Assessed Meter Fixed Charges	1	0	0	0	0
Assessed Sewerage	Assessed Volumetric Charges	1	0	0	0	0
Assessed Sewerage	Banded Charge	1	0	0	0	0
Unmeasured Sewerage	Fixed Charge	1	0	0	0	0
Unmeasured Sewerage	Rateable Value Charge	1	0	0	0	0
Unmeasured Sewerage	Miscellaneous Charges	1	0	0	0	0
Unmeasured Sewerage	Pipe Sized Charges	1	0	0	0	0
Surface Water	Area Based Charges	1	0	0	1	1
Surface Water	Fixed Charges	1	0	0	1	1
Surface Water	Rateable Value Charges	1	0	0	1	1
Surface Water	Meter Fixed Charges	1	0	0	1	1
Surface Water	Foul Sewerage Based Volumetric Charges	1	0	1	1	1
Highway Drainage	Area Based Charges	1	0	0	1	1
Highway Drainage	Fixed Charges	1	0	0	1	1
Highway Drainage	Rateable Value Charges	1	0	0	1	1
Highway Drainage	Meter Fixed Charges	1	0	0	1	1

$\mathcal{T}^e$ for Sewerage Service Supply Points Value of $\mathcal{T}^e$ when *TDISC*$_d$ is True by Charging Element						
SERVICE COMPONENT	Charging Element (e)	tSA	tSB	tSC	tSD	tSE
Highway Drainage	Foul Sewerage Based Volumetric Charges	1	0	1	1	1
Trade Effluent	Fixed Charges	1	0	0	0	0
Trade Effluent	Banded Charges	1	0	0	0	0
Trade Effluent	Availability Charges	1	0	0	0	0
Trade Effluent	Operational Charges	1	0	1	0	1
Trade Effluent	Minimum Charges	1	0	0	0	0
Sewerage Charge Adjustment	Section 154A	1	0	0	0	0

B.7 Heaviside function $\mathcal{H}(x)$

B.7.1 The Heaviside function $\mathcal{H}(x)$ is defined as

$$\mathcal{H}(x) = \begin{cases} 0, & x < 0, \\ 1, & x \geq 0, \end{cases}$$

B.8 Ramp function $\mathcal{R}(x)$

B.8.1 The Ramp function $\mathcal{R}(x)$ is defined as

$$\mathcal{R}(x) = \begin{cases} 0, & x < 0, \\ x, & x \geq 0, \end{cases}$$

B.9 Maximum function with undefined (*None*) arguments max(list)

B.9.1 The Maximum function of a list of n items $(x_1, x_2, \ldots, x_n)$, where some of the items x_i on the list may have the value *None* is:

$$max(\text{list}) = \begin{cases} \textit{None}, & \text{if } x_i = \textit{None} \text{ for all } i,\ 1 \leq i \leq n, \\ \max\limits_{\substack{1 \leq i \leq n \\ x_i \neq \textit{None}}} x_i & \text{otherwise} \end{cases}$$

B.10 Minimum function min(list) with undefined (*None*) arguments

B.10.1 The Minimum function of a list of n items $(x_1, x_2, \ldots, x_n)$, where some of the items x_i on the list may have the value *None* is:

$$min(\text{list}) = \begin{cases} \textit{None}, & \text{if } x_i = \textit{None} \text{ for all } i,\ 1 \leq i \leq n, \\ \min\limits_{\substack{1 \leq i \leq n \\ x_i \neq \textit{None}}} x_i & \text{otherwise} \end{cases}$$

B.11 The isNone function $isNone$(x)

B.11.1 The $isNone$ function is defined as

$$isNone(x) = \begin{cases} 1 & \text{if } x = \textit{None}, \text{ else} \\ 0 & \text{otherwise} \end{cases}$$

B.12 The isSubtract function $isSubtract$(x)

B.12.1 The $isSubtract$ function is defined as

$$isSubtract(x) = \begin{cases} 1 & \text{if } x = \text{‘SUBTRACT’, else} \\ 0 & \text{otherwise} \end{cases}$$

B.13 The isNullTariff function $isNullTariff$(T)

B.13.1 The $\mathit{isNullTariff}$ function is defined as

$$\mathit{isNullTariff}(T) = \begin{cases} 1 & \text{if the Discharge Point has a Null Tariff, else} \\ 0 & \text{otherwise} \end{cases}$$

B.14 Water SPID Only function $\mathcal{WOnly}(d)$

B.14.1 The $\mathcal{WOnly}$ function is defined on Water Services Supply Points for a day d, and is defined as

$$\mathcal{WOnly}(d) = \begin{cases} 1 & \text{if there is no paired Sewerage Services Supply Point on the day } d \text{ which is or has been Tradable; else} \\ 0 & \text{otherwise} \end{cases}$$

C Appendix - Computational Requirements

C.1 Currency Unit

All calculations in respect of money should be carried out in pounds (£).

C.2 Precision

All calculations should be carried out in decimal arithmetic, and should allow for at least 10 places after the decimal point, and should allow for 12 digits before the decimal point.

C.3 Rounding

All rounding should be to even. This is sometimes called bankers' rounding or unbiased rounding. In particular this applies to any rounding carried out either in calculations or for presentation in reports.[31]

C.4 Exceptions

C.4.1 Exceptions arise where problems have occurred during the calculation. For example, one of the variables in the calculation may be undefined; or the results of the calculation may be significantly larger than expected (arithmetic overflow) such that the computer cannot represent the result of the calculation. Exceptions should be managed as specified in this section.

C.4.2 This CSD 0207 classifies exceptions into two types:

(a) User exceptions; and
(b) System exceptions.

These two types of exception are reported differently.

[31] Some languages provide this as the default, others provide a choice, while some round in different manner.

Causes of exceptions

C.4.3 As noted, exceptions can arise as a result of:

(a) Undefined variables; or
(b) Any other reason.

C.4.4 In all cases of an exception resulting from 'any other reason', the exception shall be classified as a system exception. The system should attempt to set the intermediate result to zero and carry on with the calculation, but in addition report the exception as described below.

Undefined variables

C.4.5 Not all calculations involving an undefined variable will result in an exception. In many cases, the calculation as defined in this CSD 0207 explicitly handles the undefined variables, and no exception will be generated.

C.4.6 Values may be undefined for the following reasons:

(a) Data Items directly relating to the Tariff may be undefined;
(b) Data Items relating to the Supply Point may be undefined;
(c) Values derived from the Tariff or the Supply Point may be undefined.

C.4.7 Some Tariff variables may be deliberately specified as *None* so that a specific Charging Element is not applied. In such cases, no exception should be generated. For example, consider the calculation of Assessed Water Meter Fixed Charges described in Section 3.3.4 above. If the Tariff element *AWMFC* is undefined then the relevant calculation proceeds no further, no exceptions are generated and no reports are generated.

C.4.8 However, where a Charging Element is being calculated, and there are missing Wholesaler Tariff Data Items, then a system exception shall be generated. For example, consider the calculation of metered water standby usage charges described in Section 3.2.27. If the Tariff element *MWCapChg* is not *None*, then the calculation also requires that the Wholesaler Tariff Data Items *PremTolFactor*, *MWDSUVC* and *MWDPUVC* are defined. Data validation when the Tariff Data was submitted should have prevented these Data Items being *None*. In such cases where there is undefined Tariff Data the result is a system exception.

C.4.9 Where Data Items relating to the Supply Point are undefined, or derived values are undefined, the result shall be a user exception except in the circumstances described in sections C.4.11 and C.4.16 below. For example, if the SPID Data for a Service Component references a Tariff band of five (5), but the applicable Tariff has only four (4) bands, then a user exception will be raised.

C.4.10 If a Sewerage volume is reduced by the Trade Effluent volume, i.e. the Sewerage Volume Adjustment Method $SVAM_T$ for the Trade Effluent DPID T has the value 'SUBTRACT', then the only meters associated with the Discharge point can be Private Trade Effluent meters, otherwise a user exception will be generated.

C.4.11 The Market Operator shall also apply special logic to the calculation of the Trade Effluent availability charges (Section 4.7.15) and the Trade Effluent operational charges (Section 4.7.20).

C.4.12 A Trade Effluent Tariff has an availability Charging Element if at least one of the availability charging Tariff variables (see Appendix 1, Example 10 of CSD 0208 (Creation and update of Wholesaler Tariff Data) is not *None*. If the Trade Effluent Tariff has an availability Charging Element then none of the parameters CDV_d, $cCOD\ell_d$ and $cSS\ell_d$ may be *None*, otherwise a user exception shall be generated. It is permissible for any of the Tariff variables to be *None*. In such a case, the corresponding term in Section 4.7.16 shall be taken to be 0, and no exceptions shall be raised in respect of the Tariff variable being *None*. Finally, if any of the indicator terms ATI_d, XTI_d, YTI_d or ZTI_d is zero, then the corresponding sub-expression in Section 4.7.16 shall have the value 0. However, if any of the terms ATI_d, XTI_d, YTI_d or ZTI_d is 1, then the corresponding Supply Point Variable $cAN\ell_d$, $cX\ell_d$, $cY\ell_d$, $cZ\ell_d$ (respectively) must not be *None* otherwise a user exception shall be generated.

C.4.13 A Trade Effluent Tariff has an operational Charging Element if at least one of the operational charging Tariff variables (see Appendix 1, Example 10 of CSD 0208 (Creation and update of Wholesaler Tariff Data) is not *None*. If the Trade Effluent Tariff has an operational Charging Element then neither of the parameters Ot_d or St_d may be *None*, otherwise a user exception shall be generated. It is permissible for any of the Tariff variables to be *None*. However, if *BoBT* is not *None* then *Os* must be specified, otherwise a system exception shall be generated. Similarly, if *So* is not *None* then *Ss* must be specified.

C.4.14 A system exception shall be generated if any of the rules below are not met:

(a) if *Ao* is not *None* then both *Am* and *As* must be specified;
(b) if *Xo* is not *None* then both *Xm* and *Xs* must be specified;
(c) if *Yo* is not *None* then both *Ym* and *Ys* must be specified; or
(d) if *Zo* is not *None* then both *Zm* and *Zs* must be specified.

C.4.15 Finally, if any of the indicator terms ATI_d, XTI_d, YTI_d or ZTI_d is zero, then the corresponding sub-expression in Section 4.7.26 shall have the value 0. However, if any of the terms ATI_d, XTI_d, YTI_d or ZTI_d is 1, then the corresponding Supply Point Variable At_d, Xt_d, Yt_d, Zt_d (respectively) must not be *None* otherwise a user exception shall be generated.

C.4.16 It shall always be a system exception whenever any of the following variables are undefined:

(a) VAC_d;
(b) $TDISC_d$;
(c) SAF_d^c;
(d) $WCMS_{Kd}$;
(e) $SCMS_{Kd}$;
(f) SF_{Td};
(g) RTS_{Kd}; or
(h) $SWDF_d$.

However, where meter advance chargeable days *MACD* are being calculated in respect of a Sub Meter in accordance with Section A.4.3, and either the vacancy state VAC_d or the temporary disconnection state $TDISC_d$ are undefined provided that the connection state $CONN_d$ is zero, then a system exception shall not be generated.

C.4.17 In respect of all these variables, while it is the responsibility of the Wholesaler or Retailer (as applicable) to submit Data Transactions which maintain these variables with the correct values, it is the responsibility of the Central Systems to ensure that these variables are always defined. In particular,

(a) the occupancy status of a Supply Point must always be defined from the Supply Point Effective From Date, such that the default initial value leads to VAC_d being set to *False*;
(b) the connection status of a Supply Point must always be defined such that the default initial value leads to $TDISC_d$ being set to *False*;
(c) SAF_d^c the Special Agreement Factor for every Service Component for a Supply Point must always be defined such that the default value is 100%;

(d) $WCMS_{Kd}$ the Water Chargeable Meter Size must always be specified for every meter;

(e) $SCMS_{Kd}$ the Sewerage Chargeable Meter Size must always be specified for every meter;

(f) SF_{Td} the Seasonal Factor for a Trade Effluent Discharge Point T must default to 100% unless specified differently;

(g) RTS_{Kd} the Return to Sewer must be specified for every meter or set to a default value; and

(h) $SWDF_d$ the Surface Water Drainage Charge Adjustment Factor must default to 100% unless specified differently.

C.4.18 As noted above, other exceptions might arise including the case of calculation overflow (which might arise, for example, through division by zero). In general, the results of such an undefined calculation should be set to zero, and an unexpected exception raise.

Exception Reporting

C.4.19 In either case of a system exception or a user exception a Report shall be produced. Where a user exception arises, the exception should be reported in the fourth part of the Disaggregated Settlement Report as specified in CSD 0201 (Settlement Timetable and Reporting). Where a system exception arises, an exception report should be written for the use of the Market Operator. The report should identify the details of the Supply Point, the calculation, the variables involved and the nature of the exception. The Market Operator should then investigate the cause of the exception and liaise with the Wholesaler and Retailer as necessary to resolve the matter.

D Interpretation

D.1 Interpretation of the above equations

D.1.1 ***Percentages and Fractions*** A number of variables in this CSD which represent fractions are expressed as percentages within the Central Systems. The equations in this CSD use them as fractions rather than as a percentage. Thus the CSD has equations with terms such as $(1 - f)$ rather than terms with explicit percentages such as $(1 - \frac{f}{100})$.

D.1.2 ***Difference between dates*** Where the expression $D_2 - D_1$ is used above, representing the difference between two dates, this should be interpreted as the difference in days between the two dates.

D.1.3 ***Numerical Interpretation of True and False*** Where VAC_d or $TDISC_d$ is *False* it can be taken to be the numerical value 0. Where VAC_d or $TDISC_d$ is either *True* it can be taken to have the numerical value 1. This interpretation applies to the usages $(1 - VAC_d)$ and $(1 - TDISC_d)$ which are used in this CSD 0207.

D.1.4 ***Empty Periods*** Where this CSD uses phrases such as 'does not have a period' this is synonymous with there being an empty period (a period with no days).

D.1.5 ***Undefined Values*** These are represented as *None* in this CSD. Where these are not explicitly handled in the equations, they may be interpreted as 0, subject to the error reporting described in Appendix C.4

E Periods

E.1 Interpretation of Periods

E.1.1 The calculation of charges in this CSD 0207 requires consideration of various periods of time. These periods of time include the Invoice Period, the SPID Chargeable Period and numerous other Periods of time for which various data items are defined and hold certain values.

E.1.2 A Period is a finite set of days.

E.1.3 Where the first day of a period of time has not been defined in the system, the period will be taken to be the empty period with no days. Examples would include a Supply Point for which the Supply Point Effective From Date has not been defined. For such a Supply Point the SPID Chargeable Period would therefore be empty.[32] Similarly, a Discharge Point without an Effective From Date would have an empty DPID Chargeable Period. A meter without an 'I' is not an Active Meter, and thus the Meter Active Period is empty.

E.1.4 If the last day of a non-empty Period has not been defined in the Central System, for the purposes of the charge calculation in this CSD, the last day of the Period will always be taken to be the 30th December 9999.

E.1.5 Periods may be 'simple' or 'complex'.

E.1.6 A Simple Period is set of contiguous days. A Simple Period may be represented by a pair of days (D_l, D_u) and is the set of days d such that $\{\, d \mid D_l \leq d < D_u \,\}$. If $D_l \geq D_u$ then the set of days for the Period (D_l, D_u) is empty. There are no days in the period.

E.1.7 A Complex Period is a union of Simple Periods. A Complex Period may be represented by an ordered list of Simple Periods $[(D_l^1, D_u^1), (D_l^2, D_u^2), \ldots]$ where the Sub-Periods i may be contiguous, but are non-overlapping. Thus $D_u^i \leq D_l^{i+1}$ for all i. The Complex Period is the set of days d such that $\{\, d \mid D_l^1 \leq d < D_u^1$ or $D_l^2 \leq d < D_u^2$ or $\ldots\}$.

[32] Additionally, a Supply Point without a Supply Point Effective From Date would not be Tradable and therefore not considered in settlement in accordance with the criterion in Section 2.1

E.1.8 This representation of a Period where the upper bound day is not included within the Period can be referred to as the 'open upper bound convention'. This open upper bound convention is used within this CSD. The lower bound day is always included within the Period.

E.1.9 In Section 2.1.8 the SPID Chargeable Period is a simple period represented by the pair of days (D_l^S, D_u^S). The upper bound day D_u^S is either:

(a) The day on which the Supply Point stopped being connected; or
(b) 31st December 9999, where no such day has been notified to the Central Systems.

E.1.10 This example is consistent with convention that all periods in this system are finite stated in Appendix E.1.4 above. Where a non-empty period is defined within the Central Systems such that a lower bound day has been defined but no upper bound day has not been set, then D_u will always be defined as 31st December 9999, i.e. the last day of the period will be 30th December 9999.

E.1.11 An alternative representation of a period within the Central Systems is for an explicit Effective To date. In this representation the period lasts from the start of the Effective From Date to the end of the Effective To Date. An example within the Central Systems where this representation is used is a Volumetric Adjustment. For example, a Volumetric Adjustment with an Adjustment Volume of 15m^{3}with an Effective From Date of 1st June and an Effective To date of 3rd June will have 5m^{3}applied equally on the 1st June, the 2nd June and the 3rd June. This is the 'closed upper bound' convention.

E.1.12 However, irrespective of the representation within the Central Systems, for the purposes of this CSD the 'open upper bound' convention will always be used. Thus for this CSD, the Volumetric Adjustment would be applied to the period represented by the days (1st June, 4th June).

E.2 Operations on Periods

E.2.1 The most common operation is the intersection of two periods P^A and P^B. Then

$$P = P^A \cap P^B = \{\, d \mid d \in P^A \text{ and } d \in P^B \,\}.$$

E.2.2 Where P^A and P^B are both simple periods (D_l^A, D_u^A) and (D_l^B, D_u^B) respectively, the period $P^I = P^A \cap P^B$ may be represented by the pair of days (D_l^I, D_u^I) where

$$D_l^I = \text{max}(D_l^A, D_l^B)$$
$$D_u^I = \text{min}(D_u^A, D_u^B)$$

As above, if $D_l^I \geq D_u^I$ then the period is empty. There are no days in the period.

E.2.3 Where P^A is a simple period (D_l^A, D_u^A) and P^B is a complex period [($D_l^{B_1}$, $D_u^{B_1}$), ($D_l^{B_2}$, $D_u^{B_2}$), ...] the period $P^I = P^A \cap P^B$ may be represented by list: [($D_l^{I_1}$, $D_u^{I_1}$), ($D_l^{I_2}$, $D_u^{I_2}$), ...] where each Sub-Period i is given by

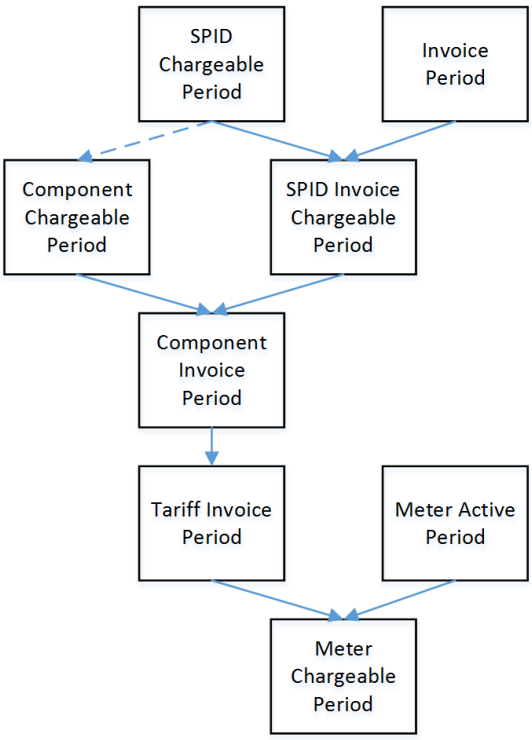
$$D_l^{I_i} = \text{max}(D_l^A, D_l^{B_i})$$
$$D_u^{I_i} = \text{min}(D_u^A, D_u^{B_i})$$

As above, if $D_l^{I_i} \geq D_u^{I_i}$ for any Sub-Period i then the Sub-Period is empty. There are no days in the Sub-Period, and it may be dropped from the list representation of the period.

E.3 Summary of the different Periods

E.3.1 The relationship between the following Periods is shown in the diagram below. Note that this is not a complete list of the Periods used in this CSD, and particular does not show the relationship of Periods related to Trade Effluent Discharge Points.

(a) Invoice Period P^{IP}
(b) SPID Chargeable Period P^S
(c) SPID Invoice Chargeable Period P^{IC}
(d) Component Chargeable Period P^{CC}
(e) Component Invoice Period P^{CI}
(f) Tariff Invoice Period P^{TI}
(g) Meter Active Period P_K^A
(h) Meter Chargeable Period P_K^{MC}



A graph showing how the which periods are sub-sets of other periods.
The Component Chargeable Periods are not formally subsets of the SPID Chargeable Period, but can only have effect during the SPID Chargeable Period

Figure 1: Periods

F Estimating Constants

F.1 Industry Level Estimate

F.1.1 The Market Operator shall set the initial values for the Industry Level Estimate Table (*ILET*) as follows. The values in the table represent rounded median estimates of the expected flows through meters of the given Water Chargeable Meter Size for Occupied Premises.

Industry Level Estimate *ILET*		
Lower Water Chargeable Meter Size	Upper Water Chargeable Meter Size	Estimate
(mm)	(mm)	(m^3/a)
0	19	250
20	24	500
25	29	1,000
30	39	2,500
40	49	3,500
50	79	7,500
80	99	20,000
100	149	35,000
150	199	150,000
200	249	350,000
250	299	1,200,000
300	449	2,000,000
450	∞	3,500,000

F.1.2 In the first quarter of each Year, the Market Operator shall review the table based upon at least two years of observed volumes through meters at Occupied Premises. The Market Operator shall publish a sensitivity showing not only the median volume,

but also the volumes at the 10th, 25th, 50th (median), 75th and 90th percentiles. Based upon the analysis, the Market Operator shall make recommendations to the Panel as to whether a Change Proposal should be brought forward or not to update either the groupings of meter sizes or the estimated flows.

F.2 Volume Estimating Caps

F.2.1 The Market Operator shall set the following caps in respect of estimating Volumes.

Estimating Caps	
Cap	Value
Ycap	3
Icap	10

F.2.2 In the first quarter of each Year in conjunction with the review of the table in Appendix F.1.2, the Market Operator shall review the table and make recommendations to the Panel as to whether a Change Proposal should be brought forward or not to update either of the Volume estimating caps. The *Ycap* should be set at around a level of the upper bound over all the meter sizes of the 90th percentile of annual volume estimates compared to the median volume.

F.3 Days in the Year

F.3.1 The Market Operator shall set the value of Days in the Year (*DIY*) as either 365 or 366 days for each Settlement Run in accordance with the number of days in the Year[33] in which the Invoice Period falls.

[33] The reader is reminded that a Year is defined as 1st April to 31st March

G Principal Assumptions

G.1 Assumptions

G.1.1 The following assumptions have been made in this CSD.

G.1.2 ***Quantum of Settlement*** The quantum of settlement is the day.

G.1.3 ***Settlement Period*** All Settlement Runs are carried out for an Invoice Period. While the Central Systems may use earlier Meter Reads to estimate meter volumes for days within the Settlement Period, the settlement system only takes account of values and estimated values for days within the Invoice Period.

G.1.4 ***Invoice Period*** The Invoice Period has been chosen to be the calendar Month for all settlement runs including the Final Settlement Run. This choice has been made for a number of reasons including:

(a) It creates a consistent pattern for settlement reconciliaton;
(b) It avoids the need to provide for different settlement calculations for monthly and annual settlement;
(c) It is significantly simpler to provide for seasonal Tariffs;
(d) It provides for reconciliaton between companies which may have different financial years.

The choice of a Month for the Invoice Period may affect the computation of block Tariffs. Companies' block Tariffs may be expressed over a period of a Year. Where the volume is variable over the course of a Year, and the volume is such that the variablility crosses a Tariff boundary, there may be some difference in the sum of the monthly block charges for a Year compared to the charge if it were computed over the full Year.

G.1.5 ***Proportionality*** All charges, allowances and volumetric bands are pro-rated on a day.

G.1.6 ***Wholesaler Tariff Data*** Changes to Wholesaler Tariff Data may only occur on the 1st day of a Month so that they are applicable unchanged for the Invoice Period. The Tariff which is applicable to any Service Component may be changed on any day within the Month. The charges for the Service Component will appropriately take account of the different Tariffs.

G.1.7 ***0mm Meters*** Volumetric charges are applied to Volumes associated with meters which have been set a chargeable size of 0mm. However, there are no meter fixed charges applied.

G.1.8 ***RTS*** Meter fixed charges do not apply in respect of any Sewerage Services Service Components for meters with a Return to Sewer of 0%.

G.1.9 ***Negative Volumes*** If a series of Meter Reads is not all monotonically increasing (taking account where applicable of Meter Rollover) it is possible for the Central Systems to compute negative Volumes for a Supply Point. If the total Volume of Water Services or Sewerage Services supplied over the course of an Invoice Period is negative, then the relevant price will usually be positive and the volumetric charges will be negative.

H Appendix - Non-Normative Description of Meter Volume Estimation

H.1 Important Caveat

H.1.1 This Appendix provides an informal non-normative description of the meter volume estimation process which is definitively described in Appendix A

H.2 Meter Advance Periods

H.2.1 The terms 'Meter Pre-advance Periods', 'Meter Advance Periods' and 'Meter Post-Advance Periods' are formally defined in Definitions Section of this CSD. The following diagram is provided as an aid to the correct interpretation of each of these terms. In the event of a conflict between any of these terms and the diagrams below, the definitions in this CSD shall prevail.

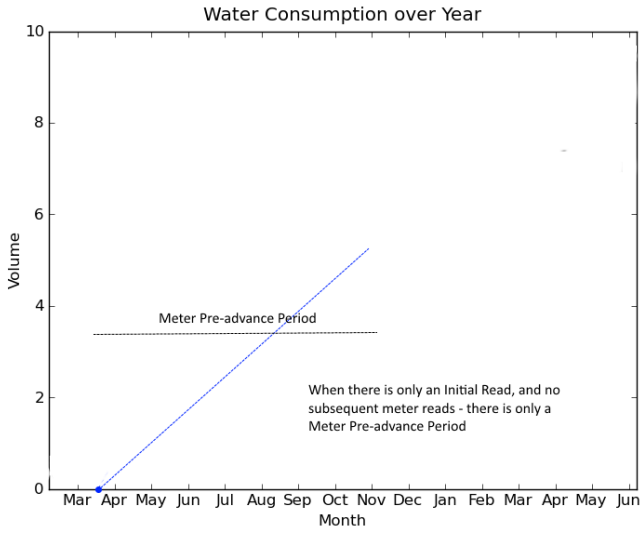


Figure 2: A single meter which is Active in the Central Systems with only a single read. The diagram shows that there is only a Meter Pre-Advance Period

H.2.2 ***Meter Pre-Advance Period*** In a Meter Pre-Advance Period the only Meter Read is the Initial Read which was supplied when the meter was installed or in the only Meter Read pre-loaded prior to the Go-Active Date. In either case, no subsequent Meter Reads have been submitted. Estimates of Volume are derived from either:

(a) The *YVE* estimate, if a *YVE* estimate has been supplied; otherwise

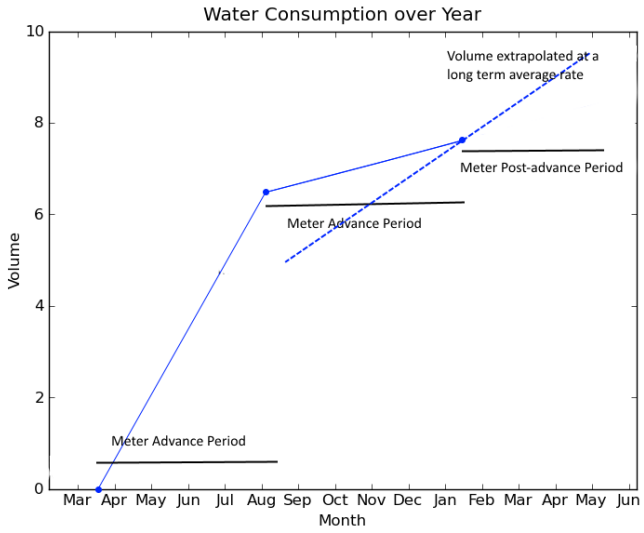


Figure 3: A single meter which is Active in the Central Systems with several reads. The diagram shows (i) Two Meter Advance Periods; and (ii) A single Meter Post-Advance Period

(b) From a table of Industry Level Estimates which is maintained by the Market Operator and based upon the Water Chargeable Meter Size of the meter.

These rates are then extrapolated forward. During Periods when either:

(a) the Supply Point relates to a Vacant Premises, or
(b) for a Water Services Supply Point, the Supply Point is Temporarily Disconnected, or
(c) for a Sewerage Services Supply Point, the paired Water Services Supply Point is Temporarily Disconnected

the rate is set to zero.

Both the *YVE* and *ILE* estimates are provided in cubic meters per annum. The use of such annualised estimates is consistent with manner in which other allowances (such as Domestic Allowance for Trade Effluent) are specified. Where the *YVE* and *ILE* estimates are used here in a Meter Pre-Advance Period or below in a Meter Post-Advance Period, the estimates are first normalised to a daily advance by dividing by the number of days in the year. The difference between using 365 or 366 days is small, and in most cases these estimates will be replaced by Volumes derived from Meter Reads.

H.2.3 ***Meter Advance Period*** In a Meter Advance Period the meter has multiple reads, and the day d for which an estimate is being derived is on or after the date of the meter's first read and before the date of the latest read for the meter. Then estimates of Volume are derived from

(a) The Meter Advance Volume derived from the Meter Reads on the dates surrounding the day d; and
(b) Whether or not a Meter Rollover has occurred between these two date.

If

(a) the Supply Point relates to a Vacant Premises, or
(b) for a Water Services Supply Point, the Supply Point is Temporarily Disconnected, or
(c) for a Sewerage Services Supply Point, the paired Water Services Supply Point is Temporarily Disconnected

then the Volumes are allocated to the days when the property was an Occupied Premises and the Water Services Supply Point was not Temporarily Disconnected. Excluding such days, the Volume is spread equally across the other days in the Period. However, if these conditions hold for the entire Meter Advance Period, then the Volume is spread equally over all the days in the Period.

H.2.4 ***Meter Post-Advance Period*** In a Meter Post-Advance Period the meter has multiple Meter Reads, and the day d for which an estimate is being derived is on or after the date of the last Meter Read. Then the estimate of volume would be derived from

(a) An average rate from Meter reads which nominally span a twelve (12) month Period. The Central System tries to find the minimum set of Meter Reads which span a twelve (12) month Period working back from the most recent Meter Read. If no such 12 month Period can be established, then the full set of Meter Reads is considered (this will be for a Period of less than a twelve (12) months).
(b) In deriving the average rate from this set of Meter Reads, periods of where the Supply Point referred to a Vacant Premises, or the Water Service Supply Point was Temporarily Disconnected are taken account of in deriving the average rate.
(c) Where the number of days for which the property was an Occupied Premises and the Water Services Supply Point was not Temporarily Disconnected is less than 30 days, then
    a) if a *YVE* has been supplied, the average rate is replaced by a weighted average of the average rate and the *YVE*;

b) if a *YVE* has not been supplied, the average rate is replaced by a weighted average of the average rate and the *ILE*.

(d) In either case, the relative weights are:

(i) for the average rate - the number of days that the property was an Occupied Premises and the Water Services Supply Point was not Temporarily Disconnected; and

(ii) for the *YVE* or *ILE* (as applicable) - 30 days minus the number of days for the average rate.

(e) This average rate is then bounded below by zero (in case the meter was going backwards) and capped above by a multiple of the *YVE* or *ILE* estimates (as applicable). This cap protects against any cases where errors in notifying Vacant Premises or the Temporary Disconnection of the Water Services Supply Point lead to very high average rates.

(f) The bounded and capped rate is then extrapolated forward. During periods when the property is a Vacant Premises or the Water Services Supply Point is Temporarily Disconnected, the extrapolated rate is set to zero.

H.2.5 ***Main Meters*** For Main Meters in a meter network, the Volumes should be adjusted for the estimated consumption in the Sub Meters. The best estimates will be obtained when meter readings for the Main Meter have been synchronised with the meter reading for the Sub Meter. The critical patterns of Temporary Disconnection and whether the premise is a Vacant Premise or not which are applied to the Sub Meter are those pertaining to the Main Meter when calculating Volumes at the Sub Meter for the purpose of calculating net volumes for the Main Meter.

H.2.6 ***Sub Meters*** When Volumes are calculated at a Sub Meter for purposes of calculating Volumes and charges at the Supply Point to which the meter is Registered, the references to Vacant Premises and Temporary Disconnection relate to the premises to which the meter is Registered.

I Appendix

I.1 Variables

I.1.1 This table describes the variables used in this CSD 0207. It should be read in conjunction with CSD 0301 (Data Catalogue).

Variables used in this CSD

Variable	Name or description	Derivation	Reference	Type	Units
Aa	Ammonia Capacity Charging Component	Tariff	D7558	decimal	£/kg per day
ADV_d	Actual Daily Volume	Internal	Appendix A.3, Appendix A.4, Appendix A.5, Appendix A.8		
Am	Minimum value of ammoniacal nitrogen content which is charged	Tariff	D7569	decimal	mg/l
Ao	Ammoniacal Nitrogen Charging Component	Tariff	D7565	decimal	£/m^3
$AreaDrained_d$	Area Drained	SPID Data	D2078	integer	m^2
$AreaProp_d$	Area of Property	SPID Data	D2012	integer	m^2
As	Ammoniacal Nitrogen Base Value	Tariff	D7568	decimal	mg/l
$ASBand_d$	Assessed Sewerage Band	SPID Data	D2081	integer	band

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
ASBandCharge	Assessed Sewerage Band Charge	Tariff	D7354	Tariff Band Table	band $\mapsto$ £/a
ASFixedCharge	Assessed Sewerage Fixed Charge	Tariff	D7351	decimal	£/a
ASMFC	Assessed Sewerage Meter Fixed Charge	Tariff	D7352	Tariff Lookup Table	mm$\mapsto$£/a
$ASMS_d$	Assessed Sewerage Meter Size	SPID Data	D2068	integer	mm
ASVCharge	Assessed Sewerage Volumetric Charge	Tariff	D7353	decimal	£/m^3
$ASVRate_d$	Assessed Sewerage Volumetric Rate	SPID Data	D2049	integer	m^3/a
At_d	Ammoniacal Nitrogen Content	SPID Data	D6011	decimal	mg/l
ATI_d	Ammonia Treatment Indicator	SPID Data	D6019	0,1	0,1
$AWBand_d$	Assessed Water Band	SPID Data	D2081	integer	band
AWBandCharge	Assessed Water Band Charge	Tariff	D7204	Tariff Band Table	band $\mapsto$ £/a
AWFixedCharge	Assessed Water Fixed Charge	Tariff	D7201	decimal	£/a
AWMFC	Assessed Water Meter Fixed Charge	Tariff	D7202	Tariff Lookup Table	mm$\mapsto$£/a
$AWMS_d$	Assessed Water Meter Size	SPID Data	D2068	integer	mm
AWVCharge	Assessed Water Volumetric Charge	Tariff	D7203	decimal	£/m^3
$AWVRate_d$	Assessed Water Volumetric Rate	SPID Data	D2049	integer	m^3/a

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
Ba	Biological Capacity Charging Component	Tariff	D7556	decimal	£/kg per day
Bo	Secondary Treatment Charging Component	Internal	Section 4.7.28		
BoBT	Secondary Treatment Block Tariff	Tariff	D7563	Block Tariff Table	m^3/a $\mapsto$£/m^3
BT	Block Tariff	Internal	Appendix B.3	Block Tariff Table	
BTI_d	Biological Treatment Indicator	SPID Data	D6017	0,1	0,1
Bva	Additional Volumetric Charging Component if there is biological treatment	Tariff	D7554	decimal	£/m^3per day
Bvo	Additional Volumetric Charging Component	Tariff	D7561	decimal	£/m^3
c	a variable representing a Service Component	Internal			
$cANl_d$	Chargeable Ammoniacal Nitrogen Load	SPID Data	D6002	integer	kg/day
$cCODl_d$	Chargeable Chemical Oxygen Demand	SPID Data	D6004	integer	kg/day
CDV_d	Chargeable Daily Volume	SPID Data	D6003	integer	m^3/day

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
CONN	Connected	Internal	Appendix A.2	boolean	
$cSSl_d$	Chargeable Suspended Solids Load	SPID Data	D6005	integer	kg/day
CV	Charge Value	Internal	Appendix B.2		
cXl_d	Trade Effluent Component 'X' Chargeable Load	SPID Data	D6032	decimal	kg/day
cYl_d	Trade Effluent Component 'Y' Chargeable Load	SPID Data	D6033	decimal	kg/day
cZl_d	Trade Effluent Component 'Z' Chargeable Load	SPID Data	D6034	decimal	kg/day
d	a variable representing a day	Internal			
D_l	a variable representing the first day of a Period	Internal			
D_u	variable representing the first day immediately after the end of a Period	Internal			
(D^A_{lK}, D^A_{uK})	Meter Active Period	Internal	Appendix A.1.5		
(D^S_l, D^S_u)	SPID Chargeable Period	Internal	Section 2.1.8		
(D^{CC}_l, D^{CC}_u)	Component Chargeable Period	Internal	Section 3.1.2		
(D^{CI}_l, D^{CI}_u)	Component Invoice Period	Internal	Section 3.1.3		

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
(D_l^{DI}, D_u^{DI})	DPID Invoice Period	Internal	Section 4.7.4		
$(D_l^{DS_j}, D_u^{DS_j})$	Calculated Discharge Period (j)	Internal	Appendix A.11		
(D_l^{D}, D_u^{D})	DPID Chargeable Period	Internal	Section 4.7.1		
(D_l^{IC}, D_u^{IC})	SPID Invoice Chargeable Period	Internal	Section 2.1.11		
(D_l^{IP}, D_u^{IP})	SPID Invoice Period	Internal	Section 2.1.6		
(D_l^{MC}, D_u^{MC})	Meter Chargeable Period	Internal	Section 3.2.3		
(D_l^{TI}, D_u^{TI})	Tariff Invoice Period	Internal	Section 3.1.5		
DA_d	Domestic Allowance	SPID Data	D6009	integer	m^3/a
$DADV_d$	Derived Actual Daily Volume	Internal	Appendix A.6.5		
$DAINC_{Td}$	Domestic Allowance Included	Internal	Section 4.7.24		
$DASPLIT_{Td}$	Domestic Allowance Split	Internal	Appendix A.7.8		
DDV_d	Derived Daily Volume	Internal	Appendix A.6		
$DEDV_d$	Derived Estimated Daily Volume	Internal	Appendix A.6.5		
DIY	Days in the Year (365 or 366)	Internal	Appendix F.3		
DPROP	Daily Proportion	Internal	Section 3.2.29		
DSCD	Calculated Discharge Chargeable Days	Internal	Appendix A.11		

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
DV_d	Daily Volume	Internal	Appendix A.3, Appendix A.4, Appendix A.5		
DVD_d	Daily Volume Discharged	Internal	Section 4.7.25		
e	a variable representing a Charging Element	Internal			
EDV_d	Estimated Daily Volume	Internal	Appendix A.3, Appendix A.4, Appendix A.5, Appendix A.8		
EDVC Kd	Estimated Daily Volume Cap	Internal	Appendix A.5		
ELT	Extended Lookup Table	Internal	Appendix B.1.5		
FA_d	Fixed Allowance	SPID Data	D6013	integer	m^3/a
HDAreaBand	Highways Drainage Area Band	Tariff	D7501	Tariff Lookup Table	$m^2 \mapsto$ band
HDAreaPropBand	Highways Drainage	Internal	Section 4.6.1		
HDBandCharge	Highway Drainage Band Charge	Tariff	D7502	Tariff Band Table	band $\mapsto$ £/a
HDBT	Highways Drainage Block Tariff	Tariff	D7510	Block Tariff Table	$m^3/a \mapsto$ £/m^3
HDBTP	Highways Drainage Block Tariff Price	Internal	Section 4.6.29		

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
HDComBand	Highways Drainage Community Concessionary Band	Tariff	D7503	integer	band
$HDComConcession_d$	Highways Drainage Community Concession flag	SPID Data	D2085	boolean	boolean
$HDFCA_{Kd}$	Highways Drainage Fixed Charges Active	Internal	Section 4.6.26		
HDFixedCharge	Highways Drainage Fixed Charge	Tariff	D7504	decimal	£/a
HDMFC	Highways Drainage Meter Fixed Charge	Tariff	D7509	Tariff Lookup Table	mm $\mapsto$ £/a
$HDMFCA_{Kd}$	Highways Drainage Meter Fixed Charges Active	Internal	Section 4.6.25		
HDRVMaxCharge	Highways Drainage RV Maximum Charge	Tariff	D7507	decimal	£/a
HDRVMinCharge	Highways Drainage RV Minimum Charge	Tariff	D7508	decimal	£/a
HDRVPoundage	Highways Drainage RV Poundage	Tariff	D7505	decimal	£/a per £RV
HDRVThresh	Highways Drainage RV Threshold	Tariff	D7506	decimal	£RV
Icap	Cap based on ILE	Internal	Appendix F.2		
ILE	Independent Level Estimate	Internal	Appendix A.3.3		

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
ILET	Industry Level Estimate Table	Internal	Appendix F.1		
K	a variable representing a meter	Internal			
LLV	Lower Lookup Value	Internal	Appendix B.1		
LT	lookup table	Internal	Appendix B.1.1		
Ma	Marine Treatment Capacity Charging Component	Tariff	D7555	decimal	£/m^3per day
MA_d	Meter Active	Internal	Section 3.2.14		
MACD	Meter Advance Chargeable Days	Internal	Appendix A.4, Appendix A.5		
MAV	Meter Advance Volume	Internal	Appendix A.4		
$MDASSOC_d$	Meter DPID Association	SPID Data	Set by T123.W, unset by T124.W	boolean	
$MDVOL_d$	Meter DPID Volume	SPID Data	D3024	percentage	dimensionless
$MFCA_d$	Meter Fixed Charges Active	Internal	Section 3.2.15		
Mo	Marine Treatment Charging Component	Tariff	D7562	decimal	£/m^3
MSBT	Metered Sewerage Block Tariff	Tariff	D7303	Block Tariff Table	m^3/a $\mapsto$ £/m^3

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
MSBTP	Metered Sewerage Block Tariff Price	Internal	Section 4.2.24		
MSMFC	Metered Sewerage Meter Fixed Charges	Tariff	D7301	Tariff Lookup Table	mm$\mapsto$ £/a
MSSPFC	Metered Sewerage Supply Point Fixed Charge	Tariff	D7302	decimal	£/a
MTI_d	Marine Treatment Indicator	SPID Data	D6016	0,1	0,1
MV	Monthly Volume	Internal	Section 3.2.18		
$MVDE_{Kd}$	Meter Volume Daily Estimate	Internal	Appendix A.3, Appendix A.5		
MWBT	Metered Water Block Tariff	Tariff	D7103, D7153	Block Tariff Table	m^3/a $\mapsto$ £/m^3
MWBTP	Metered Water Block Tariff Price	Internal	Section 3.2.19		
MWCapChg	Metered Water Capacity Charge	Tariff	D7104, D7154	Standby Capacity Block Table	m^3/day$\mapsto$ £/a per m^3/day
$MWCap_d$	Metered Water Capacity	SPID Data	D2080	decimal	m^3/day
MWDPUVC	Metered Water Daily Premium Usage Volume Charge	Tariff	D7107, D7157	decimal	£/m^3
MWDSUVC	Metered Water Daily Standard Usage Volume Charge	Tariff	D7106, D7156	decimal	£/m^3

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
MWMD$_d$	Metered Water Maximum Daily Demand	SPID Data	D2079	integer	m^3/day
MWMDT	Metered Water Maximum Demand Tariff	Tariff	D7108, D7158	decimal	£/a per m^3/day
MWMFC	Metered Water Meter Fixed Charges	Tariff	D7101, D7151	Tariff Lookup Table	mm $\mapsto$ £/a
MWMonCap	Metered Water Monthly Capacity	Internal	Section 3.2.29		
MWPUV	Metered Water Standby Usage charged at premium rates	Internal	Section 3.2.31		
MWSPFC	Metered Water Supply Point Fixed Charges	Tariff	D7102, D7152	decimal	£/a
MWSUV	Metered Water Standby Usage charged at standard rates	Internal	Section 3.2.31		
OPc	Trade Effluent Operating Charge	Internal	Section 4.7.26		
Os	Chemical Oxygen Demand Base Value	Tariff	D7566	decimal	mg/l
Ot$_d$	Chemical Oxygen Demand	SPID Data	D6006	decimal	mg/l
P	a variable representing a Period	Internal			
P_K^A	Meter Active Period	Internal	Appendix A.1.5		

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
P^S	SPID Chargeable Period	Internal	Section 2.1.8		
P^{CC}	Component Chargeable Period	Internal	Section 3.1.2		
P^{CI}	Component Invoice Period	Internal	Section 3.1.3		
P^{DI}	DPID Invoice Period	Internal	Section 4.7.4		
P^{DS_j}	Calculated Discharge Period (j)	Internal	Appendix A.11		
P^D	DPID Chargeable Period	Internal	Section 4.7.1		
P^{IC}	SPID Invoice Chargeable Period	Internal	Section 2.1.11		
P^{IP}	SPID Invoice Period	Internal	Section 2.1.6		
P^{MC}	Meter Chargeable Period	Internal	Section 3.2.3		
P^{TI}	Tariff Invoice Period	Internal	Section 3.1.5		
PA_d	Percentage Allowance	SPID Data	D6012	percentage	dimensionless
PremTolFactor	Premium Tolerance Factor	Tariff	D7105, D7155	percentage	dimensionless
PS_d	Pipe Size	SPID Data	D2071	integer	mm
$PTEM_K$	Private Trade Effluent Meter	Internal	Section 4.7.23		
PTI_d	Primary Treatment Indicator	SPID Data	D6015	0,1	
PV	Proportional Volume	Internal	Appendix B.3.4		

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
Ra	Reception capacity charging component	Tariff	D7552	decimal	£/m^3per day
Ro	Reception Treatment Charging Component	Internal	Section 4.7.27		
RoBT	Reception Block Tariff	Tariff	D7559	Block Tariff Table	m^3/a $\mapsto$ £/m^3
RTI_d	Reception Treatment Indicator	SPID Data	D6014	0,1	0,1
RTS_d	Return to Sewer	SPID Data	D3007	percentage	dimensionless
RTS_W	Default Return to Sewer	Tariff	D7051	percentage	dimensionless
RV_d	Rateable Value	SPID Data	D2011	decimal	£RV
Sa	Sludge capacity charging component	Tariff	D7557	decimal	£/kg per day
SAF_d	Special Agreement Factor	SPID Data	D2003	percentage	dimensionless
SCBT	Standby Capacity Block Table	Internal	Appendix B.4	Standy Capacity Block Table	
$SCMS_{Kd}$	Sewerage Chargeable Meter Size	SPID Data	D3005	integer	mm
$SDADV_d$	Sewerage Derived Actual Daily Volume	Internal	Appendix A.7.10		

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
SDDV$_d$	Sewerage Derived Daily Volume	Internal	Appendix A.7.9, Appendix A.9.2, Appendix A.12.2		
SDEDV$_d$	Sewerage Derived Estimate Daily Volume	Internal	Appendix A.7.10		
Sec154ACount	Section 154A Dwelling Units	SPID Data	D2074	integer	dimensionless
Sec154AValue	Section 154A Payment Value	Tariff	D7601	decimal	£/a
SF$_d$	Seasonal Factor	SPID Data	D6010	percentage	dimensionless
SMA$_{Kd}$	Sewerage Meter Active	Internal	Appendix A.7.4		
SMFCA$_{Kd}$	Sewerage Meter Fixed Charges Active	Internal	Section 4.2.20		
SMV	Sewerage Monthly Volume	Internal	Section 4.2.23, Section 4.5.29, Section 4.6.28		
So	Sludge Treatment Charging Component	Tariff	D7564	decimal	£/m^3
SPFCA	Supply Point Fixed Charges Active	Internal	Section 3.2.16		

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
Ss	Suspended Solids Base Value	Tariff	D7567	decimal	mg/l
SSPFCA	Sewerage Supply Point Fixed Charges Active	Internal			
St_d	Suspended Solids	SPID Data	D6007	decimal	mg/l
STI_d	Sludge Treatment Indicator	SPID Data	D6018	0,1	0,1
$SVAM_d$	Sewerage Volume Adjustment Method	SPID Data	D6035	string	'NONE', 'DA' or 'SUBTRACT'
SVNETA	Sewerage Volume Net Adjustment	Internal	Appendix A.7.7		
SWAreaBand	Surface Water Area Band	Tariff	D7451	Tariff Lookup Table	$m^2 \mapsto$ band
SWAreaDrainedBand	Surface Water Area Drained Band	Internal	Section 4.5.1		
SWBandCharge	Surface Water Band Charge	Tariff	D7452	Tariff Band Table	band $\mapsto$ £/a
SWBT	Surface Water Block Tariff	Tariff	D7460	Block Tariff Table	m^3/a $\mapsto$ £/m^3
SWComBand	Surface Water Community Band	Tariff	D7453	integer	band
$SWComConcession_d$	Surface Water Community Concession flag	SPID Data	D2085	boolean	boolean
$SWDF_d$	Surface Water Drainage Charge Adjustment Factor	SPID Data	D2072	percentage	dimensionless

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
SWFCA$_{Kd}$	Surface Water Fixed Charges Active	Internal	Section 4.5.27		
SWFixedCharge	Surface Water Fixed Charge	Tariff	D7454	decimal	£/a
SWMFC	Surface Water Meter Fixed Charges	Tariff	D7459	Tariff Lookup Table	mm$\mapsto$ £/a
SWMFCA$_{Kd}$	Surface Water Meter Fixed Charges Active	Internal	Section 4.5.26		
SWRVMaxCharge	Surface Water RV Maximum Charge	Tariff	D7457	decimal	£/a
SWRVMinCharge	Surface Water RV Minimum Charge	Tariff	D7458	decimal	£/a
SWRVPoundage	Surface Water RV Poundage	Tariff	D7455	decimal	£/a per £RV
SWRVThresh	Surface Water RV Threshold	Tariff	D7456	decimal	£RV
T	a variable representing a Discharge Point	Internal			
TB	Tariff Band Table	Internal	Appendix B.2		
TD	Tariff Days	Internal	Appendix B.3.4		
TDISC$_d$	Temporarily Disconnected	Internal	Appendix A.2.6		
TDV	Total Daily Volume	Internal	Appendix A.5.7		
TEBand$_d$	Trade Effluent Tariff Band	SPID Data	D6024	integer	band
TEBandCharge	Trade Effluent Band Charge	Tariff	D7551	Tariff Band Table	band $\mapsto$ £/a

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
TEDailyShortfall$_d$	Trade Effluent Daily Shortfall	Internal	Section 4.7.34		
TEDDV$_d$	Trade Effluent Derived Daily Volume	Internal	Appendix A.11		
TEDDVC$_d$	Trade Effluent Derived Daily Volume Cap	Internal	Appendix A.11.11		
TEFixedCharge	Trade Effluent Fixed Charge	Tariff	D7571	decimal	£/a
TEMDA	Trade Effluent Minimum Daily Addition Charge	Internal	Section 4.7.34		
TEMinCharge	Trade Effluent Minimum Operational Charge	Tariff	D7570	decimal	£/a
TEMinDailyCharge	Trade Effluent Minimum Daily Operational Charge	Internal	Section 4.7.31		
TEMinPeriodCharge	Trade Effluent Minimum Period Operational Charge	Internal	Section 4.7.31		
TEPeriodCharge	Trade Effluent Period Operational Charge	Internal	Section 4.7.32		
TEPeriodShortfall	Trade Effluent Period Operational Shortfall in Charge	Internal	Section 4.7.33		
TFCD	Total Fixed Charging Days	Internal	Section 3.2.17		
TRD	Total (TE) Reception Days	Internal	Section 4.7.27		

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
TSFCD	Total Sewerage Fixed Charging Days	Internal	Section 4.2.22		
TVDS	Total Volume of Calculated Discharges	Internal	Appendix A.11.9		
UEDV	Unadjusted Estimated Daily Volume	Internal	Appendix A.5.9		
ULV	Upper Lookup Value	Definition	Appendix B.1		
USFixedCharge	Unmeasured Sewerage Fixed Charge	Tariff	D7401	decimal	£/a
$USMiscCharge^{\mathcal{C}}$, $\mathcal{C} \in [A \ldots H]$	Unmeasured Sewerage Miscellaneous Type $\mathcal{C}$ Charge	Tariff	D7406 . . . D7413	decimal	£/a
$USMiscCount_d^{\mathcal{C}}$, $\mathcal{C} \in [A \ldots H]$	Unmeasured Sewerage Item $\mathcal{C}$ Count	SPID Data	D2018 . . . D2022, D2024, D2046, D2048	integer	integer
USPFC	Unmeasured Sewerage Pipe Fixed Charge	Tariff	D7414	Tariff Lookup Table	mm$\mapsto$ £/a
USRVMaxCharge	Unmeasured Sewerage RV Maximum Charge	Tariff	D7404	decimal	£/a
USRVMinCharge	Unmeasured Sewerage RV Minimum Charge	Tariff	D7405	decimal	£/a

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
USRVPoundage	Unmeasured Sewerage RV Poundage	Tariff	D7402	decimal	£/a per £RV
USRVThresh	Unmeasured Sewerage RV Threshold	Tariff	D7403	decimal	£RV
UTEDDV	Uncapped Trade Effluent Derived Daily Volume	Internal	Appendix A.11.10		
UWFixedCharge	Unmeasured Water Fixed Charge	Tariff	D7251	decimal	£/a
$UWMiscCharge^{\mathcal{C}}$, $\mathcal{C} \in [A \ldots H]$	Unmeasured Water Miscellaneous Type $\mathcal{C}$ Charge	Tariff	D7256 . . . D7263	decimal	£/a
$UWMiscCount_d^{\mathcal{C}}$, $\mathcal{C} \in [A \ldots H]$	Unmeasured Water Item $\mathcal{C}$ Count	SPID Data	D2018 . . . D2022, D2024, D2046, D2048	integer	integer
UWPFC	Unmeasured Water Pipe Fixed Charge	Tariff	D7264	Tariff Lookup Table	mm$\mapsto$ £/a
UWRVMaxCharge	Unmeasured Water RV Maximum Charge	Tariff	D7254	decimal	£/a
UWRVMinCharge	Unmeasured Water RV Minimum Charge	Tariff	D7255	decimal	£/a
UWRVPoundage	Unmeasured Water RV Poundage	Tariff	D7252	decimal	£/a per £RV

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
UWRVThresh	Unmeasured Water RV Threshold	Tariff	D7253	decimal	£RV
v	a variable representing a Volumetric Allowance	Internal			
V	Volume	Internal	Appendix B.1		
Va	Volumetric Charging Component	Tariff	D7553	decimal	£/m^3per day
VAC_d	Vacant	Internal	Appendix A.2.4	boolean	boolean
VACD	Volumetric Adjustment Chargeable Days	Internal	Appendix A.8		
VAV_d	Adjustment Volume	SPID Data	D2047	decimal	m^3
VDS_d	Calculated Discharge Notified Volume	SPID Data	D6008	decimal	m^3
Vo	Volumetric Treatment charging component	Tariff	D7560	decimal	£/m^3
$WCMS_{Kd}$	Water Chargeable Meter Size	SPID Data	D3002	integer	mm
Xa	Trade Effluent Component ‘X’ Capacity Charging Component	Tariff	D7572	decimal	£/kg per day
Xm	Minimum value of Trade Effluent Component ‘X’ which is charged	Tariff	D7581	decimal	mg/l

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
Xo	Trade Effluent Component 'X' Charging Component	Tariff	D7575	decimal	£/m^3
Xs	Trade Effluent Component 'X' Base Value	Tariff	D7578	decimal	mg/l
Xt_d	Trade Effluent Component 'X' Content	SPID Data	D6026	decimal	mg/l
XTI_d	Trade Effluent Component 'X' Treatment Indicator	SPID Data	D6029	0,1	0,1
Ya	Trade Effluent Component 'Y' Capacity Charging Component	Tariff	D7573	decimal	£/kg per day
Ycap	Cap based on YVE	Internal	Appendix F.2		
Ym	Minimum value of Trade Effluent Component 'Y' which is charged	Tariff	D7582	decimal	mg/l
Yo	Trade Effluent Component 'Y' Charging Component	Tariff	D7576	decimal	£/m^3
Ys	Trade Effluent Component 'Y' Base Value	Tariff	D7579	decimal	mg/l
Yt_d	Trade Effluent Component 'Y' Content	SPID Data	D6027	decimal	mg/l
YTI_d	Trade Effluent Component 'Y' Treatment Indicator	SPID Data	D6030	0,1	0,1

Variables used in this CSD					
Variable	Name or description	Derivation	Reference	Type	Units
YVE_d	Yearly Volume Estimate	SPID Data	D2010	integer	m^3/a
Za	Trade Effluent Component 'Z' Capacity Charging Component	Tariff	D7574	decimal	£/kg per day
Zm	Minimum value of Trade Effluent Component 'Z' which is charged	Tariff	D7583	decimal	mg/l
Zo	Trade Effluent Component 'Z' Charging Component	Tariff	D7577	decimal	$£/m^3$
Zs	Trade Effluent Component 'Z' Base Value	Tariff	D7580	decimal	mg/l
Zt_d	Trade Effluent Component 'Z' Content	SPID Data	D6028	decimal	mg/l
ZTI_d	Trade Effluent Component 'Z' Treatment Indicator	SPID Data	D6031	0,1	0,1