# SECTION H

# ASSET INVENTORY AND SYSTEM PERFORMANCE

## Reporting Requirements

Edition 5

# ANNUAL RETURN 2006-07

## EDITION CHANGES – SECTION H

| Edition | Description of Change |
|---|---|
| 5.0 | **Tables Restructured:**<br>H1 "Summary"<br>H2 "Water Non- infrastructure"<br>H3 "Water Infrastructure"<br>H4 "Wastewater Infrastructure"<br>H5 "Wastewater Non – Infrastructure"<br>H6 "Support Services"<br>- Blocks referring to "Risk Grading £m MEAV", "Capital Investment" and "Finance Impact £m MEAV" have been removed.<br>- New block: "Net Value of Element (£m MEAV)" inserted. |
| 5.0 | **Comments tables:**<br>Comments tables, where relevant, have been reprofiled to indicate clearly where comments must be made in commentary document. Please see Introduction, part 10.1.3 more information. |
| 5.0 | **DEFINITIONS & GUIDANCE DOCUMENT:**<br>Definitions have been updated in line with changes to the tables. Previous WICS and Ofwat references are detailed, where appropriate, on tables and general guidance, as well as line definitions for this Section (and any Reporter Guidance), has been updated as necessary. |

## ASSET INVENTORY AND SYSTEM PERFORMANCE

### Purpose

The purpose of this section is to enable SW to summarise its surveys of its existing asset stock in terms of asset value, life categories and summary age profiles, asset risk condition and performance as at 31 March 2007.

The format of the Asset Inventory is based on Ofwat's Asset Inventory & System Performance, Submission H, adapted for Scotland. This information will form a record of the asset stock as at 31 March 2007.

### Guidance

SW shall submit a summary of its asset stock arising from its asset surveys, in terms of asset value, life categories and summary age profiles, asset condition and performance as at 31 March 2007, as set out in Tables H1 through H6 of these requirements.

SW shall update asset information annually through the Annual Return. This update shall be based on new information collected during the year and where appropriate grossed up on a statistical basis.

#### *Inputs*

Each line of Tables H2 through H6 requires some or all of the following data to be input. The Summary Table H1 is partly calculated from the other tables.

On completion of Tables H2 through to H6 SW should ensure that no input cell is left blank. If the information is unknown or not applicable, then a zero should be entered in the cell with an appropriate CG. This is true apart from in column block 2 (Summary age profiles) where if no defined code is applicable then the cell should be left blank.

#### *Summary of Asset Stock*

Except where stated, the number, length or area, depending on the units indicated by the Tables, of each asset type shall be allocated by size bands as defined in Tables H7 for the water service, H8 for the wastewater service and H9 for support services;

#### *Gross and Net Modern Equivalent Asset Value (MEAV)*

SW is required to confirm that the basis for the derivation of the unit costs for the purpose of calculating the gross Modern Equivalent Asset Value (MEAV) shall be the same as those used by SW to estimate the standard costs required from time to time in the Cost Base (Information Requirement J), and those used to prepare estimates of future expenditure requirements. Costs shall include land.

- The gross MEAV represents the equivalent replacement cost of the asset and should reflect both the most technically up to date new asset and the most technically up-to-date method of constructing that asset.

  It is apparent that the development of new technologies may cause the overall replacement costs of some assets to fall in real terms. For example the development of no-dig techniques in pipeline construction have, in addition to the lower costs associated with the use of modern pipeline materials, caused the cost of replacing some pipelines to fall. In such cases, the gross MEAV of existing assets should be reassessed to reflect both the up-to-date method of construction and lower material costs. SW should state in the commentary how they determined where the reassessment of an MEAV of a particular asset was appropriate because of the development of new technologies and materials.

- The net MEAV, for non-infrastructure assets shall be calculated on an asset-by-asset basis using the following relationship:

$$\text{Net MEAV} = \text{Gross MEAV} \times \frac{\text{Asset remaining life}}{\text{Expected overall asset life}}$$

- Where decommissioned (and "mothballed") assets or sub-assets have been included in tables the value and type of those decommissioned assets must be stated in the commentary. SW is required to confirm that the values of decommissioned assets are included in both the gross and net MEAV.

- The MEAV on all buildings owned and maintained by SW should be based on market value.

- Where land values exceed £100,000 or are greater than 15% of the value of the asset, the average unit price of land included in the gross MEAV valuations for each type of asset should be stated in the commentary. The value assigned to any land included in gross MEAVs should be identified separately in the commentary, along with the basis for this valuation. It is anticipated that existing use valuation will be the basis for the majority of land.

- The price indexation used to bring the MEAVs up to. SW is required to confirm that MEAVs have been indexed using the index as given in the Annual Return Reporting Requirements and Definitions Manual. Average 2006-07 financial year prices should be used.

***Asset life categories***

SW should disaggregate Gross MEAV by asset life categories on all tables (H1 to H6). Net should also be provided by asset life categories on H1.

Assets are categorised in terms of very short, short, medium, medium long and long life, non-depreciable, land and decommissioned as set out below:

Very short: assets having a life of up to 5 years, e.g. vehicles and computer equipment.

Short: assets having a life of 6 to 15 years, e.g. some ICA plant, telemetry, heavy vehicles and plant.

Medium: generally mechanical assets having a life of 16 to 30 years, e.g. pumping units and associated electrical plant, process plant, filter bed media, glass coated steel storage tanks.

Med/long: generally mechanical assets having a life of 31 to 50 years, e.g. filter bed structures, site fencing, GRP covers and kiosks.

Long: generally operational structures including service reservoirs, treatment work structures, inter-process pipe work and filter bed structures. Such assets will have a life exceeding 50 years.

Non-Depr: infrastructure assets (non-depreciable).

Dcm: decommissioned assets, which are not being used operationally, but are mothballed and are being maintained for future usage. This category does not include redundant assets, which are also out of operational service, but are not being maintained for future usage and are available for disposal.

Land: the land on which the asset type is situated and any surplus land.

***Condition and Performance***

SW is requested to provide a breakdown of the value of its assets (Gross MEAV) according to 'condition' and 'performance'. **The guidance for asset condition and performance grading can be found in Appendices 2 and 3.**

"Condition" as a parameter describes the physical state or *reliability* of the asset whereas "performance" describes how *fit for purpose* the asset is to carry out its required duty or process. Building a capital investment programme upon decisions made using condition and performance measures in isolation assumes that all assets in the same grades are effectively the same in terms of remaining life and so will all need replacing at the same time. Under these terms there is no time element or prioritisation involved in the

replacement decision and so there can be no differentiation between assets in the same grade.

In reality, although two similar assets may be classified in the same grade, because of the duty-cycle under which they have operated or the environment in which they have been exposed, they will undoubtedly have different remaining lives and hence different replacement times. Making investment decisions under these circumstances is prone to abortive or untimely costs being incurred leading to a skewed view of investment capital requirements.

Some analytical models can be used to assess the remaining life of asset types at a sub-process level, however they are difficult to use to get a view of differential remaining lives at process level at which investment is actually targeted.

The one dimension that allows replacement decisions to be made between assets, which are judged to be the same in condition/performance terms, is risk. Many of the judgements made whilst running a water distribution network are subject to risk. Risk cannot be totally avoided; it can only be reduced. Assessing whether to accept a risk should be central to any decisions that are taken about when to replace or do work on an asset.

Existing redundant assets or sub-assets shall not be entered in the Tables. The columns for redundant assets are intended for existing commissioned assets that will in future become redundant. On this basis, to keep account of reductions in the asset stock, the three columns in blocks 1, 2 and 3 will include all future redundant assets or sub-assets.

***Confidence grades***

For Tables H1 through H6, the reliability and accuracy of information submitted shall be assessed and assigned a confidence grade in the columns headed CG.

Where SW is unable to follow or comply with the confidence grading structure outlined in the Manual above, it shall consult with the Commission.

**Commentary**

The report submitted by SW to the Commission shall state on a line-by-line basis:

- A commentary. This should outline all assets where £100k equivalent asset replacement cost, or more, lies in condition or performance grades 4 or 5.
- All material assumptions made in deriving Table data.
- An outline of the methodologies used to derive the Table data.

Material in this context shall be taken as any assumption that singly or in combination with others, has a significant effect on the Table information.

This information, taken together with the relevant confidence grading, will give the Commission a clearer understanding of the robustness of the figures in the Tables.

For example, *material assumptions* shall include*:*

- Assumptions made in determining the allocations to size band, asset life category, for poorly understood assets such as communication pipes or non-critical sewers, etc;

- Assumptions made in establishing unit costs to determine the equivalent asset replacement cost.

- Assumptions made in determining the asset lives and the summary age profile descriptors.

- Assumptions made on determining asset condition grading in Tables H2 through H6.

- Assumptions made in the assessment of asset performance grading in Tables H2 through H6.

And examples on *methodologies* shall include:

- Extrapolation of condition data on network assets, by Bayesian statistics or by other methodologies such as straight-line projection;

- Estimation of data to fill gaps by engineering judgement

- Data resulting from distribution zone studies or drainage area plans;

SW is required to provide a statement of the quality assurance procedures used in relation to the production of the submission.

**Guidance for the Reporter**

The Reporter should assess the consistency of Scottish Water's asset inventory with previous submissions and how the necessary data capture and storage is implemented across its business. Specifically, the Reporter should check that Scottish Water has provided clear reasons for any significant fluctuations in the total Modern Equivalent Asset Value (MEAV), and the split of this total by both condition and performance gradings.

The Reporter should verify any similar 'additions' to the assessed inventory in Scottish Water's revision of its total MEAV. The Reporter should note any

information provided by Scottish Water as to the refinement of estimated asset numbers, units or lengths. Any such information and/or justification should be presented in a manner consistent with the data and commentary in Section D.

With regard to condition and performance assessments, the Reporter should comment on any apparent improvement or deterioration within the various asset groups, and how these may relate to the assets' useful lives or programmes of maintenance or replacement. The Reporter should also note changes to the associated confidence grades, both in terms of accuracy and reliability, and examine the reasons attached to any movement in these assessments themselves.

The Reporter should ensure that Scottish Water is using the appropriate definitions and guidelines in assigning condition and performance grades on the established '1-5' scales. Scottish Water should have sufficient processes in place to ensure consistency of assessment across its business and asset base, and to limit the subjectivity of judgments.

The Reporter should note any assertion from Scottish Water as to the relationship between the condition and performance assessments for any given asset group. For example, performance may, to some extent, be interpreted as a function of asset condition and operational policy. The Reporter should explore the potential for reporting a breakdown of the MEAV for each asset group in a 5x5 'matrix' of condition against performance, such that there is no overlap between the two assessments as reported at present.

The Reporter should highlight any commentary relating to asset 'serviceability' and Scottish Water's assessment of the capacity of asset groups to fulfil their specified role regardless of relative condition or performance.

The Reporter should comment on any observed change in the proportion of redundant and decommissioned assets, and how these contribute to Scottish Water's overall valuations.

The Reporter is asked to consider the potential for reporting the asset inventory for Support Services on a water/wastewater basis. The Reporter should seek to establish the code changes needed to facilitate such a split under the existing reporting mechanism.

Overall, the Reporter should make some judgement of the suitability of the MEAV measure for assessing the asset base, and how condition and performance gradings are assigned on this basis. The Reporter should consider this methodology in relation to those used in other utility businesses, specifically the water industry in England and Wales.

# APPENDIX 1

# DEFINITIONS USED WITHIN THE ASSET INVENTORIES

These definitions are grouped into three categories: (a) Asset & Process, (b) Operation and Impact of the asset, (c) Cost of the Asset.

## *a) Asset & Process*

"***Process***"
A series of operations performed in the collection, treatment or distribution of water or wastewater. The key process areas are:

- Water abstraction
- Water treatment
- Water distribution
- Sewage collection (via sewers)
- Sewage treatment and disposal
- Sludge treatment facilities and disposal
- Support Services – the provision of a management process to support the processes above

"***Sub-process***"
A discrete stage within a process that performs a defined key function. A sub-process is delivered by a sub-asset. Examples of sub-processes:

- Primary settlement
- Chlorination
- Sludge stabilisation (e.g. digestion).

"***Asset Category***"
The set of assets that provide the same type of process. For example:

- For water treatment works "SW1 treatment works" is an asset category.
- For sewage treatment works "Tertiary treatment only" is an asset category.

"***Asset***"
The set of one or more sub-assets designed to provide a particular type of process. Examples of this would include:

- Within the Water Service: A water treatment works; a distribution main; etc.
- Within the Wastewater Service: A sewage treatment works; a CSO; etc.
- Within Support Services: A computer; a vehicle.

Each asset will fall into a particular Asset Category, depending on the type of process.

"***Sub-Asset***"
A physical item, which has a cash value in terms of EARC, that enables a sub-process to be carried out. For example:

- A slow sand-filter on a water treatment works.

- An in-line sewage pumping station on the sewerage network.
- A personal computer, within Information Systems in Support Services

"***Sub-Asset Type***"
A major component part of a sub-asset. For example in a pumping station on a water works, the sub-assets could typically be:

- The control building.
- The civil substructure and internal pipework.
- The M&E components such as pumps and switchgear.
- The ICA equipment

***b) <u>Operation and Impact of the Asset</u>***

"***Capacity***"
The ability of an asset or sub-asset to meet the required quality or standard and/or throughput, during normal operation. An example of capacity would be:

- The ability of a settlement tank to operate within design limits at peak flow.

"***Condition***"
The physical state or reliability of a sub-asset; i.e. it is a measure of its deterioration at any time. It can be expressed in terms of an assets estimated remaining life, as well as a physical description.

"***Collateral Effects***"
The ability of a sub-asset to avoid causing inadvertent nuisance or hazard, such as health and safety problems, noise, odour problems, fly nuisance, etc.

"***Operational Performance***"
The capacity of an asset to deliver a required level of service, during normal operation.

"***Reliability***"
The ability of a sub-asset to continuously deliver normal operation without breakdown.

# APPENDIX 2

## GUIDANCE FOR ASSET CONDITION GRADING

For the Asset Inventory, there are three additional columns within the condition gradings, beyond the Ofwat model. These include:

- **New**: This column is used for the cost of new assets. It is determined from the investment plan and only contains new assets created under the purpose of Quality, Growth and Enhanced Service Levels. Base expenditure is not included, as this does not increase the value of the asset stock; it only improves its performance, condition or risk levels.

- **Dcm**. This column is for assets or sub-assets that are or are expected to become decommissioned, and will be "mothballed" for future usage.

- **Redn**. This column is for the inclusion of assets or sub-assets, which are expected to become redundant in the future. Include all items that are made redundant, whether due to capital investment in new sub-assets or due to strategic changes etc. Redn *does not* include assets/sub-assets that have been directly replaced in parallel under Capital Maintenance. This is because replacement expenditure is assumed to not change the asset stock value.

Asset condition grades shall be assigned at individual sub-asset level or groups of assets according to Tables H2 through H6.

The basis of the asset condition grades for below ground assets shall comply with the general classifications for assets groups set out below:

- Water mains, sewage and sludge pumping mains Table A2.1
- Communications pipes Table A2.2
- Sewers, other sewer structures and sea outfalls Table A2.3

The basis for asset condition grades for above ground assets shall comply with the general classification as set out below:

- Classification for civil structures & buildings sub-assets Table A2.4
- Classification for mechanical & electrical sub-assets Table A2.5

SW may have aligned the asset condition grades to its own specific available asset information. Such alternative definitions of asset condition need to be consistent with the definitions set out in Tables A2.1-A2.5, so that reliable comparisons can be made within Scotland and across England and Wales. Any such alternative definitions shall be described in the commentary accompanying Tables H2 through H6 and shall be reconciled to the condition grades set out in this annex. Best practice suggests that this condition

grading should be based on more than one methodology, for example for water mains, pipe wall thickness shall be considered with burst rates and performance to customers.

### Asset Condition Grades

### Table A2.1 - Water Mains, Sewage or Sludge Pumping Mains

| Condition Grade | General Meaning |
|---|---|
| 1<br>Very good | Modern pipe material designed to current standards with no evidence of internal or external degradation. No bursts have occurred. |
| 2<br>Good | As condition 1, but not designed to current standards in respect of pressure ratings, design specification or corrosion protection. Deterioration causing minimal influences on levels of service. There is less than 1 burst/km/yr of main. |
| 3<br>Adequate | Water mains, sewage or sludge pumping mains are generally sound. However, a few pipewall or joint failures or evidence of some external or internal degradation. Some deterioration beginning to be reflected in levels of service. There are less than 3 bursts/km/yr of main. |
| 4<br>Poor | Water mains, sewage or sludge pumping mains with a significant level of joint failures or evidence of significant external or internal degradation or likely to cause a marked deterioration in levels of service. Some asset replacement or rehabilitation needed within the medium term. There are between 3 - 5 bursts/km/yr. |
| 5<br>Very Poor | Unsound water mains, sewage or sludge pumping mains with extensive pipe failures, or significant external or internal degradation. There are more than 5 bursts/km/yr. |

## Asset Condition Grades

### Table A2.2 – Communications Pipes

| Condition Grade | General Meaning |
|---|---|
| 1<br>Very good | Modern pipe material designed to current standards with no evidence of internal or external degradation. |
| 2<br>Good | As condition 1, but not designed to current standards in respect of pressure ratings, design specification or corrosion protection. Deterioration causing minimal influences on levels of service. |
| 3<br>Adequate | Communications pipes are generally sound, however, a few failures requiring replacement or repair. Some deterioration beginning to be reflected in levels of service. |
| 4<br>Poor | Communications pipes with a significant level of failures requiring replacement or repair, with evidence of significant external or internal degradation or likely to cause a marked deterioration in levels of service. Some asset replacement or rehabilitation needed within the medium term. |
| 5<br>Very Poor | Unsound communications pipes with high level of failure, or significant external or internal degradation, which has failed or is about to fail, causing unacceptable levels of service. No life expectancy, requiring urgent replacement or repair. |

## Asset Condition Grades

### Table A2.3 - Sewers, Other Sewer Structures and Sea Outfalls (to be treated as Other Sewers)

| Condition Grade | General Meaning |
|---|---|
| 1<br>Very Good | No structural defects. |
| 2<br>Good | **For brick sewers**, (< 3 ring)<br>Minor cracking or no deformation or loss of bricks **and** mortar loss confined to surface **and** line and level as built **and** connections satisfactory.<br>**For other sewers,**<br>Circumferential cracking **or** moderate joint defects. |
| 3<br>Adequate | **For brick sewers,**<br>Deformation 0-5%, no fracture and only moderate mortar loss **or** displaced bricks **or** total mortar loss without other defects **or** occasional defective connections.<br>**For other sewers,**<br>Deformation 0-5% and cracked **or** fractured **or** longitudinal/multiple cracking **or** occasional fractures **or** severe joint defects **or** minor loss of level **or** badly made connections. |
| 4<br>Poor | **For brick sewers,**<br>Deformation 5-10% and fractured **or** total mortar loss or small number of missing bricks **or** displaced/hanging brickwork **or** moderate loss of level **or** frequent badly made connections **or** dropped invert.<br>**For other Sewers,**<br>Deformation 5-10% and cracked **or** fractured or broken **or** serious loss of level. |
| 5<br>Very Poor | **For brick sewers,**<br>Already collapsed **or** deformation > 10% and fractured **or** extensive areas of missing bricks **and**/**or** displaced/hanging brickwork **or** missing invert.<br>**For other sewers,**<br>Already collapsed **or** deformation >10% and cracked or fractured or broken **or** extensive areas of missing fabric. |

## Asset Condition Grades

### Table A2.4 - Classification for Civil Structures & Buildings Sub-Assets

| Condition Grade | General Meaning | Expected Durability | Capital maintenance |
|---|---|---|---|
| 1<br>Very Good | Sound modern structure, well maintained in "as new" condition. | Asset adequate for the medium term with only routine maintenance | Forseen in the long term |
| 2<br>Good | Sound modern structure, well maintained, but showing signs of minor wear and tear and/or deterioration of surfaces. No evidence of corrosion in structural steel components. | Needs to be re-inspected in the medium term. Unlikely to require more than normal maintenance in the medium term | Forseen in the long term |
| 3<br>Moderate | Functionally sound structure but appearance affected by minor cracking or staining, but no leakage to/from vessels with potable water. Buildings have more than superficial wear and tear as columns are affected by rust staining, minor cracking of brickwork or masonry, with barely adequate pointing. Minor leakage to/from vessels not containing potable water. | Will need maintenance in the short to medium term | Potential for capital maintenance in medium term to prevent deterioration to Grade 4 |
| 4<br>Poor | Structure functioning and just safe but with problems due to significant leakage, cracking, spalling, loss of stability or deformation. Buildings have roof leaks, rising damp, rotting structural woodwork, decayed brickwork or pointing. Corrosion substantially reducing size of structural member(s). Danger of contamination of potable water. | Needs almost immediate maintenance | Needed in short term |
| 5<br>Very Poor | Out of commission because unsafe to use, corrosion causing significant reduction in size of structural member(s) and overstressing, contamination of potable water has been a serious problem. | Out of commission. Requires immediate replacement. | Needed urgently in short term |

## Asset Condition Grades

### Table 2.5 - Classification for Mechanical & Electrical Sub-Assets

| Condition Grade | General Meaning | Expected Durability | Capital maintenance |
|---|---|---|---|
| 1<br>Very Good | Electrically safe. Sound units generally in "as new" condition | Asset adequate for the medium term with only routine maintenance | Forseen in the long term |
| 2<br>Good | Electrically safe. In reasonable condition, but showing signs of minor wear and tear protective coatings still intact. | Some action may be needed in the medium term | Forseen in the medium term |
| 3<br>Moderate | Electrically safe. All components functioning reasonably well. Early signs of significant, rather than superficial wear and tear apparent, more than superficial corrosion. Minor failures or breakdowns have occurred. | Some action will be needed in the medium term | Potential for capital maintenance in medium term to prevent deterioration to Grade 4 |
| 4<br>Poor | Electrically safe. Still functioning, but repeated failures/breakdowns. Significant maintenance costs being incurred. | Needs almost immediate action | Needed in short term to prevent deterioration to Grade 5 |
| 5<br>Very Poor | Electrically unsafe, not working, in extremely poor condition and/or frequently breaking down (in excess of 12 times per year). Health and safety risk. | Requires immediate action. | Needed urgently in short term |

# APPENDIX 3

## GUIDANCE FOR ASSET PERFORMANCE ASSESSMENT

For the Asset Inventory, there are three additional columns within the performance gradings, beyond the Ofwat model. These include:

- **New**: This column is used for the cost of new assets. It is determined from the investment plan and only contains new assets created under the purpose of Quality, Growth and Enhanced Service Levels. Base expenditure is not included, as this does not increase the value of the asset stock; it only improves its performance, condition or risk levels.

- **Dcm**. This column is for assets or sub-assets that are or are expected to become decommissioned, and will be "mothballed" for future usage.

- **Redn**. This column is for the inclusion of assets or sub-assets, which are expected to become redundant in the future. Include all items that are made redundant, whether due to capital investment in new sub-assets or due to strategic changes etc. Redn *does not* include old assets/sub-assets that have been directly replaced in parallel under Capital Maintenance. This is because replacement expenditure is assumed to not change the asset stock value.

Asset performance grades shall be assigned at individual sub-asset level or groups of assets according to Tables H2 through H6.

SW is required to summarise the operational performance of its assets as part of Section H5 of these requirements. An asset that is performing satisfactorily should not require significant work to maintain its performance in the following five years. After five years, the assessment of investment needs would look to forecasts of growth in requirements and deterioration of the serviceability of the asset.

The basis for asset performance shall comply with the general classification as set out below.

| | |
|---|---|
| Water mains | Table A3.1 |
| Sewage pumping mains | Table A3.2 |
| Sewers, other structures and sea outfalls | Table A3.3 |
| General classification for above ground assets | Table A3.4 |

SW shall use the above performance grading system classifications or alternatively state and use an appropriate performance grading system that is consistent with that given in Tables A3.1- A3.4.

SW may wish to develop and define a range of performance indicators for specific asset types or groups of assets and to state threshold levels for

capital maintenance expenditure. In this case, SW shall exclude all aspects considered under the asset condition grading system as set out in Appendix 2 of these requirements. By way of example and for guidance purposes only, typical sample asset performance indicators are included as follows:

| | |
|---|---|
| Sewage treatment works (typical) | Table A3.5 |
| Biological filters (typical) | Table A3.6 |

Similar grading systems may be prepared for other asset groups such as water treatment works and sewer structures.

**Performance Grades**

**Table A3.1 - Water Mains**

| Performance Grade | General Meaning |
|---|---|
| 1<br>Excellent | Smooth bored mains and communication pipes not subject to corrosion or with sound factory applied linings, no operational performance problems. |
| 2<br>Good | As 1, but with loose deposits that are noticeable under abnormal flow conditions, slight tuberculation which may give a rough surface, but does not substantially reduce the cross-sectional area of the pipe. May require routine flushing or air scouring. |
| 3<br>Moderate | Some problems with loose deposits or deterioration of linings leading to occasional complaints. Risk of quality failure. Pipe with tuberculation causing up to 20% blockage by encrustation. |
| 4<br>Borderline | Frequent problems causing complaints, water quality known to have failed on more than one occasion under normal operating condition during previous twelve months. Mains with tuberculation causing 20-40% blockage by encrustation. |
| 5<br>Fail | Main suffering severe problems of infestations and loose deposits. Water quality cannot be ensured. Mains with tuberculation causing >40% blocking by encrustation. |

Note: For water mains: references to water quality do not apply to non-potable water.

## Performance Grades

### Table A3.2 - Sewage Pumping Mains

| Performance Grade | General Meaning |
|---|---|
| 1<br>Excellent | Smooth bored mains not subject to corrosion or with sound factory applied linings, no operational problems. |
| 2<br>Good | As 1, but with loose deposits that are noticeable under abnormal flow conditions, slight tuberculation which may give a rough surface, but does not substantially reduce the cross-section area of the pipe. May require routine flushing or desilting. |
| 3<br>Moderate | Some problems with loose deposits or deterioration of linings leading to occasional blockage. History of occasional pipe with tuberculation causing up to 20% blockage by encrustation. |
| 4<br>Borderline | Frequent problems causing blockage on more than one occasion under normal operating condition during previous twelve months. Mains with tuberculation causing 20-40% blockage by encrustation. |
| 5<br>Fail | Mains suffering severe problems of blockage. Pumping performance cannot be ensured. Mains with tuberculation causing >40% blockage by encrustation. |

## Performance Grades

### Table A3.3 - Sewers and Sea Outfalls

| Performance Grade | General Meaning |
|---|---|
| 1<br>Excellent | Properly designed, with self-cleansing velocity, no deposition or operational performance problems. |
| 2<br>Good | As 1, but with sliming or minor deposition causing some hydraulic loss of pipe capacity. |
| 3<br>Moderate | Sewers with some sliming and deposition, minor backfalls causing loss of pipe capacity and surcharging of sewer at times of peak flow. |
| 4<br>Borderline | Sewers which need to be occasionally cleaned out to prevent blockages, blockages within sewer occurring less than 1 in 5 years due to silting, which can lead to external flooding of property. |
| 5<br>Fail | Sewers requiring excessive desilting, or other excessive maintenance to prevent flooding of property or premature operation of storm overflows. |

## Performance Grades

### Table A3.4 - Above Ground Assets including Other Sewer Structures

| Performance Grade | Description | General Meaning |
|---|---|---|
| 1<br>Excellent | (100% on all aspects) | Meets all design and statutory requirements at all times and under all demand conditions. Meets authority's internal standards at all times in terms of performance. |
| 2<br>Good | (100% on key aspects or > 95% on other aspects) | As 1, but shows minor performance shortcomings in non-critical aspects or under extreme demand or climatic conditions. |
| 3<br>Moderate | (equivalent to > 90% on all aspects) | Asset meets all statutory and performance criteria under all normal conditions, but has minor shortcomings under extreme operational or climatic conditions. |
| 4<br>Borderline | (equivalent to > 75% on all aspects) | Performance or operational shortcomings have a significant effect on asset function/effectiveness when capacity exceeds 115% of average throughput or major shortcoming on one or more key aspects. |
| 5<br>Fail | (equivalent to < 75% on all aspects) | Substantially incapable of meeting externally imposed and authority's internal standards except under normal or reduced operating conditions. |

## Performance Grades

### Table A3.5 - Sewage Treatment Works (typical)

Performance grades are provided for:

- the overall works as an asset equated to consent conditions and,
- individual sub-process stages or sub-assets, which may have proven failings or are in such a poor physical state that process failure can be assumed or anticipated. This performance may also impact directly or may contribute to the overall poor performance of the works.

| Performance Grade | General Meaning |
|---|---|
| 1<br>Excellent | Hardly ever has a sanitary determinand failure and no more than 20% of look-up table allowance where more than 100 samples are taken per year. No non-sanitary failures. |
| 2<br>Good | More than 20% and less than 50% of look-up table allowance for sanitary determinand failures. No non-sanitary failures. |
| 3<br>Moderate | Some cause for concern. More than 50% of look-up table allowance for sanitary determinand failures, but still a slight margin for further failures before becoming borderline (Grade 4). No non-sanitary failures. |
| 4<br>Borderline | Cause for concern, due to isolated, but explainable breaches of the consent. The next failure of sanitary determinand will cause failure of consent. No non-sanitary failures, although there is less than 5% margin on any one determinand during the last year. |
| 5<br>Fail | Recurrent consent failures on either sanitary or non-sanitary determinands or exceedance of discharge rate. |

## Performance Grades

### Table A3.6 - Typical Biological Filters (Conventional)

| Performance Grade | General Meaning |
|---|---|
| 1<br>Excellent | Media appropriate and in good condition. No ponding at any time. Performance is such that it can deal with effluent from inefficient or overloaded primary settlement stage. |
| 2<br>Good | Media appropriate and in good condition. No ponding at any time. While able to produce excellent results, its own performance depends on primary settlement stage being efficient in solids removal. |
| 3<br>Moderate | Some cause for concern. Some ponding occurs at times. May be causing or contributing to the overall works performance being Grade 3, or worse. Its own performance is very dependant on the performance of the primary settlement stage being better than that required to meet design parameters and/or because there is a need for recirculation. |
| 4<br>Borderline | Cause for concern. Significantly overloaded. Quite severe ponding occurs for parts of the year and there are significant amounts of growth on the media. It is the main cause for the overall works performance being Grade 4, or Grade 3, where the efficiency of other units partly compensates. |
| 5<br>Fail | Severe ponding all year long. Significant amounts of growth on the media. Water flows across parts of the surface of the beds to a point where it can either escape or pass through only part of the media. Irrespective of the efficiency of other parts of the plant it is the main cause of the overall works performance being grade 4 or 5. |