

YORKSHIRE WATER SERVICES LTD
PERIODIC REVIEW 2009
PART C3 – ASSET INVENTORY

PERIODIC REVIEW 2009 – FINAL BUSINESS PLAN
PART C3 – Asset Inventory

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1. OVERVIEW

1.1. INTRODUCTION

1. The Asset Inventory has been completed in line with Ofwat's reporting requirements. The Company has established processes and tools that are used in our asset management processes. These processes and tools support our approach in LEADA (Leading Edge Asset Decision Assessment) to comply with the requirements of MD161 and the UKWIR Common Framework. These information systems and approach to asset management planning have formed the basis of the information used in the asset inventory and revaluation submission. Further explanation of the approach and techniques used in asset management is set out in section B3 of the Final Business Plan (FBP) submission.
2. In accordance with RD12/07 a full revaluation has been undertaken on a modern equivalent asset (MEA) basis. The vast majority of above ground assets have been surveyed, and for the remainder sampling techniques have generally been used.
3. It is 10 years since the last full revaluation was carried out and this has resulted in a step change in the gross MEA and net MEA values. The reasons for the changes are outlined within the detailed commentary and in section B.7 of the FBP.

1.2. OBJECTIVES OF THE SUBMISSION

4. The purpose of this section is to:-
 - Summarise the latest investigations and reviews of the Company's asset stock as at 31 March 2008, including the condition and value on a MEA basis
 - Demonstrate that we have maintained serviceability to customers and the environment
 - Demonstrate we have appropriate systems and processes for recording and maintaining our assets.

1.3. FORMAT OF THE SUBMISSION

5. The format of the submission complies with Ofwat's requirements, follows the structure of the reporting requirements and comprises the accompanying sections:
 - Overview of the information systems that underpin the management of the Company's assets (section 2)

- Summary of Company's asset stock (section 3)
- Summary of the new asset valuation (section 4)
- Condition -including summary age profiles for mains and sewers as at 31 March 2008 (section 5)
- Changes in asset condition since 31 March 1998 (section 6).

1.4. *SUMMARY OF CHANGES SINCE DBP SUBMISSION*

6. A number of further refinements have been made to the C3 tables and associated commentary since the Draft Business Plan (DBP) submission.
7. Overall the gross MEA valuation has increased by 0.7% from £35,469.8m to £35,714.5m.
8. Although the gross MEA value has increased, due to the mix in asset lives the overall current cost depreciation (CCD) charge on base assets for 2007/08 has slightly reduced from £205m to £202m.
9. Outlined below is a summary of the main changes:-
 - General updating of Unit Cost Database (UCD) cost models to include data from completed schemes up to November 2008 (section 4.1)
 - Further quality assurance work on Above Ground Asset Surveyor Predictor (AGASP) surveys and updating where appropriate (section 4.1)
 - Review and updating of water pumping station valuation for civil structures and buildings (section 4.2.5)
 - Review and amendments to W1 Water Treatment works asset stock numbers and valuations (section 3.1.1.3 and section 4.2.3)
 - Inclusion of additional mains burst information on Table 3.1a and associated commentary (section 5.1.9)
 - Review and updating of meter valuation to fully reconcile to reported JR08 number of meters (section 4.2.9)
 - Review and updating of sewage pumping station valuation for civil structures and buildings (section 4.4.5)
 - Review and updating survey data for Hull West and Hull East sewage pumping stations (section 4.4.5, section 5.2.3 and section 6.2.5)
 - Review and updating of Combined Sewer Overflow (CSO) survey information and valuation (section 4.4.3)
 - Review and updating of Other Sewer structures asset stock and valuation (section 3.2.1.2 and section 4.4.4)
 - Review and updating sewer condition grading (section 5.2.2, 5.2.3, 6.2.1, 6.2.2)

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- Review and updating of sea outfall survey information and valuation (section 3.2.1.5 and section 4.4.7)

2. REPORT ON INFORMATION USED FOR ASSET MANAGEMENT PLANNING

2.1. INTRODUCTION

10. Yorkshire Water manages its records within integrated forums of computer applications. The forums that make up the Asset Registry can be categorised as:-

- Asset Records
- Operational Process Records (Including Customer Records)
- Investment Planning Records
- Financial Records
- HR Records

11. These forums make up the Asset Inventory register in its entirety. This section identifies the key systems and principles of asset records management and also describes the asset record relationship with the other forums. The asset records are structured, designed and managed to achieve the following:

- Meet the needs of the Company Vision and Strategic Direction Statement
- Comply with legal requirements
- Meet operational needs
- Deliver efficiency.

2.2. ASSET RECORDS

12. The asset records are stored on seven integrated computer applications. These systems are integrated with each other and systems within the other forums. The asset record systems are listed below:-

- Asset Inventory (AI2)
- Geographical Information System, Odyssey (GIS)
- Boundaries and Zones management System (BOZO)
- Regional Operations Database (ROD)
- AIB (Asset Information Base) Schematics
- Engineering Document Management System (EDMS)

Business Risk Model (BRM)

- 13. The asset records are managed as an asset and follow the asset management principles and lifecycle. This management approach is summarised in figure 1 below.

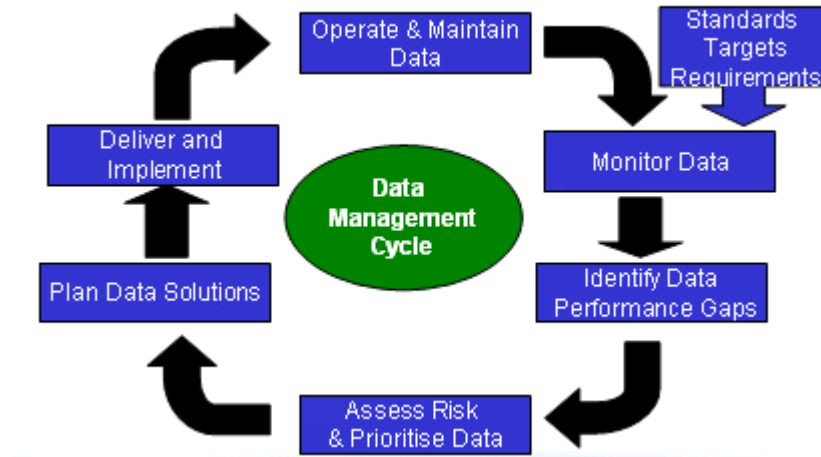


Figure 1: The data management cycle

- 14. The asset records processes and procedures have been assessed and certified as meeting the requirements of ISO 9001:2000. This important third party endorsement demonstrates our commitment to quality information upon which to base our investment decisions.
- 15. The defining and identification of data standards, data targets and data requirements underpin the structure and complexity of the asset record. These have driven the development of the record and ensure the record provides information to comply with its legal requirements and enables the Company to update its underground asset management plan in accordance with Condition L of the Instrument of Appointment.
- 16. Our engineering specification sets out what records are required from Contract Partners as a result of capital works. A dedicated Asset Records team monitor the records supply chain to ensure the appropriate records are received and recorded in the appropriate application.
- 17. Updates, amendments and changes to the asset record are triggered in two ways:

- o Capital works- Financial records identify expenditure and scheme progress milestone dates. These records are used to monitor progress of capital works and ensure that the contract partner provides the necessary records at the appropriate time. If the record is not provided the dedicated Asset Records team contacts the contract partner to ensure the appropriate records are received and recorded.
 - o Operational activity - As part of normal day to day activities, staff assess the asset record for reference purposes. If they identify a record that needs amendment they use the appropriate amendment tool, a change request facility or a redlining facility. These tools form part of the records application. In this way amendments are sent to the dedicated Asset Records team who quality assure the amendment and integrate it into the asset record as appropriate.

- 18. The asset records systems are available on the PC network and all staff have access to the systems. Training programmes ensure that staff achieve a minimum level of competency. Mobile workers also have access to the asset record systems via a toughbook.

- 19. To minimise the risk of poor data quality the business has put in place processes and mitigation plans to ensure the quality of the record is not compromised. The elements of this mitigation plan consist of:-
 - o Dedicated Asset Records team to manage the asset record
 - o A records maintenance process that is ISO accredited (external and internal audits)
 - o Monitoring of work activity and capital works to ensure records are provided following completion of work
 - o An Ofwat reporting process and communication chain that ensures auditors comments relating to records non-conformity are identified and fed through to the dedicated asset record team
 - o Dedicated computer systems to hold specific records
 - o Regular external audits and benchmarking initiatives
 - o Operational reviews and challenges including a control room reporting process following operational incidents
 - o IT systems that automatically identify record anomalies

- 20. Asset records and asset plans are essential and underpin good asset management and operation. Good quality assured asset records are at the heart of an efficiently operated and maintained water company. The key asset record systems in Yorkshire Water are identified below. The AI2 and GIS form the foundation and referencing system that integrates all the other record applications.

21. The AI2 system holds data in a hierarchical structure. Different types of assets are associated with different logical levels in the hierarchy. This type of structure is object orientated. A key advantage of this structure is that it enables other applications and data to be linked. Each level in the hierarchy has an associated number of asset types. Each Asset type also has its associated attribute data level:
- 1 - Asset Hierarchy Structure
 - 2 - Business Unit
 - 3 -Business Unit grouping -Water Supply System (WSS) or Catchment
 - 4 - Function Type
 - 5 - Installation Type
 - 6 - Process Group
 - 7 - Process
 - 8 - Plant Item
 - 9 - Plant Equipment.
22. Using the hierarchy enables different types of assets and information to be integrated into a consistent format and brings structure to the Asset Register. For example a Distribution Management Area (DMA) record within AI2 can be used to initiate the GIS and display the DMA selected from AI2.
23. The GIS holds spatial data in the form of displayable overlays. Over 100 different overlays are available to the business via different user types.
24. The water network overlay and sewer network overlay are displayed against the positional accurate Ordnance Survey maps. Eight map scales are used from 1:1,200,000 (Outline) to 1:650 (MasterMap). It is possible to zoom in on any area of the map.
25. The customer property overlay shows the location of the customer's property. The customer contact overlay show real time customer contacts.
26. The property records are linked to the water network overlay and sewer network overlay and all the associated assets.
27. Each overlay is linked to every other overlay within the GIS system. This enables the business to provide information linking the performance of the asset with service to customers. Jobs (e.g. repair a burst) are raised via Point and Promote. These jobs are all displayed within the appropriate overlay within the GIS.

28. The GIS contains a redlining tool that assists in maintaining the record and ensures the highest data quality level. Users of the GIS can submit a 'redline' from any personal computer. These redlines are received by the Asset Records Team who quality assure the record and integrate it into the master record. The service level for this work is to integrate the 'redline' into the record within 24 hours.
29. The Odyssey GIS holds digitised records of water mains and sewers for the Yorkshire Water region. The system acts as both a mains record system for the operation of the company and also as a detailed asset register. The system is maintained and all rehabilitation work is updated on the system following the completion of work on site. As laid drawings from the rehabilitation contractors are updated on the system, these are governed by a quality assurance system with independent checks being made on the plans submitted. Updating of as laid drawings is cross checked against the Capital Management System (CMS) to ensure that all schemes are updated.
30. The Water Industries Act 1991 and NRASWA (New Roads and Street Works Act) define what records including map records should be provided by the business to other organisations and members of the public. The Water Industries Act 1991 and Part VII Section 199, relates to the provision of sewer maps and the categorisation of sewers drains and disposal main. The locations of all sewers vested in Yorkshire Water are recorded along with other relevant particulars. A new developments process ensures that adoptable sewers are also recorded. District council boundaries are recorded and enable records, in relation to each local authority, to be accessed via the GIS or our Web interface to the GIS.
31. The BOZO system and its GIS Overlays provide a hierarchy of zones. Zones are defined in line with operational and reporting requirements. Zone hierarchies are in place for the Water Business unit (WBU) and one for the Environmental Business Unit (EBU).
32. The WBU zone hierarchy is made up of areas defined by a boundary line. The relationship between the zones forms the hierarchy. Yorkshire Water Region, WSS, Production Management Zones (PMZ), Water Supply Zones (WSZ) and Distribution Management Areas (DMA). This hierarchy enables Integrated Zone Management (IZM) and operates as shown in figure 2.

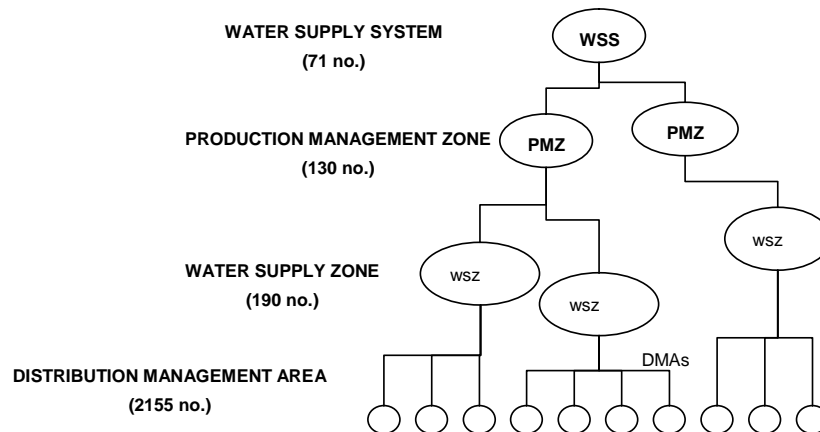


Figure 2 - Integrated Zone Management Hierarchy – Asset Hierarchy

33. The DMA Zone is the reporting unit which best describes the management of the distribution system and the level of provision of service to the customers within a hydraulically discrete area. The implementation of initiatives to reduce leakage, low pressure and interruptions to supply are all measured at DMA level. Asset management studies undertaken by the Company are based at WSS, Water Supply Zone level or at DMA level.
34. IZM is designed to create a pro-active, sustainable approach to the management of the distribution network. IZM is delivering for Yorkshire Water the necessary processes, systems and tools to ensure a sustainable distribution network infrastructure capable of supporting the required levels of service and compliance, and enabling the pro-active management of operational assets and resources, delivering value to the customer and the Company.
35. Distribution Asset Management Plans build on the approach aligning our LEADA process and the Common Framework for Capital Maintenance Planning. Water safety plans are being used to identify hazards to the water supply system. This includes the use of systems which are accredited through ISO9000 and bespoke risk based systems including asset criticality studies.
36. The Environmental Business Unit zone hierarchy is made up of the following levels. Yorkshire Water region, Asset Management Zones, Drainage Area Zones (DAZ) and Independent Hydraulic Area.
37. ROD holds performance records associated with assets. These records are captured via the Telemetry system. Typical data includes flows,

pressure, pump stop/start, high/ low alarms. The laboratory management process is also integrated into ROD. Analysis of water quality results and other laboratory analysis are captured in ROD. These results are held against sample points. The sample point references are inked to AI2 and other applications. AI2 can list all the sample points associated with each asset. When ROD is used in conjunction with AI2 and GIS the performance of the asset can be linked to the service to customers. Specialist applications, such as Shortfalls, pulls the data from these sources to derive additional information

38. AIB Schematics are intelligent pictures, which show how assets are connected to each other. These schematics cover both the Water Business Unit and Environmental Business Unit assets. The pictures show connectivity and aid understanding of the relationships between assets. When risk data is added to the schematic (via the overlay selection) the connecting link between assets are colour coded. These colour coded connections delivers a common understanding of the risk to all users of the schematic and enable the business to prioritise work activities to minimise the risk to customers. Installation schematics show the connectivity of plant items within installations. These schematics are effectively P and I (Process and Instrumentation) diagrams representing each works. The schematic in figure 3 represents detailed specific risks associated with the network.

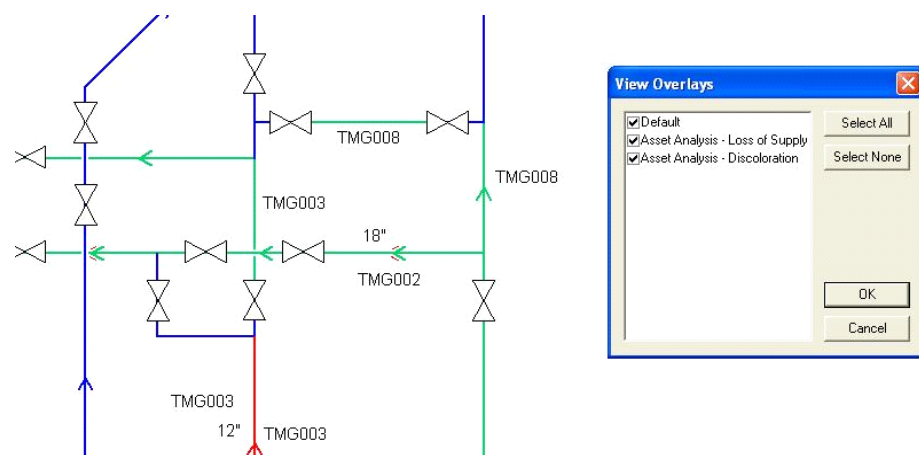


Figure 3 – Example of AIB schematic of network risks

39. The EDMS is the company repository for Operation and Maintenance (O&M) manuals, Health and Safety files and drawings, photographs and other asset related documents. EDMS is structured in line with the AI2

hierarchy. This facilitates the retrieval of documents for each installation and enabled the business to comply with the CDM regulations.

- 40. The BRM application stores identified risks associated with the assets recorded in AI2 and the GIS. Risk categories are selected from pre defined lists and assigned to the asset as failure scenarios. BRM also stores possible solutions that would mitigate the risk. Additional details about BRM are contained in the investment planning records section.

2.3. OPERATIONAL PROCESS RECORDS

- 41. To enable us to be the company of choice and earn the respect of our customers we utilise an Integrated Customer and Operations Management (ICOM) system. The integrated IT infrastructure developed has enabled us to provide a single view of all customer contacts and accessing all customer information, together with real time visibility of progress of all work on the Company’s assets.

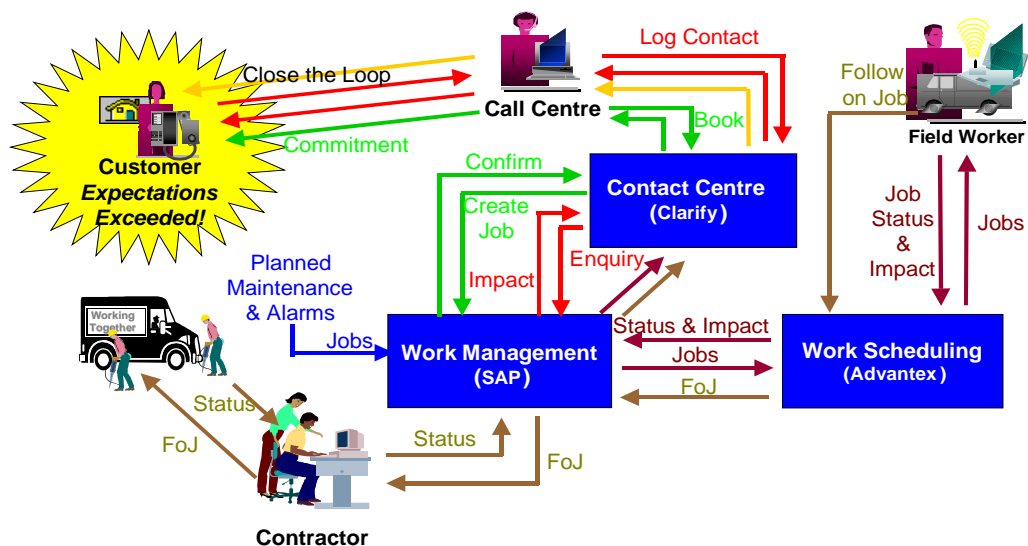


Figure 4 - Integrated Customer and Operations Management (ICOM) system

- 42. The Work Management System (WMS) is one of the SAP modules and is used to initiate and record jobs. These may be routine maintenance jobs that are repeated at set interval or emergency type jobs. WMS allows prioritisation of jobs and the allocation of jobs to groups and individuals. Within WMS jobs are categorised by type. Burst water main is one type of job. The history of the job and all the associated activities are logged. This provides detailed information about the burst, the staff involved, the

- cost and the time taken to repair. The burst data and all customer contact date have GIS overlays. WMS is integrated with GIS. This ensures that the Regional Operations Control Centre (ROCC) has both a detailed view of individual jobs and a high level view of every job and customer contact in real time. WMS is a key system within the ICOM environment of applications.
43. Advantex is the scheduling system and sequences WMS jobs. In this way jobs are prioritised to meet operational and customer needs.
 44. Clarify is used in the contact centre and logs customer contacts. The three systems WMS, Advantex and Clarify make up the ICE (Integrated Customer Environment)
 45. WMS jobs that are suspected of being pollution incidents or flooding incidents are transferred to a register where records of investigations are held. Deficiencies as a result of pollution incidents are addressed by changes in procedures in the form of standing instructions, minor improvement works or capital schemes.
 46. WRAP (Water Resource Application Plan) monitors and predicts water demand and programmes works outputs to meet the demand. This process enables the efficient operation of the network. A major step change in the development of our asset management IT system is the introduction of Real Time WRAP. This ensures the optimum programme is managed and maintain for the secure supply of water to our customers at all times.
 47. The Shortfalls Monitoring System (SMS) assesses asset performance. It identifies performance gaps and how efficient the Company's assets are and where improvements need to be made. The SMS constantly reviews asset performance against defined targets and reports by exception to Asset Managers. Shortfalls provides monitoring, exception reporting and normalisation (which aids consistent comparison of performance) of compliance, chemicals and energy usage, number of maintenance jobs, telemetry alarms and customer contacts for treatment works, pumping stations and drainage and distribution zones. The SMS identifies risks in both above and below ground assets. The distribution, operation and maintenance risk matrix, shown in figure 5, is an excellent example of this. Identifying distribution zones which are at risk of discolouration events via a traffic light system and allowing the management of these assets through operation mitigation or capital investment.

DMA	DMA Name	Prop Count	W/SZ 2004	W/SZ	MSP	Matrix Colour Apr08	Matrix Colour Jun08	Matrix Colour Jul07	Matrix Colour Apr07	DOMS score	DMA within Priority A of TM prog (TM section named)	Priority of W/SZ within TM prog (Disc/W/SZ)	W/SZ of M > 50%	W/SZ of Fe > 50%
D438	OVSTON FERRY	504	Doncaster Rural	CANTLEY WATER SUPPLY SYSTEM	0	Green	1 Green	1 Green	Amber	2	5	A	Y	Y
D440	HYDE PARK SOUTH	526	Doncaster Urban	CANTLEY WATER SUPPLY SYSTEM	4	Amber	2 Amber	2 Green	Amber	2	7	A	Y	Y
D442	FINNINGLEY	1155	Doncaster Rural	CANTLEY WATER SUPPLY SYSTEM	1	Amber	2 Amber	2 Amber	2 Red	3	9	A	Y	Y
D443	HYDE PARK NORTH	755	Doncaster Urban	CANTLEY WATER SUPPLY SYSTEM	4	Amber	2 Amber	2 Amber	2 Amber	2	8	A	Y	Y
D460	ST JAMES STREET	525	Doncaster Urban	CANTLEY WATER SUPPLY SYSTEM	4	Green	1 Green	1 Green	Amber	2	5	A	Y	Y

Figure 5 - Distribution, Operation and Maintenance risk matrix

48. Asset Managers review poorly performing assets using performance data to determine the most appropriate course of action whether through cheaper operational practice or capital investment. Asset risks promoted through the company risk tool, BRM and prioritised by the LEADA (Leading Edge Asset Decisions Assessment) suite for an optimal programme. JUT (Joined Up Thinking) for Electrical and Mechanical (E&M) plant monitors maintenance at plant item level (e.g. a pump), flags up exceptions (e.g. large numbers of breakdowns) and has the facility for whole life cost comparisons of opex or capex solutions.
49. Telemetry data is linked by the Regional Telemetry System (RTS) to Regional Operations Control Centre (ROCC), where the alarms are received and actioned 24 hours a day. Information generated by the RTS system, both alarm status and on line instrumentation output, is held on the ROD and used to inform decisions on asset maintenance and replacement. The RTS includes Water Treatment Works (WTW's), Water Water Treatment Works WWTW's), Pumping Stations, Reservoirs, and Combined Sewer Overflows (CSO's).
50. RTS data on the status of the asset, including flow, pump status, wet well levels and chlorine residual levels amongst others, are collected via the RTS and held on the ROD for trend analysis to increase understanding of asset performance and enable more efficient asset management to be effected.
51. SCADA (Supervisory Control and Data Aquisition) is used on large works. The systems are integrated with RTS and ROD. This data, when linked to energy and chemical usage, provides real time cost information for the works.

2.4. INVESTMENT PLANNING RECORDS

52. BRM contains a risk based scoring system and utilises a 5 x 5 risk matrix based upon probability of impact, severity of impact and quantity of impact. The matrix has red, amber and green traffic lighted areas. The red area is

the area of unacceptable risk, the green is acceptable risk and the amber area is in between. Risks in the amber area are constant monitored for signs of movement/deterioration. This allowed Yorkshire Water to quantify and compare risk across the whole business. This risk based approach is integrated into the LEADA process, which brings together asset management, risk management, and investment planning processes. Our stated objective for LEADA is to 'maximise the service from every pound we spend on our assets. For PR09, LEADA+ (an enhanced version of LEADA) has delivered an economic assessment and optimisation of capital maintenance in line with the UKWIR common framework for capital maintenance planning.

53. The Above Ground Asset Surveyor Predictor (AGASP) is used to predict the probability, and consequence, of failure for above ground assets. Site survey results are uploaded into the system which then produces failure scenarios and solutions for transfer into the BRM+. This process is covered in detail in the AGASP Technical Approach, which has been made available to SMC (Ofwat Certifiers).
54. The Below Ground Asset Surveyor Predictor (BGASP) is used to predict the probability, and consequence, of failure for water mains and sewers. Statistical modelling is employed to make predictions based on the nature of a pipe, its environment and past history. The system then produces failure scenarios and solutions for transfer into the BRM+. This process is covered in detail in the BGASP technical approach, which has been made available to SMC (Ofwat Certifiers).
55. CMS is integrated with SAP, WMS and ICOM. CMS is used for capital expenditure forecasting and tracking. CMS and the related systems are available throughout the company via the corporate network. High cost areas can be targeted and costs reduced where possible, using best practice techniques including waste minimisation, energy saving and procurement methods. Capital solutions and delivery is a key output of the asset management process.
56. The Investment Authorisation Procedures (IAP) ensures appropriate levels of authorisation and approvals are obtained throughout the life of a scheme. The IAP holds the Needs Authorisation (NA), Project Authorisation (PA) and Solution Authorisation (SA) forms. These forms are required to approve a scheme. If approved by the regional challenge group, Investment Planning raise an IN (Investment Need) electronically from the BRM entry using the IAP database. The IN specifies the problem description, assets involved, cost etc. The IN provides data at a scheme outline level. The Solution Manager (SM) forms a Core team with the

Business Unit Sponsor. The SM issues a brief to the contractor with details of the problem and a target cost based on an obvious solution. A core team is established and a preferred solution agreed and submitted via the Solution Authorisation (SA) process for approval.

57. Prior to the scheme solution proceeding to a detailed design, CMS is used to track the progress of the scheme to time, cost and for outputs and activities. On completion of each capital project, agreed procedures are in place, which require 'as-built' records and documentation to be completed by the contractors before final payments can be made, so that company asset records can be updated. Completion of the schemes to time and cost, activities and outputs is monitored by CMS. Lessons learned from schemes are monitored by post project reviews. To deliver capital schemes, we have two main contract structures including 6 Joint Delivery Teams and 4 Large Scheme Contractors, 2 Repair and Maintenance (R&M) contract partners for work on distribution assets and 2 Sewer R&M contract partners. All the contractors work in pre-defined geographical areas.
58. Framework suppliers are employed where bulk ordering of appropriate quality goods can provide a competitive advantage and reduce maintenance costs and spares holding. Framework suppliers work with the contractors and input to company design standards and standard designs.

2.5. FINANCIAL RECORDS

59. SAP is used to manage Company finances and an extensive suite of modules are available. SAP is linked to AI2 and via the hierarchical key all asset costs are assigned to the individual assets. This enables the Company to understand and monitor asset expenditure.
60. SAP is integrated with WMS, ICOM and CMS, which is used for capital expenditure forecasting and tracking. These systems are available throughout the Company via the corporate network. High cost areas can be targeted and costs reduced where possible, using best practice techniques including waste minimisation, energy saving and procurement methods.

2.6. HR RECORDS

61. SAP is used for the recording of Human Resources (HR) records. Staff training records and competency profiles ensure the Company has an understanding of its management capability. Where gaps are identified

appropriate recruitment or development programmes are put in place. Managers assign priorities and objectives to staff based on business plan targets. The HR records in SAP link to operational assets and standby rotas. This enables the Company to identify staff costs associated with the operation of assets

3. SUMMARY ASSET INVENTORY

3.1. ASSET STOCK – CLEAN WATER

62. Table 1 is an extract of the asset stock section within Table C3.1.

		Summary of asset stock								
Description	Units	Band 1	Band 2	Band 3	Band 4	Band 5	Total	CG		
A Group 1 - Water resources										
1	Dams and impounding reservoirs	nr	113	10	2	1		126	A1	
2	Raw water aqueducts	km	267.00	364.00	367.00	621.00		1,619	A1	
3										
4										
B Group 2 - Water treatment works										
5	SD treatment works	nr	0	0	0	0	0	0	A1	
6	W1 treatment works	nr	8	0	0	0	0	8	A1	
7	W2 treatment works	nr	12	12	0	0	0	24	A1	
8	W3 treatment works	nr	4	5	8	7	1	25	A1	
9	W4 treatment works	nr	0	3	2	4	3	12	A1	
10										
11										
C Group 3 - Water storage										
12	Service reservoirs	nr	201	143	45	40	23	452	A1	
13	Water towers	nr	19	10	11	3		43	A1	
14										
15										
D Group 4 - Pumping stations										
16	Intake pumping stations	nr	0	1	4	2	4	11	A1	
17	Source pumping stations	nr	70	60	44	4	4	182	A1	
18	Booster pumping stations	nr	146	125	143	79	32	525	A1	
19										
20										
E Group 5 - Water mains										
21	Potable mains (up to 320mm)	km	24,343.00	4,259.00				28,602	A2	
22	Potable mains (greater than 320mm)	km			1,761.00	511.00		2,272	A2	
23	Other mains	km	0.00	0.00	0.00	0.00		0	A2	
24	Ancillaries - customer (infrastructure)	nr	480,941	6,981	1,114,860				A2	
25	Ancillaries - customer (non-infrastructure)	nr				688,113	128,593		A2	
26										
27										
F Group 6 - Management and general										
28	Offices and laboratories (total area)	m ²	9,660.00					9,660	A3	
29	Depots and workshops (total area)	m ²	6,618.00					6,618	A3	
30	Vehicles									
31	Telemetry systems	%	86.0%	26.0%					A3	
32	Computers	nr	2,522	0	275				A1	
33										
34										
35										
36										
37										

Table 1: Water Service asset stock profile

3.1.1. *Commentary and Reconciliation with PR04*

3.1.1.1. *Dams and Impounding Reservoirs*

63. The total number for this submission is 103 Impounding Reservoirs (IRE) and a further 23 installations classified as Pumped Storage Reservoirs or Bankside Storage. The overall reduction of 9 assets is due to 1 impounding and 7 pumped storage reservoirs or bankside storage being demolished, abandoned or decommissioned. One asset previously reported as an impounding reservoir has been re-designated as a Storm Water Lake and consequently is reported in Other Sewer structures. The confusion around this asset arose because it falls within the Reservoir Safety Act. For this PR09 return the Company has banded them in accordance with the Ofwat reporting requirements (MI/d). Information on Dams and Impounding Reservoirs has been abstracted from AI2. Table 2 shows the change in numbers over the 4 Periodic Reviews.

	PR94	PR99	PR04	PR09
Nr.	124	142	135	126

Table 2: Change in Dams and IRE asset numbers

3.1.1.2. *Raw Water Aqueducts*

64. We have employed OVIC consultants again to carry out a full survey of all Raw Water Aqueducts and Catchwaters. The Catchwaters are made up of pipes, tunnels, channels and culverts and are classed as a conveyor of raw water. As a result of this survey the total length has been identified at 1619km. We have banded the lengths in accordance with the reporting requirements. Table 3 shows the change in numbers over the 4 Periodic Reviews.

	PR94	PR99	PR04	PR09
Nr	n/a	1,188	1,619	1619

Table 3: Change in Raw Water Aqueduct asset numbers

3.1.1.3. *Water Treatment Works*

65. The requirements covering water treatment have changed since the PR04 FBP and are more closely aligned with the June Return submissions where the current categorisation is SD to W4.
66. The total number for this submission is 69, an overall reduction of 17 due to works being demolished, abandoned or decommissioned as part of the Water Treatment Rationalisation programme.

67. Since the DBP submission a further 6 works have been added to the category W1. These installations consist of very small treatment processes at our 'concessionary supplies'. Previously these have been excluded from asset stock numbers (in the Periodic Review and June Returns) as the output does not enter the distribution network. However, the asset valuation and capital programme formulation have included these works, therefore they have now been included in the FBP asset stock for consistency. In addition, recent DWI guidance has stated that concessionary supplies are now sampled on the same basis as water treatment works and hence we are counting them as such.
68. All works have been banded and categorised in accordance with the reporting requirements. Information on Water Treatment installations has been abstracted from the AI2. Table 4 shows the change in numbers over the 4 Periodic Reviews.

Type	PR94	PR99	PR04	PR09
SD	0	0	0	0
W1	39	80	5	8
W2	37	32	8	24
W3	0	0	6	25
W4	0	0	67	12
Total	76	112	86	69

Table 4: Change in Water Treatment Works asset numbers

3.1.1.4. *Service Reservoirs*

69. The total number for this submission is 452 an overall change of 25 due to 21 new reservoirs being commissioned and 46 reservoirs being demolished, abandoned or decommissioned. The difference across the bandings is due to capacity changes or better information. The information has been abstracted from the AI2 and banded in accordance with the reporting requirements.

3.1.1.5. *Water Towers*

70. The total number of Water Towers for this submission is 43, an overall reduction of 5 due to towers being demolished or abandoned. The information has been abstracted from AI2 and banded in accordance with the reporting requirements. Table 5 shows the change in numbers over the 4 Periodic Reviews.

Asset type	PR94	PR99	PR04	PR09
Service Reservoirs	422	502	477	452
Water Towers	57	51	48	43

Table 5: Change in Service Reservoir and Water Tower asset numbers

3.1.1.6. Pumping Stations

71. The numbers for this submission are 11 Intake, 182 Source and 525 Booster stations. The numbers reported have changed due to the establishment of some new pumping facilities and the abandonment and decommissioning of others. The information has been abstracted from AI2 and banded in accordance with the reporting requirements. Table 6 shows the change in numbers over the 4 Periodic Reviews.

Asset Type	PR94	PR99	PR04	PR09
Intake	9	10	13	11
Source	126	169	199	182
Booster	277	433	511	525

Table 6: Change in Pumping Station asset numbers

3.1.1.7. Mains – Potable

72. Potable mains lengths (nominal bore) has been calculated by extracting a report from the Company GIS, and is shown in table 7.
73. At JR98 we reported the following;

“Over the past few years the Company has been developing a GIS (Geographical Information System) that digitizes the mains activity. For this return this system has been used to report the total length of main and an increase is reported in line 10. Information is held at Leakage Control Zone level which covers approximately 2000 zones. Due to improved quality information the Company has increased the total length of mains by 1400km. Information relating to unlined iron/steel mains also shows an adjustment from the previous year”.

74. At JR02 we revised the reporting mechanism such that the length could be reported for the whole region not by Leakage Control Zone. This identified a variance in the methodologies of some 600km less if calculated on a regional basis than by summing lengths at a Leakage Control Zone level. We have continued to track this variance on the assumption that the variance would reduce over time. However, as the variance has not

reduced it is now appropriate to move to the figure reported directly from the GIS.

75. The potable mains (nominal bore) recorded in JR08 is 30,874km. In order to achieve an asset balance the following calculation has been applied and the variance has been included in the JR08 as 'Other changes'.

A	31st Mar 08 GIS	30,874.00km
- B	Renewed mains 07/08	120.38km
- C	New Mains 07/08	75.34 km
+D	Abandoned mains	139.38km
=E	Start balance JR08	30,817.66km
F	Close Balance JR07	31,445.68km
G	Variance (F - E)	628.02km

	PR99	PR04	PR09
km	29,507	31,136	30,874

Table 7: Change in length of mains

3.1.1.8. Mains - Other

76. We have not shown any asset stock data within this line due to the way the assets are classified. All raw water mains have been classified as Aqueducts within Resources and Treatment and all treated water mains as part of Distribution (Service Delivery). This is consistent with PR94, PR99 and PR04.

3.1.1.9. Ancillaries – customer (Infrastructure)

77. Information relating to Communication Pipes has been based on the PR04 asset stock numbers and updated annually with June Return data.
78. As shown in Table 8, total Communication Pipes have increased from 1,480,537 in the 2004 FBP to 1,602,782 in this return. The reported number of lead communication pipes reported in 2004 was 484,571 the current assessment has reduced slightly to 480,941.

Asset Type	PR94	PR99	PR04	PR09
Comms – lead	521,496	501,948	483,571	480,941
Comms – Galv Iron	7,466	7,186	7,020	6,981
Comms – Other	838,538	935,212	989,946	1,114,860
Total	1,367,500	1,444,346	1,480,537	1,602,782

Table 8: Change in communication pipe asset numbers

3.1.1.10. *Ancillaries – customer (Non-infrastructure)*

79. The number of non-household and household meters reported is consistent with JR08. The number of non-household meters is relatively stable, whereas there has been a significant increase in household meters as a result of Domestic Meter Options. Table 9 shows the change in numbers over the 4 Periodic Reviews.

Asset Type	PR94	PR99	PR04	PR09
Non-Household meters	101,800	120,697	124,177	128,593
Household meters	69,900	299,722	463,135	688,113

Table 9: Change in household and non-household meter numbers

3.1.1.11. *Management and General (M&G)*

80. The number of assets for Management and General (M&G) have been allocated on a 50/50 basis between the Water and Sewerage Services as they generally relate to multi-functional assets. This is on the same basis as for June Return and PR04.

3.1.1.11.1. 1. *Offices and Laboratories*

81. The total area for offices and laboratories is 6,618 m² compared to 21,048 m² in the 2004 FBP. The 50/50 rule has been applied to populate the water and sewerage service tables. The reasons for the change are:-

- Sites have been rationalised
- This submission is based on offices which are key sites managed by our Facilities section classified as M&G, whereas PR04 included a number of adhoc offices within operational sites. These are now included within the value of the operational sites.

3.1.1.11.2. 2. *Depots and workshops*

82. The total area for depots and workshops is 9,660 m² compared to 19,846 m² in the 2004 FBP. The same methodology applies to this group of assets as above.

3.1.1.11.3. 3. *Telemetry Systems - Water*

83. An asset base review detailing the levels of telemetry on operational sites is shown in Table 10. This has been split by Raw Water, Treatment and Distribution and Transmission Assets.

84. It does not distinguish between levels of telemetry i.e. assets that can be remotely controlled and optimised rather than monitored.

Asset Area	Assets included	Telemetry %
Raw Water Assets	Raw water transmission, impounding reservoirs, boreholes, springs, adits, raw water pumping stations and river intakes	39%
Treatment Assets	Water Treatment Works, Clean Water Tanks and Chlorine Monitoring Points	99%
Distribution Assets	DMAs, Trunk Mains, Water Pumping Stations (94%), Service Reservoirs (99%), Water Towers (100%), PRVs	26%

Table 10: Level of telemetry at operational sites

3.1.1.11.4. 4. Computers

85. Since PR04 the computer asset stock of personal computers (laptops, desktops and workstations) has increased slightly to 5,044 from 4,832. As reported in PR04 there are no workstations or mainframes within the business, servers are now used to support the computer network. There are in total 550 servers across the Company compared with 114 in PR04. The 50/50 rule has been used to populate both the Water and Sewerage service tables.

3.2. ASSET STOCK – WASTE WATER

86. Table 11 is an extract of the asset stock section within Table C3.3.

		Summary of asset stock								
Description	Units	Band 1	Band 2	Band 3	Band 4	Band 5	Total	CG		
A Group 1 - Sewers										
1	Critical sewers	km	841.00	4,316.00	2,573.00	1,004.00	1,006.00	9,740	B3	
2	Non-critical sewers	km	10,361.00	8,047.00	1,297.00			19,705	B3	
3	Sewage pumping mains	km	672.00	212.00	160.00	7.00	0.00	1,051	B3	
B Group 2 - Sewer structures										
4	Combined sewer & emergency overflows	nr	1336	293	170			1799	B3	
5	Other sewer structures (volume m ³)	nr	266	202	24			492	B3	
6										
7										
C Group 3 - Sewage pumping stations										
8	In-line pumping stations	nr	917	336	148	39	6	1446	A2	
9	Terminal pumping stations	nr	141	76	56	25	11	309	A2	
10										
11										
D Group 4 - Sewage treatment works										
12	Preliminary treatment only	nr	0	0	0	0	0	0	A1	
13	Primary treatment only	nr	50	3	2	0	0	55	A1	
14	Secondary treatment only	nr	270	105	46	43	11	475	A1	
15	Tertiary treatment only	nr	10	35	30	23	3	101	A1	
16										
17										
E Group 5 - Sea outfalls										
18	Short outfalls	nr	3	5	4			12	A1	
19	Long outfalls	nr	6	5	1			12	A1	
20										
21										
F Group 6 - Sludge treatment facilities										
22	Liquid disposal	nr	0	0	0	0	0	0	A2	
23	Cake disposal	nr	2	8	10	1	0	21	A2	
24	Compost disposal	nr	2	1	1	0	0	4	A2	
25	Ash disposal	nr	2	12	4	0	4	22	A2	
26	Other disposal	nr	1	4	1	0	1	7	A2	
27										
28										
G Group 7 - Management and general										
29	Offices and laboratories (total area)	m ²	9,660.00					9,660	A3	
30	Depots and workshops (total area)	m ²	6,618.00					6,618	A3	
31	Vehicles									
32	Telemetry systems	%	64.0%	69.0%					A3	
33	Computers	nr	2,522	0	275				A1	
34										
35										
36										
37										
38										

Table 11: Sewerage Service asset stock profile

3.2.1. Commentary and Reconciliation with AMP4

3.2.1.1. Sewers

87. The total length of sewers reported in this submission is 30,496 km, of which 9,740 km were Critical sewers and 19,705 Non-critical and 1,051 km of Sewage Pumping main. These figures are consistent with the figures reported in JR08. Table 12 shows the reported length over the 4 Periodic Reviews.

Asset Type	PR94	PR99	PR04	PR09
Critical Sewers	7,175	6,803	7,607	9,740
Non-critical Sewers	16,848	21,741	21,413	19,705
Pumping Mains	N/A	938	1,025	1,051
Total	24,023	29,482	30,045	30,496

Table 12: Change in length of sewers

3.2.1.2. Sewer Structures

88. The number of CSOs, including those designed to operate as Emergency Overflows (EO's), reported in this submission is 1,799. This is consistent with the figure reported in PR04, in that these numbers exclude EO's which are not CSO's and cannot be banded on the required basis. There is an increase of 295 against the figure of 1,504 reported in 2004. This increase reflects the significant investment to eliminate unsatisfactory overflows and is combined with improved records.
89. The current number of Other Sewer Structures is 492 compared to 315 in 2004. The 492 includes 433 detention tanks, 50 storm screen chambers and 9 storm lakes. Table 13 shows the change in numbers over the 4 Periodic Reviews. The main reason for the increase is the significant investment that has taken place over AMP3 and AMP4.

Asset Type	PR94	PR99	PR04	PR09
CSO and EO's	2,512	1,695	1,504	1,799
Other structures	N/a	54	315	492

Table 13: Change in other sewer structure asset numbers

3.2.1.3. Sewage Pumping Stations

90. The number of Sewage Pumping stations reported in this submission is 1,755. The changes are due to the commissioning of new assets and the decommissioning of redundant pumping facilities. The information has been abstracted from the AI2 system and banded in accordance with the reporting requirements. Table 14 shows the change in numbers over the 4 Periodic Reviews.

	PR94	PR99	PR04	PR09
Nr	1,253	1,422	1,577	1,755

Table 14: Change in sewage pumping station asset numbers

3.2.1.4. Waste Water Treatment Works (WWTW's)

91. The number of WWTW's reported in this submission is 631 and is consistent with the figure reported in JR08. The rise in the number of WWTW's since PR04 is attributed to the replacement of crude discharges with Package Plants and the installation of 'First Time Sewerage'. There are no works carrying out preliminary treatment. There are 55 primary, 475 secondary and 101 tertiary treatment works. The information has been abstracted from AI2 and banded in accordance with the reporting requirements. Table 15 shows the change in numbers over the 4 Periodic Reviews.

Asset Type	PR94	PR99	PR04	PR09
Preliminary	7	3	0	0
Primary	69	91	74	55
Secondary	466	436	434	475
Tertiary	98	90	106	101
Total	640	617	614	631

Table 15: Change in sewage treatment works asset numbers

3.2.1.5. Sea Outfalls

92. The total number of sea outfalls reported in this submission is 24. Since PR04, surveys by Costain and Northern Divers were commissioned and as a result assets that were previously assigned as part of the sewerage network have been re classified as Sea Outfalls. It is felt that two outfalls that were reported in PR04 do not conform to the Ofwat definition and therefore have been removed from this submission. Generally the information has been abstracted from the AI2 and banded in accordance with the reporting requirements. A further outfall (Jackson Bay) has been identified since the DBP, hence the increase from 23 to 24 for PR09. Table16 shows the change in numbers over the 4 Periodic Review periods.

Asset Type	PR94	PR99	PR04	PR09
Outfalls	10	18	17	24

Table 16: Change in sea outfall asset numbers

3.2.1.6. Sludge Treatment Facilities

93. The total number of Sludge Treatment Facilities (STF's) reported in this submission is 54. Table 17 shows the change in numbers over the 4 Periodic Reviews.

Disposal Type	PR94	PR99	PR04	PR09
Liquid		21	0	0
Cake		10	28	21
Compost		6	2	4
Ash		4	23	22
Other		0	1	7
Total	48	41	54	54

Table 17: Change in sludge treatment facilities asset numbers

3.2.1.7. Management and General (M&G)

94. The assets for Management and General (M&G) have been allocated on a 50/50 basis between the Water and Sewerage Services as they generally relate to multi-functional assets.

3.2.1.7.1. Office and Laboratories

95. The total area for offices and laboratories is 6,618 m² compared to 21,048 m² in the 2003 FBP. The reasons for the change are:

- Sites have been rationalised.
- This submission is based on offices which are key sites managed by our Facilities section classified as M&G, whereas PR04 included a number of adhoc offices within operational sites. These are now included within the value of the operational sites.

3.2.1.7.2. Depots and Workshops

96. The total area for depots and workshops is 9,660 m² compared to 19,845 m² in the 2004 FBP. The same methodology applies to this group of assets as above.

3.2.1.7.3. Telemetry Systems – Waste Water

97. The number of operational sites covered by telemetry is 64%. This is the percentage of the total number of WWTW's and STF's which are monitored by telemetry. The parameters covered by telemetry are often site specific however typical parameters monitored are:

- WWTW's
- Flow volume
- Key Mechanical Equipment Status
- Dissolved Oxygen
- Filter Rotation Monitor

- o Final Tank Sludge Blanket Level
- o Certain key sites also have:
- o Primary Tank inlet COD
- o ASP COD
- o ASP SVI
- o Primary Tank Sludge Blanket Level
- o Primary Tank Sludge Density
- o Final Effluent Quality
- o Sludge Treatment Facilities:
- o Digester temperature
- o Digester Status
- o Gas flows
- o Gas pressure
- o Belt press status
- o Combined Heat and Power Status.

98. The percentage of the sewerage network covered by telemetry is 69%. This is the percentage of the total number of flow control points which are monitored by telemetry. Flow control points are CSO's and sewage pumping stations. The parameters covered by telemetry are often site specific however typical parameters monitored are:-

- o CSO's:
- o Flow level relative to overflow level.
- o Screen status (for powered screens)
- o Sewage Pumping Stations:
- o Wet Well Level
- o Emergency Overflow alarm
- o Pump status

3.2.1.7.4. *Computers*

99. Since PR04 the computer asset stock of personal computers (laptops, desktops and workstations) has increased slightly to 5,044 from 4,832. As reported in PR04 there are no workstations or mainframes within the business, servers are now used to support the computer network. There are in total 550 servers across the Company compared with 114 in PR04. The 50/50 rule has been used to populate both the Water and Sewerage Service tables.

4. ASSET VALUATION

4.1. GENERAL APPROACH ADOPTED

100. To meet Ofwat's requirements, as set out in PR09 Business Plan: Information Requirements, the company is required to submit a summary of its asset stock in terms of asset value (gross MEA and net MEA) as at the 31st March 2008. Age profiles are now only required for mains and sewers. These details are summarised in Tables C3.1 (Water Services) and C3.3 (Sewerage Services) in Part C of the Final Business Plan (Supporting Information).
101. Ofwat have stated in RD12/07 that a full asset revaluation is required. The valuation has therefore involved a whole scale reassessment, using the same information systems and approach to that used for asset management planning and replacement of assets covered in section B.3 of the submission.
102. The key components of these systems and approach being:-
- Use of same existing asset data set for above ground assets as used in AGASP
 - Use of same existing assets data set for mains and sewer network as used in BGASP
 - Management and General assets have used asset replacement cost values and remaining life consistent with those used to derive the AMP5 Capex requirements in B3.
103. The use of AGASP / BGASP information to derive the asset valuation is a key aspect in terms of providing robust valuations and subsequent current cost depreciation forecasts. More details around the AGASP and BGASP information and approach is covered in section B3, but the following key aspects in terms of asset valuation and resulting current cost depreciation (CCD) are outlined below:
- AGASP has involved the most comprehensive and detailed survey of non-infrastructure assets ever undertaken
 - AGASP surveys have been at the sub-assembly (significant components) level for each process at each installation site
 - Weibull relationships have been established for each sub assembly and these have provided details of risk levels and likely remaining life
 - AGASP condition grades have been assigned to individual sub-assembly components

- AGASP asset lives have been assigned by a combination of observed data and expert assessment
 - A common 'Costing Engine' is used for AMP5 Capex maintenance requirement and the gross MEA valuation
 - BGASP contains network data extracted from our GIS system, Odyssey. Key parameters such as diameter, material and depth have been reviewed and intelligent infill techniques (such as network tracing) employed to provide a complete dataset at pipe level
 - Using the BGASP dataset, overall unit costs have been applied to total lengths to derive an overall valuation.
104. The approach outlined above ensures the valuations are in line with the requirement to revalue on a MEA basis. This complies with the requirements of RAG1 (Current Cost Accounting), valuing a technically up to date asset with the same service capability, based on the actual system, but reflecting the most technically up to date materials and methods of construction. In particular by:
- The use of the common costing engine for AGASP assets, with Unit Cost Models (UCD's) typically derived from actual cost of constructing assets over the last 7 years
 - Use of replacement cost for other assets aligned to capital maintenance requirement assessments arising in B3
105. Decommissioned assets have not been included in the asset stock or valuation, but a small number of assets which are 'mothballed' have been included in the valuation.
106. The calculation of net MEA has taken into account the remaining service potential of existing assets. Asset lives used to derive the net MEA are as reported in Table B7.9 (Depreciation of Assets, non-infrastructure lives).
107. The price base, as with all other submissions for the PR09 DBP is 2007/08, using RPI year average for any indexation (for example for unit cost model calculations).
108. Land has been valued on the basis of existing use, using the Valuation Office Agency's Property Market report July 2007 for Yorkshire and Humber region, which has been assumed to correspond to average 2007/08 prices. Operational sites have been assessed by a desk top study using mainly the A12 system to identify areas of a sample of sites for each type of installation. The location of each site has been defined as rural or urban, where the classification is not immediately apparent, the

assumption of sites with green land adjacent to all boundaries or predominantly surrounded by green land has been used.

109. Table 18 shows the average unit price of land that has been used:

Existing use	Average unit price
Urban Industrial land	£300,000 per hectare
Rural industrial land	£5,400 per hectare
Residential buildings land	£2,550,000 per hectare
Agricultural land	£5,400 per hectare

Table 18: Average unit price of land

110. Asset lives used are based on a combination of observed data and expert assessment. They are consistent with asset lives used:

- To derive capital maintenance replacement requirements in section B3 (using AGASP)
- In the Company's Statutory Accounts and Regulatory Accounting Statements.

111. It is 10 years since the last full revaluation was undertaken, so it not surprising there has been a step change in the valuation compared to that produced at PR04, which (updated for general indexation and asset additions/ disposals) has been used for JR08.

112. The key changes from PR04 are as a result of:

- A more detailed level of assets covered (e.g. PR04 had most M&E equipment valued as one component on a process with an average life of 20 years, whereas PR09 has assessed each sub component in terms of cost and typical life).
- Unit cost data and models are more robust as systems/ procedures for data capture have improved.

113. A more detailed explanation of the approach for different installation types is covered in the following sections. A more detailed explanation of the changes in gross MEA, net MEA and CCD from that reported in JR08 is covered in section B7.

114. Since the DBP submission the UCD models for AGASP have been updated for further data captured on actual schemes during the period up to November 2008. These updated cost models have been used for the FBP valuation (and within AGASP for capital maintenance requirements), leading to some relatively small changes in valuation. Some survey data for certain sites has been reviewed and refreshed where the data used for

the DBP was found to have some errors. This has also led to some relatively small changes from the DBP valuations.

115. Overall the impact of survey and cost model changes has been a small increase of 0.7%, from the DBP gross MEA of £35,469.8m to the FBP gross MEA of £35,714.5m. Although the gross MEA value has increased, due to the mix in asset lives the overall CCD charge on base assets for 2007/08 has slightly reduced from £205m to £202m.

4.2. WATER SERVICE – ASSET VALUATION

116. Table 19 is an extract of the valuation section within Table C3.1.

Description	Gross MEA £m	Net MEA £m
A Group 1 - Water resources		
1 Dams and impounding reservoirs	3,326.466	
2 Raw water aqueducts	853.851	
3 Total water resources GMEA	4,180.317	
4 Water resources expenditure as a % of its GMEA	1.63%	
B Group 2 - Water treatment works		
5 SD treatment works	0.000	0.000
6 W1 treatment works	8.835	2.865
7 W2 treatment works	31.028	11.720
8 W3 treatment works	351.366	109.963
9 W4 treatment works	294.463	104.599
10 Total water treatment works GMEA	685.692	229.147
11 Water treatment works expenditure as a % of its GMEA	13.44%	
C Group 3 - Water storage		
12 Service reservoirs	996.876	439.426
13 Water towers	35.482	12.228
14 Total water storage GMEA	1,032.358	451.654
15 Water storage expenditure as a % of its GMEA	2.36%	
D Group 4 - Pumping stations		
16 Intake pumping stations	19.098	12.539
17 Source pumping stations	121.259	56.959
18 Booster pumping stations	223.987	130.876
19 Total pumping station GMEA	364.344	200.374
20 Pumping station expenditure as a % of its GMEA	1.89%	
E Group 5 - Water mains		
21 Potable mains (up to 320mm)	7,652.058	
22 Potable mains (greater than 320mm)	2,889.581	
23 Other mains	7.072	
24 Ancillaries - customer (infrastructure)	488.210	
25 Ancillaries - customer (non-infrastructure)	36.752	28.835
26 Total water mains GMEA	11,073.673	28.835
27 Water mains expenditure as a % of its GMEA	1.30%	
F Group 6 - Management and general		
28 Offices and laboratories (total area)	13.971	11.657
29 Depots and workshops (total area)	4.507	3.279
30 Vehicles	8.050	3.008
31 Telemetry systems	21.882	13.265
32 Computers	60.067	36.257
33 Other	70.621	69.685
34 Total management and general GMEA	179.098	137.151
35 Management and general expenditure as a % of its GMEA	45.60%	
36 Water service - summary asset information	17,515.482	1,047.161
37 Water service expenditure as a % of its GMEA	2.38%	

Table 19: Water Service asset stock valuation

4.2.1. Dams and Impounding Reservoirs

117. We have not constructed any dams or impounding reservoirs since the 1970's, therefore there are no internal unit cost models available. As each installation tends to be unique it was felt to be appropriate to continue to use existing valuations (based on detailed consultant studies for PR94, reviewed and re-priced) rather than any national or international unit costs. This continues the basis used in PR99 and PR04, and although the valuations may be less robust than other areas of the revaluation, this is considered acceptable. These infrastructure assets do not form part of the

CCD charge (which feeds into price setting) and therefore an expensive fundamental reassessment by external consultants is difficult to justify.

118. Land values have been calculated using surface area identified in AI2, and applying the relevant rural / urban unit value. The total land value has been assessed at £14.0m.

4.2.2. *Raw Water Aqueducts and Catch Waters*

119. A comprehensive study of all installations relating to Raw Water Aqueducts was undertaken by Bullens Consulting Engineers for AMP3. This study captured all measures relating to the Mains, Culverts and Tunnels, and also included Catch Waters. Unit costs were then applied to derive the asset valuation.
120. These valuations have subsequently been reviewed by the consultants Ovic for AMP4 and again in a survey commissioned in 2007. Asset data has been taken from Oddysey and enhanced from aqueduct record drawings and by many aqueduct studies.

4.2.3. *Water Treatment Works*

121. The asset valuation has been assessed using the AGASP survey data (measures, unit costs, typical and remaining asset lives) at the sub-assembly level for each WTW's. The sub-assembly level is a breakdown of the process level (e.g. Rapid Gravity Filtration) into the significant components (e.g. tanks, pumps, Media).
122. In addition to the AGASP related data, buildings and land (which did not form part of the AGASP surveys) have also been incorporated in the valuation.
123. Buildings were based on the corporate AI2 information of assets at each site by size, to which our average unit cost models have been applied. Where no measure value was readily available, average measure values have been used. For the FBP, very small buildings (less than 20m²) have been costed using a 'kiosk' cost model as the general operational building model was felt to be potentially overstating the cost of very small structures.
124. The top 24 sites have been individually assessed for land values. For all other sites a 3% sample was used to assess the average area which was then applied to the remainder of the sites identified on AI2. The total land value was assessed as £13.5m.

125. A small number of installations are not included in AI2 as operational (and not within the AGASP data), as they are currently 'mothballed'. As no detailed surveys were carried out, a desk top assessment has been made and included in the valuation. The total value of the 'mothballed' sites amounts to a gross MEA of £30.0m and a net MEA of £6.5m.
126. The valuation of W1 treatment works has been reviewed from the DBP submission. The DBP total value was £17m and this has been revised to £9m. These costs include 6 very small works associated with concessionary supplies. Due to the atypical small size of these works, some cost models were producing inappropriately large values. The costs have been recalculated to more accurately reflect the uniqueness of these sites.
127. The revised value of £9m is still significantly higher than the £3m 'expected costs' from Ofwat modelling. However, the £3m Ofwat modelled figure will be based on only two works (Horsehouse WTW and Countersett WTW) shown in the DBP asset stock numbers. This number has now been revised to 8, to include 6 concessionary supplies works. The overall cost of £9m is considered reasonable for 8 works.
128. The overall gross MEA for all WTW has reduced by £96m (12%) from the DBP, mainly reflecting changes to UCD's. Overall CCD has reduced by £1.3m (5%) from the DBP.

4.2.4. *Service Reservoirs and Water Towers*

129. The asset valuation has been assessed using the AGASP survey data (measures, unit costs, typical and remaining asset lives) at the sub-assembly level for each installation site.
130. In addition to the AGASP related data, buildings and land (which did not form part of the AGASP surveys) have also been incorporated in the valuation.
131. Buildings were based on the corporate AI2 information of assets at each site by size, to which our average unit cost models have been applied. Where no measure value was readily available, average measure values have been used.
132. The top 29 sites have been individually assessed for land values, for the remainder a 3% sample was used to assess the average area which was then applied to the remainder of the sites identified on AI2. The total land value was assessed as £28.1m.

4.2.5. Pumping Stations

133. The asset valuation has been assessed using the AGASP survey data (measures, unit costs, typical and remaining asset lives) at the sub-assembly level for site.
134. In addition to the AGASP related data, civil structures, buildings and land (which did not form part of the AGASP surveys) have also been incorporated in the valuation
135. Civil structures have been assessed as a desktop exercise using our unit cost models and added to the valuation. The basis of these costs has been reviewed from those at the DBP, where the cost model used for distribution pumping station civils was based on sewage pumping stations. This is now considered to be overstating the cost and has been removed.
136. The valuation of buildings has been reviewed since the DBP and the following applied:
- o For intake pumping stations the size of the building was estimated using an equation relating pump Kw rating to building size and costed using a specific pumping station building model
 - o For source pumping stations a kiosk size of 18m² was assumed
 - o For booster pumping stations an assumed average size of 50m² has been used in conjunction with a pumping station building cost model.
137. For land values, a 2% random sample of sites has been used to determine the average area for booster stations and borehole sites, which was then applied to the remainder of the sites identified on AI2. No land value has been included for the 11 intake pumping station sites, as this was not deemed material. The total land value for pumping stations was assessed as £1.9m.
138. Overall pumping station values have increased by £7.7m (2.2%) from the DBP, mainly as a result of incorporating buildings / kiosk costs. This has increased CCD by around £0.2m per annum.

4.2.6. Mains - Potable

139. Distribution mains data for this submission has been obtained from Yorkshire Water's BGASP system, and is consistent with lengths reported in JR08. UCD's for each diameter band have been applied, assuming laying mains in 1km lengths.

140. The overall valuation has increased significantly since PR04 and a significant increase over that reported in JR08. This is mainly as a result of the unit costs now being much higher than those used in PR04 which is a combination of :
- ⦿ Real increases in the cost of laying mains combined with the PR04 unit costs
 - ⦿ Unit costs used previously were using old (PR99) data and now appear to have significantly understated the true value.

4.2.7. *Mains-other*

141. The value of mains related equipment, including PRV valves, DMA meters and data loggers have been included on this. The total GMEA value is £7.1m.

4.2.8. *Ancillaries – customer (Infrastructure)*

142. Communication pipe data for the asset valuation has been obtained from a regional statistical study of Service Pipes undertaken in 1993, the data within this study has been updated to reflect changes from 1993 to 31 March 2008.

143. Current unit cost contractor rates have been used to assess the overall valuation.

4.2.9. *Ancillaries – customer (Non-Infrastructure)*

144. Asset data on Customer Revenue Meters is that used in B3 to assess future replacements AMP5 Capex.

145. Revenue meters have been valued based upon overall average UCD's in line with assumptions for AMP5 Capex replacement, which are based upon a proactive programme of replacement and includes the cost of the meter and the costs associated with replacing the meter. Chamber costs have been excluded.

146. There has been a slight revision in the valuation from £35.8m gross MEA in the DBP to £36.8m (2.8%) in the FBP. This is to reflect a valuation fully consistent with the total meter numbers reported in JR08.

4.2.10. *Management and General (M&G)*

147. The value of the assets for M&G has been allocated on a 50/50 basis between the Water and Sewerage Services as they generally relate to multi-functional assets.

4.2.10.1. *Offices and Laboratories*

148. Offices and Laboratories include only the general offices managed by our Facilities section. Small individual offices on a specialised site have been regarded as part of the operational installation and included in the valuation of the relevant installation.

149. The Company does not have any buildings regarded as laboratories.

150. The valuation of these non-specialised buildings has been undertaken by our Land, Property and Planning section as a desk top exercise.

151. For the purposes of the revaluation exercise the value of buildings have been separately identified to that of any associated land. Only the building part has been assessed for remaining life and a net MEA lower than the gross MEA assessed. This is different to PR04 where an open market value was assessed for the combined land and building, with the total being depreciated over the life of the building. The overall value included for offices is as follows (of which 50% is shown in Water service and 50% in Sewerage Service).

•	gross MEA buildings	£21.3m
•	gross MEA land	£6.6m

152. Land has been identified as rural or urban and valued using an assessment of the area and applying the appropriate average value from Valuation Office Report.

153. Building costs have been estimated using modern building method costs from the Building Cost Information Service (a trading arm of the RICS).

154. In line with our normal practice land has been assumed to last indefinitely and has not been depreciated and buildings are assumed to last typically for 60 years.

155. The method used in PR09 is felt to more accurately represent the fact that over time the building depreciates but the value of the land will remain undiminished.

156. The value of Offices has changed from that reported in JR08 as a result of:

- Land and building costs have increased in excess of general indexation since 2003
- The changed method of valuing land and buildings separately has increased the gross MEA, as the open market value method used previously understated the full replacement cost
- Rural estate properties and land are now shown under 'Other', whereas for PR04 were under the 'Offices and Laboratories' line.

4.2.10.2. *Depots and Workshops*

157. The same approach has been adopted as outlined for Offices and Laboratories.
158. Only main depots under responsibility of our Facilities section have been included. Small individual buildings which may have a depot or workshop type use on a specialised site have been regarded as part of the operational installation and included in the valuation of the relevant installation.
159. The overall value is split as follows (of which 50% is shown in Water Service and 50% in Sewerage Service).
- | | |
|-----------------------|-------|
| • gross MEA buildings | £6.2m |
| • gross MEA land | £2.8m |

4.2.10.3. *Vehicles*

160. Vehicle valuation has been based on the latest asset inventory of vehicles and plant at the 31 March 2008, using current replacement vehicle costs provided by our Fleet section.
161. The replacement costs, typical and remaining lives are consistent with those used in the capital replacement requirements for AMP5 (included in B.3) and the company's statutory and regulatory accounting.
162. The gross MEA value has reduced slightly reflecting lower number of items as the Fleet is continually rationalised.

4.2.10.4. *Telemetry Systems*

163. Telemetry systems have been valued using the inventory and current replacement cost provided by the Company's telemetry section. Typical and remaining lives are based on those assumed for asset replacement plans.

164. The overall valuation is broadly unchanged, with increased coverage of telemetry equipment offset by lower hardware costs.

4.2.10.5. Computers

165. Computers have been valued using the inventory and current replacement cost provided by the Company's IT section. Typical and remaining lives are based on those assumed for asset replacement plans.

166. The overall valuation has reduced mainly due to lower valuation of major corporate software systems:-

- The PR04 valuation of ICOM and the SAP Business systems included significant cost of re-engineering business processes
- The replacement of the ICL main billing systems with the server based Yorbill has been achieved at significantly lower cost than previously assumed.

4.2.10.6. Other

167. The following items have been included:-

- Residential properties
- Agricultural estate buildings
- Agricultural estate land
- Residential properties (non agricultural)
- Woodland (unlet)
- Miscellaneous land and property
- Onsite wind turbines.

168. The valuation of the non-specialised buildings (outlined above) and land has been undertaken by our Land, Property and Planning section as a desk top exercise.

169. Land has been identified as rural or urban and valued using an assessment of the area and applying the appropriate average value from Valuation Office Report.

170. Building costs have been estimated using modern building method costs from the Building Cost Information Service (a trading arm of the RICS).

171. In line with our normal practice land has been assumed to last indefinitely and has not been depreciated and buildings are assumed to last typically for 60 years.

172. For the purposes of the revaluation exercise the value of buildings have been separately identified to that of any associated land. Only the building part has been assessed for remaining life and a net MEA lower than the gross MEA assessed. This is different to PR04 where an open market value was assessed for the combined land and building, with the total being depreciated over the life of the building.
173. Onsite wind turbines at Chelker Reservoir, Loftsome Bridge WTW and Hull Waste Water Treatment works have been included, with a total gross MEA value of £8.5m. These assets are part of the regulated business.
174. The overall valuation can be summarised as (of which 50% is shown in Water Service and 50% in Sewerage Service):-
- | | | |
|---|----------------------|---------|
| • | gross MEA buildings | £8.0m |
| • | gross MEA land | £124.7m |
| • | Onsite wind turbines | £8.5m |

4.3. SEWERAGE SERVICES – ASSET VALUATION

175. Table 20 is an extract of the valuation within Table C3.3.

Description	Gross MEA £m	Net MEA £m
A Group 1 - Sewers		
1 Critical sewers	5,323.649	
2 Non-critical sewers	7,856.120	
3 Sewage pumping mains	351.799	
B Group 2 - Sewer structures		
4 Combined sewer & emergency overflows	449.760	
5 Other sewer structures (volume m ³)	136.261	
6 Total sewerage (sewers and sewer structures) GMEA	14,117.589	
7 Sewerage expenditure as a % of its GMEA	0.76%	
C Group 3 - Sewage pumping stations		
8 In-line pumping stations	393.866	161.025
9 Terminal pumping stations	200.777	58.913
10 Total pumping stations GMEA	594.643	219.938
11 Sewage pumping stations expenditure as a % of its GMEA	5.17%	
D Group 4 - Sewage treatment works		
12 Preliminary treatment only	0.000	0.000
13 Primary treatment only	39.932	15.312
14 Secondary treatment only	1,949.045	908.455
15 Tertiary treatment only	868.638	363.899
16 Total sewage treatment works GMEA	2,857.615	1,287.666
17 Sewage treatment works expenditure as a % of its GMEA	4.71%	
E Group 5 - Sea outfalls		
18 Short outfalls	12.671	
19 Long outfalls	37.464	
20 Total sea outfalls GMEA	50.135	
21 Sea outfalls expenditure as a % of its GMEA	0.00%	
F Group 6 - Sludge treatment facilities		
22 Liquid disposal	0.000	0.000
23 Cake disposal	204.972	74.472
24 Compost disposal	7.083	3.118
25 Ash disposal	165.966	61.800
26 Other disposal	21.891	13.008
27 Total sludge treatment GMEA	399.912	152.398
28 Sludge treatment expenditure as a % of its GMEA	4.76%	
G Group 7 - Management and general		
29 Offices and laboratories (total area)	13.970	11.656
30 Depots and workshops (total area)	4.508	3.279
31 Vehicles	8.049	3.009
32 Telemetry systems	21.882	13.264
33 Computers	60.066	36.257
34 Other	70.621	69.686
35 Total management and general GMEA	179.096	137.151
36 Management and general expenditure as a % of its GMEA	45.60%	
37 Sewerage service - summary asset information	18,198.990	1,797.153
38 Sewerage service expenditure as a % of its GMEA	1.99%	

Table 20: Sewerage Service asset stock valuation

4.3.1. Critical and Non-critical Sewers

176. Sewerage data for this submission has been obtained from our BGASP system, and is consistent with lengths reported in JR08. UCD's for each diameter band have been applied.
177. UCD's for general sewer assets and sewage pumping mains valuation have been used, these assume relaying in 1km lengths. They have been re-priced to 2007/08 prices and applied to the reported sewer lengths.
178. The overall valuation has increased since PR04 and reported in JR08. This is mainly as a result of the unit costs now being much higher than those used in PR04. This is a combination of :

- Real increases in the cost of laying sewers combined with the PR04 unit costs
- Unit costs used previously were using old (PR99) data and now appear to have understated the true value.

4.3.2. *Sewage Pumping Mains*

179. The same approach has been adopted as for critical and non-critical sewers.

4.3.3. *Combined Sewer and Emergency Overflows*

180. The asset valuation has been assessed using the AGASP survey data (measures, unit costs, typical and remaining asset lives) at the sub-assembly level for site.

181. In addition to the AGASP related data, civil structures (which did not form part of the AGASP surveys) have also been incorporated in the valuation.

182. These civil structures have been assessed as a desktop exercise and added to the valuation. Valuation was determined using an appropriate UCD cost model based on incoming pipe diameter. For certain sites where incoming pipe diameter was not available (around 3%), an average measure was used. For sites where civil structures are within sewage pumping stations (around 6%) the valuation is accounted for within sewage pumping station civils.

183. This is a refinement over the DBP, where an overall average cost was used for each CSO. The gross MEA value has increased from £406m (DBP) to £450m (FBP). As the civil structures are regarded as infrastructure assets this does not impact on the CCD charge.

4.3.4. *Other Sewer Structures*

184. The asset valuation has been assessed using the AGASP survey data (measures, unit costs, typical and remaining asset lives) at the sub-assembly level for site.

185. In addition to the AGASP related data (which only included 58 pumped return detention tanks), storm lakes, screen chambers and the non-pumped return detention tank civil structures have been assessed as a desktop exercise and manually incorporated in the valuation.

186. For the DBP 376 detention tanks were manually added to the valuation. However, for the FBP this has been reviewed as many of the detention

tanks are integral to the sewer structure, relying on upsized sewer pipes to increase capacity. To avoid double counting of these pipes, which will form part of the sewer network valuation, an assessment was done that identified only a further 72 should be included in the valuation. The cost was calculated using an underground tank UCD cost model based on capacity using an average measure of 411m³.

187. This has led to a significant reduction in the valuation of other sewer structures from £198m at the DBP to £136m at the FBP. The structures are infrastructure and so there is no impact on CCD.

4.3.5. *Sewage Pumping Stations*

188. The asset valuation has been assessed using the AGASP survey data (measures, unit costs, typical and remaining asset lives) at the sub-assembly level for site.
189. In addition to the AGASP related data, buildings and land (which did not form part of the AGASP surveys) have also been incorporated in the valuation.
190. Buildings were based on the corporate AI2 information of assets at each site by size, to which our average unit cost models have been applied. Where no measure value was readily available, average measure values have been used.
191. For land, in view of the very large number of pumping station sites it was not practical to measure the size of each site. A small random sample was selected (around 1%) to assess the average area which was then applied to the remainder of the sites identified on AI2. The total land value was assessed as £2.7m.
192. As part of reviewing AGASP survey data it was identified that some civil structures and buildings had not been included at the DBP and surveys for the very large Hull west and Hull East pumping stations were incomplete. These have now been incorporated for the FBP. This has significantly increased the gross MEA value from £315m to £595m (89%), with a corresponding increase in CCD of around £3.9m per annum.

4.3.6. *Waste Water Treatment Works*

193. The asset valuation has been assessed using the AGASP survey data (measures, unit costs, typical and remaining asset lives) at the sub-assembly level for each WWTW. The sub-assembly level is a breakdown

- of the process level into the significant components (e.g. tanks, pumps, media).
194. In addition to the AGASP related data, buildings and land (which did not form part of the AGASP surveys) have also been incorporated in the valuation
195. Buildings were based on the corporate AI2 information of assets at each site by size, to which our average unit cost models have been applied. Where no measure value was readily available, average measure values have been used. For the FBP, very small buildings (less than 20m²) have been costed using a 'kiosk' cost model as the general operational building model was felt to be potentially overstating the cost of very small structures.
196. The top 65 sites have been individually assessed for land values, for the remainder a 3% sample was used to assess the average area which was then applied to the remainder of the sites identified on AI2. The total land value was assessed as £159.7m.
197. At a number of large sites there are capital schemes currently ongoing to replace significant parts of the treatment process, for example the Esholt Fresh Water Fish Directive (FFD) scheme. Assets which are being replaced were not included as part of the AGASP surveys and these have been assessed separately as a desktop exercise. The relevant assets were identified along with associated key attributes such as measures, typical and remaining asset lives. The same UCD models (as used in AGASP) were then used to produce gross MEA. Net MEA values are then derived from the gross MEA values and remaining asset lives.
198. Also a small number of minor installations were not included in the AGASP surveys (and not within the AGASP data). As no detailed surveys were carried out, a desk top assessment has been made and included in the valuation.
199. Overall WWTW gross MEA has increased from £2,817m at DBP to £2,858m at FBP, an increase of £41m (1.5%). This is mainly due to changes in UCD cost models. Due to the mix of MEA changes over assets with differing lives the overall CCD has reduced by £6.2m (7%).

4.3.7. *Sea Outfalls*

200. Physical data for valuation was obtained from surveys undertaken by specialist divers and a capital partner (where the outfall was fully visible at low tide). This was reconciled to AI2.

201. The relevant UCD models were applied to the physical measures to derive the gross MEA value. However, since the DBP it was recognised that the sea outfall cost model had very few data points and had a minimum measure value of 1320m length. This was over-costing the shorter outfalls, so for the FBP the minimum measure was removed for asset valuation purposes. This has significantly reduced the gross MEA valuation.
202. Further work has been undertaken from the DBP, to validate sea outfall length data using site observations, as built drawings and consent information. As a result a number of recorded lengths have been amended.
203. For the DBP and FBP 9 estuarine outfalls have been included in the valuation but are not recorded in the asset stock, as these do not conform to the banding criteria, as they tend to be a civil overflow structure from the sewer network. These have been costed using an appropriate cost model based on diameter. The overall gross MEA value of these structures is £0.8m.
204. The impact of the changes since the DBP, offset by the additional Jackson Bay outfall mentioned in section 3.2.1.5, has resulted in a significant reduction in gross MEA, from £88.4m to £50.1m (43%). Sea outfalls are infrastructure assets and there is no impact on CCD.

4.3.8. *Sludge Treatment Facilities*

205. The asset valuation has been assessed using the AGASP survey data (measures, unit costs, typical and remaining asset lives) at the sub-assembly level for each WTW. The sub-assembly level is a breakdown of the process level into the significant components (e.g. tanks, pumps).
206. In addition to the AGASP related data, buildings (which did not form part of the AGASP surveys) have also been incorporated in the valuation.
207. Buildings were based on the corporate AI2 information of assets at each site by size, to which our unit cost models have been applied. Where no measure value was readily available, average measure values have been used. For the FBP, very small buildings (less than 20m²) have been costed using a 'kiosk' cost model as the general operational building model was felt to be potentially overstating the cost of very small structures.
208. No land has been specifically attributed to STF sites, as these form part of WWTW sites the land value will already be included in the WWTW overall value.

209. At a number of large sites there are capital schemes currently ongoing to replace significant parts of the treatment process. The assets, which are being replaced, were not included as part of the AGASP surveys, and these have been assessed separately as a desktop exercise. The relevant assets were identified along with associated key attributes such as measures, typical and remaining asset lives. The same UCD models (as used in AGASP) were then used to produce gross MEA and net MEA values.

4.3.9. *Management and General (M&G)*

210. The same approach has been adopted for Sewerage Service M&G assets as for Water Service, as outlined in section 4.2.10.
211. All assets have been allocated to service on a 50/50 basis.

4.4. *QUALITY ASSURANCE*

212. The following quality assurance procedures have been initiated in deriving the asset valuation for Tables C3.1 and C3.3.
- The majority of assets details are directly imported into the asset valuation system from the AGASP system. The data entry of survey details into AGASP was subject to quality assurance checks by relevant Business Unit staff.
 - The process for feeding data onto the asset valuation has been formalised for quality assurance purposes. All data has been checked for completeness before processing, and has all been processed into the 'file format' which ensures all data fields are completed before being entered into the asset valuation system.
 - There are also validation checks and error reports within the asset valuation system which validate data and reject input where mandatory data has not been completed.
 - Where appropriate the number of assets valued has been reconciled with the numbers in JR08 (where reported), and the asset stock analysis in Tables C3.1 and C3.3.

5. **ASSET CONDITION**

5.1. *WATER SERVICE*

213. Table 21 is an extract of the asset condition within Table C3.1.

Description	Asset condition % of Gross MEA					CG
	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5	
	%	%	%	%	%	
A Group 1 - Water resources						
1 Dams and impounding reservoirs	0.4%	1.0%	54.2%	19.7%	24.7%	B3
2 Raw water aqueducts	23.4%	61.6%	9.9%	5.1%	0.0%	A2
3						
4						
B Group 2 - Water treatment works						
5 SD treatment works	0.0%	0.0%	0.0%	0.0%	0.0%	A2
6 W1 treatment works	7.0%	30.4%	53.5%	4.4%	4.7%	A2
7 W2 treatment works	30.2%	32.9%	16.6%	12.8%	7.5%	A2
8 W3 treatment works	14.9%	30.5%	35.5%	14.1%	5.0%	A2
9 W4 treatment works	19.8%	35.8%	29.6%	11.0%	3.8%	A2
10						
11						
C Group 3 - Water storage						
12 Service reservoirs	27.7%	22.0%	25.3%	20.1%	4.9%	B2
13 Water towers	13.0%	40.1%	23.2%	22.9%	0.8%	B2
14						
15						
D Group 4 - Pumping stations						
16 Intake pumping stations	62.0%	14.0%	18.1%	5.9%	0.0%	A2
17 Source pumping stations	14.3%	44.4%	33.9%	7.0%	0.4%	A2
18 Booster pumping stations	52.3%	31.8%	12.8%	2.9%	0.2%	A2
19						
20						
E Group 5 - Water mains						
21 Potable mains (up to 320mm)	42.7%	33.2%	18.9%	4.6%	0.6%	B3
22 Potable mains (greater than 320mm)	94.4%	4.5%	0.4%	0.6%	0.1%	B3
23 Other mains	0.0%	0.0%	0.0%	0.0%	0.0%	B3
24 Ancillaries - customer (infrastructure)	21.7%	68.6%	8.8%	0.4%	0.5%	B3
25 Ancillaries - customer (non-infrastructure)	89.0%	5.0%	5.0%	1.0%	0.0%	A2
26						
27						
F Group 6 - Management and general						
28 Offices and laboratories (total area)	42.2%	57.8%	0.0%	0.0%	0.0%	A2
29 Depots and workshops (total area)	56.5%	0.0%	43.5%	0.0%	0.0%	A2
30 Vehicles						
31 Telemetry systems						
32 Computers						
33						
34						
35						
36 Water service - summary asset information	39.4%	23.8%	22.5%	7.9%	5.4%	B3
37						

Table 21: Water Service asset condition as a percentage of gross MEA

5.1.1. General Approach

214. The key aspects are:-

- o Experts from the relevant operational areas have undertaken site surveys
- o A fixed questionnaire has been used on all asset groups
- o To achieve consistency all assets within each asset type have been surveyed by one team
- o Where assets could not be accessed directly experts from the relevant fields using the best available knowledge have undertaken desktop surveys
- o Unless otherwise stated the condition grade assessments have been undertaken at individual sub-assembly level.

215. Table 22 provides a summary of the condition grade assessment methodology.

Asset Group	Site Surveys	Desktop Surveys	Statistical method	Other
Water Treatment Works	100%		-	-
Service Reservoirs and Water Towers	50%	50%		
Pumping Stations	100%			-
Dams and Impounding Reservoirs		100%	-	-
Raw Water Aqueducts and Catchwaters	100%	-		-
Mains	-	-	-	100% "Cohort" methodology
Communication pipes		100%		-
Revenue Meters		100%		-
Operational Buildings for above asset groups		100%		-

Table 22: Condition grade assessment methodology

216. For operational above ground assets, condition grades have been based on the criteria in Table 23.

Criteria	Condition	Visual	Remaining Life Expectancy	Increased Opex
1	Good.	As new	As new	None
2	Fair.	Superficial wear	Long	Minor
3	Adequate.	Significant wear and tear	Medium	Acceptable for Age
4	Poor.	Work required	Short	Becoming unacceptable
5	Awful.	Worn out	None	Unacceptable

Table 23: Operational above ground assets condition grades

5.1.2. *Dams and Impounding Reservoirs*

217. Condition grade assessments are based on Ofwat condition grade tables for above ground assets.
218. Condition grade assessments have been carried out in the form of a desktop study by an expert panel for 100% of dams and impounding reservoirs.

5.1.3. *Raw Water Aqueducts and Catchwaters*

219. The condition grading criteria followed the examples given in the Ofwat guidelines.
220. Condition grade assessments are based upon detailed surveys of individual lengths of transmission carried out in 2007 by external consultants, Ovic.
221. Ovic surveyed 100% of Raw Water aqueducts and Catchwaters in line with Ofwat's guidelines.

5.1.4. *Water Treatment Works*

222. The condition grade assessments are made at the sub-assembly level.
223. The condition grades used are in line with the Ofwat guidelines.
224. The WTW results are based upon physical site surveys, incorporated into our business as usual process of Asset Status Investment Plans (ASIP).
225. 100% of the WTW were graded in 2007, including 6 concessionary supply works.
226. A Weibull relationship exists for sub assembly type.
227. A sample of operational buildings were surveyed to derive an overall proportion in condition grade 1 to 5, which was then applied to all water service operational buildings.

5.1.5. *Service Reservoirs and Water Towers*

228. Condition grade assessments have been carried out at sub-assembly level in the form of a desktop study and routine site inspections for service reservoirs and water towers. These assessments are based upon records taken at each site during routine maintenance and cleaning, details of which are held on the Reservoir Maintenance Database. Such data has been collected during the cleaning and maintenance activity undertaken over the past five years.
229. Condition grade assessments have been undertaken on 100% of the service reservoir sites and 100% of water towers.
230. Additional surveys have been completed to comply with a current Undertaking from the Drinking Water Inspectorate, based on the same

criteria above. However not all surveys are programmed to be completed until 2009.

5.1.6. *Pumping Stations - Intake*

231. Intake Pumping stations condition grades are assessed for sub-assembly level.
232. The Intake Pumping stations condition grade results are based upon physical site surveys.
233. Civil structure were not surveyed, condition grade has been assessed as a desk top exercise based on the age of the structure.

5.1.7. *Pumping Stations - Source*

234. Source Pumping stations condition grade are assessed for each sub-assembly level on the following basis:
- The Source Pumping stations condition grade results are based upon physical site surveys
 - 100% of Raw Pumping stations condition grade results are based upon physical site surveys
 - 100% of boreholes have been internally assessed using CCTV over the last 10 years
 - 100% of adits and springs were assessed through an expert panel.
235. Civil structure were not surveyed, condition grade has been assessed as a desk top exercise based on the age of the structure.

5.1.8. *Pumping Stations - Booster*

236. The Booster Pumping stations condition grade results are based upon physical site surveys. 100% of booster pumping stations have had physical site surveys completed.
237. Civil structure were not surveyed, condition grade has been assessed as a desk top exercise based on the age of the structure.

5.1.9. *Mains – Potable*

5.1.9.1. *Reported Bursts Reconciliation with June Return*

238. For the PR09 FBP we have followed the UKWIR guidance, based on the methodology developed with Tynemarch.

239. However, for JR08 we continued to use the approach used in previous June Returns to enable commentary on the condition grade trend to be made. The JR08 approach utilises a different method to the Tynemarch methodology used for PR09 DBP and FBP, with an entirely different grading structure. As such, the results in the June Return commentary cannot be directly compared with the results of the PR09 FBP analysis.
240. At present burst jobs are not assigned to pipes, so an annual off-line exercise is carried out to attach bursts to pipes. This information is used to create the condition grade summary that we have submitted in the June Return commentary over the last 7 years, since JR02.
241. The number of bursts used in the condition grading for the PR09 FBP is different to the total number of bursts. If data for a burst does not match a pipe in the vicinity then the burst cannot successfully be attached to any pipe. In this situation the burst data cannot then be included in any condition grade analysis that involves pipe level data. Table 24 shows the % bursts mapped to pipes (which shows an increasing trend).

June Return	Bursts Successfully attached to a pipe	Total Bursts	% bursts mapped
JR04	6,507	7,917	82.2
JR05	5,598	6,499	86.1
JR06	6,658	7,634	87.2
JR07	5,832	6,771	86.1
JR08	6,461	7,018	92.1
Average	6,211	7,168	86.7

Table 24: June Return bursts successfully mapped to pipes

242. This table explains why the average total bursts used in the condition grade profile is 6,211 (which relates to the number successfully 'attached' to a pipe), compared with the average total burst reported in the June Return of 7,168.

5.1.9.2. *Criteria used to derive the Cohorts*

243. Further to the DBP commentary, we have included below more detail about the criteria used to derive the cohorts for the condition profile.
244. These were based primarily on the burst model Tynemarch developed for us, which has been utilised, along with further geographical splits such as Distribution Management Area (DMA), to allow for cohorts of the specified sizes to be created. The following list shows all of the criteria used for creating the cohorts in decreasing order of importance:

- Material Group – Materials were sorted into 12 groups
 - Age Bin – The age bins derived by Tynemarch were utilised
 - Diameter Split – 11 'typical diameter' bins
 - Soil type – 7 types from our GIS system
 - Land Use – 10 types from our GIS system
 - Area – 13 Distribution Areas
 - Urban / Rural – Based on population density in the DMA
 - DMA – around 2,500 DMA's.
245. Five years worth of burst data was used for both pipe diameters up to and including 320mm and pipe diameters greater than 320mm.
246. 2,394 cohorts were created for pipes of diameter ≤ 320 mm, with an average of 2.55 bursts per cohort, which is well within the 2.5 +/- 10% as laid out in the methodology. Out of these, only 7 had less than 50% of the recommended 2.5 bursts per cohort and only 15 had more than 150% of the recommended number of bursts.
247. 118 cohorts were created for pipes of diameter > 320 mm, with an average of 1 burst per cohort, which is exactly on the target of 1 +/- 10%. There was only one cohort that was less than 50% of the recommended 1 burst per cohort, and there were no cohorts that had more than 150% of the recommended 1 burst.
248. In total, less than 1% of all cohorts fall outside of the desired limits. The reason for some cohorts containing fewer than the desired minimum number of bursts is that it was not feasible to combine these cohorts with an appropriate neighbouring cohort as the resulting combined cohort would have been too big.
249. Some cohorts contain more bursts than the desired limit because it would take more than the 8 grouping criteria listed above to break them down further. However it is worth noting that only 15 cohorts (around 0.6%) are too big, and so it was felt that it does not merit including further (and potentially more arbitrary) criteria for such a small number of cohorts.
250. The analysis performed for the FBP was based on burst data from April 2003 until March 2008. The pipes data represents a snapshot of the live network taken midway through the same period and is based on the data used for capital planning for PR09.
251. It is not currently possible to use a snapshot of the network taken in March 2008, as a large-scale amendment to our asset records took place before

then and we cannot accurately match the burst data to the amended pipe data. As our snapshot only contains live pipes, we would need a snapshot taken at the start of the period and a further one taken at the end to identify the pipes which have been removed from service over the period. Similarly, we are unable to identify pipes that have been put into service since the snapshot was taken, which covers about half of the period in question. Therefore all bursts on pipes taken out of service in the first part of the period are excluded, but all bursts on pipes taken out of service in the latter half of the period will be included as they are not identifiable and so cannot be removed. Conversely all the bursts on pipes put into service in the first half of the period are included, but those bursts on pipes put into service in the latter half are not.

252. This means that we are not able to accurately assess the impact on the cohort analysis of excluding the mains that have been put into or removed from service in the period. It is worth noting that over the period April 2003 to March 2008 there were only 841 km of main replaced (as per the relevant June Returns), which equates to around 2.7% of the network by length, indicating that the impact on the cohort analysis of excluding these pipes is likely to be minimal.
253. Rather than report incomplete or poorly estimated figures that could potentially be misleading, the most accurate route is to not exclude anything from the analysis we have carried out. Report rows 1 to 3 are the same as rows 5 to 8, with row 4 being reported as zero to reflect this.
254. Row 6 differs slightly (around 33km) from the value in table C3.1 on line 21. Again, this is due to the cut of the network used here being taken at a different time to the one used for the JR08.

5.1.9.3. *Distribution of condition grade by length*

255. Table 25 show the distribution of condition grade by length.

Grade	Diameter <= 320mm				Diameter > 320mm				All Diameters			
	Cohorts No.	Bursts No.	Length (km)	Length (%)	Cohorts No.	Bursts No.	Length(km)	Length (%)	Cohorts No.	Bursts No.	Length (Km)	Length (%)
1	353	886	10,536	36.9	85	85	2,142	94.3	438	9701	12,678	41.1
2	721	1,809	10,024	35.1	18	18	107	4.7	739	1,827	10,131	32.8
3	821	2,100	6,246	21.9	3	2	8	0.3	824	2,102	6,254	20.3
4	390	1,013	1,564	5.5	8	8	13	0.6	398	1,021	1,577	5.1
5	109	285	200	0.7	4	4	2	0.1	113	289	202	0.7
Total	2,394	6,093	28,569	100.0	118	118	2,272	100.0	2,512	6,211	30,842	100.0

Table 25: Distribution of mains condition grade by length

- 256. There is a slight difference between the mains condition profile by gross MEA and that by length of main. This is due to a higher proportion of larger diameter mains being in the lower condition grades, because these mains in general tend to burst less frequently than smaller diameter mains.
- 257. The graphs in Figure 6 show cumulative length versus burst rate and cumulative length percentage versus burst rate percentage respectively (after the cohorts have been sorted by increasing burst rate).

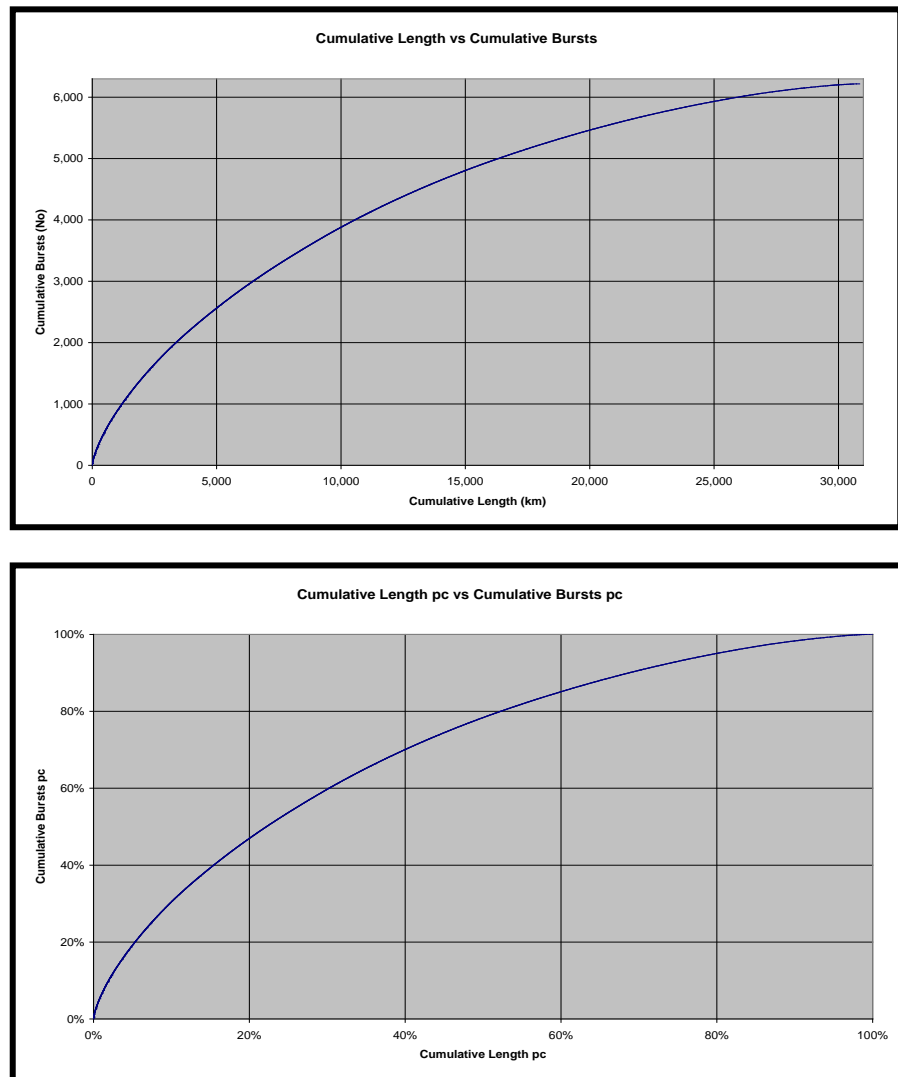


Figure 6: Mains length versus burst rate and length % versus burst rate %

- 258. The graphs show that approximately 50% of bursts occur on the worst 20% of the network, and approximately 20% of bursts occur on the worst 6% of the network.

5.1.10. *Mains Age Profile*

259. For PR09 an age profile of the mains network is required and this is shown Table26.

Water Mains		Pre 1880	1881-1900	1901-1920	1921-1940	1941-1960	1961-1980	1981-2000	2001-2020	CG
Potable and other mains	Km	370	2,038	926	4,971	8,367	6,545	6,638	1,019	B3
age profile (date of construction)										

Table 26: Mains network age profile

260. Age bands of water mains have been assessed for each pipe length as part of the BGASP modelling carried out.

261. BGASP age bands were mapped onto the required 20 year bands specified in the Ofwat company guidance. BGASP extracted data from our GIS system (Odyssey) and placed mains in the relevant categories using the date of installation of the water mains. We were then able to apply the total length of mains (km) in each age category to populate the table shown above.

262. Water mains were installed throughout Yorkshire (and the rest of the UK) when stringent recording systems were not in place. Some records of installation date may not be accurate as to the specific year. Therefore checking of the age of properties within specific areas has also taken place.

5.1.11. *Ancillaries – customer (Infrastructure)*

263. The condition grading of Communication Pipes has been based on an investigation of a sample of 487 customer properties in 1993, which has been adjusted for assessed condition movement since. The majority of properties within the investigation were domestic (95%) and these were principally semi-detached (34%), terraced (28%) and high and low rise flats (11%).

264. Table 27 shows the definitions that have been used for the condition grading of Communication Pipes.

Condition Grade	Comment	Description
1	Good.	Smooth bored mains and communication pipes not subject to corrosion or with sound factory lining, no level of service problems.
2	Fair.	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	Adequate.	Some problems with loose deposits or deterioration of linings leading to occasional complaints. Risk of quality failure, pipes with tuberculation causing 20% blockage by encrustation.
4	Poor.	Frequent problems causing complaints, water quality known to have failed on more than one occasion under normal operating condition during previous twelve months. Pipes with tuberculation causing 20-40% blockage by encrustation.
5	Awful.	Pipes suffering severe problems of infestations and loose deposits. Water quality cannot be ensured. Pipes with tuberculation causing 60-80% blockage by encrustation.

Table 27: Communication pipe condition grade definitions

5.1.12. Ancillaries – customer (Non-Infrastructure)

265. Currently we have 816,706 domestic and business live meters. The asset life and condition grade of an average meter obviously depends on a lot of different factors such as manufacturer, model, through-flow, size and where the customers live.
266. An assumption has been made that an average life of a meter is 12 years. No condition grading surveys have taken place, so the assumed condition grades are based on age (derived from serial numbers where possible).
267. Information was extracted from an access database derived from Yorbill (the billing database), and data was also gathered from AI2 for domestic and commercial meters. Data was validated and amended where appropriate, such as installation dates based on when the first meter was installed at the property, rather than when the latest meter was actually installed. The serial numbers derived 82% of installation dates and the further 18% came from Yorbill.
268. The definitions in Table 28 have been used for the condition grading of the revenue meters.

Condition Grade	Comment	Description
1	Good.	New, No failures – designed to current standards
2	Fair.	No failures – not designed to current standards
3	Adequate.	Deterioration beginning in level of service
4	Poor.	Asset nearing end of useful life,
5	Awful.	Asset substantially derelict

Table 28: Revenue meters condition grade definitions

5.1.13. Management and General (M&G)

269. The following definitions in Table 29 have been used for the condition grading of buildings.

Condition Grade	Comment	Description
1	Good.	Sound weather proof structure, well maintained. Good access and secure, safe site.
2	Fair.	As 1 but showing signs of minor wear / deterioration. Needs to be re-inspected in the medium term.
3	Adequate.	Functionally sound structure but appearance affected by staining, peeling paintwork, overgrowth etc. Some minor problems with access or site. Early stages of decay, or dereliction are becoming evident.
4	Poor.	Significant deterioration of building. Evidence of structural problems e.g. leakage, woodwork, rising damp, rotting decayed brickwork, inadequate security etc. Access in poor condition. Site not secure. Some safety problems. Structural integrity becoming affected. Remedial action required in short term.
5	Awful.	Serious structural problems. Building unsafe or insecure. Access impassable. Site unsafe for use. Requires immediate action.

Table 29: Buildings condition grade definitions

270. For the purposes of the asset valuation, our Land and Property section undertook a desktop exercise to assess the current condition grade of non-operational buildings.

271. The vast majority of Office and Depot assets are in condition grade 1 or 2, which reflects:

- All land classed as condition grade 1

- o Land now split as separate asset to building structures (whereas in PR04 it was included in the value and condition of the building)
- o Investment to improve previous poor accommodation (e.g. new modern offices to replace portacabin temporary buildings).

5.2. SEWERAGE SERVICE – ASSET CONDITION

272. Table 30 is an extract of the asset condition and performance within Table C3.3.

Description	Asset condition % of Gross MEA					CG
	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5	
	%	%	%	%	%	
A Group 1 - Sewers						
1 Critical sewers	40.3%	10.6%	10.3%	33.4%	5.4%	B3
2 Non-critical sewers	36.2%	11.9%	14.9%	31.1%	5.9%	B3
3 Sewage pumping mains	64.9%	18.4%	10.9%	3.4%	2.4%	B3
B Group 2 - Sewer structures						
4 Combined sewer & emergency overflows	58.0%	34.6%	6.5%	0.6%	0.3%	B3
5 Other sewer structures (volume m ³)	45.2%	40.9%	9.3%	4.5%	0.1%	B3
6						
7						
C Group 3 - Sewage pumping stations						
8 In-line pumping stations	26.2%	33.4%	27.8%	11.3%	1.3%	B2
9 Terminal pumping stations	17.0%	26.8%	22.2%	14.1%	19.9%	B2
10						
11						
D Group 4 - Sewage treatment works						
12 Preliminary treatment only	0.0%	0.0%	0.0%	0.0%	0.0%	A2
13 Primary treatment only	29.9%	10.1%	30.1%	21.8%	8.1%	A2
14 Secondary treatment only	25.2%	40.5%	25.6%	7.0%	1.7%	A2
15 Tertiary treatment only	18.5%	43.1%	25.5%	11.5%	1.4%	A2
16						
17						
E Group 5 - Sea outfalls						
18 Short outfalls	0.0%	13.2%	29.8%	46.9%	10.1%	A2
19 Long outfalls	0.0%	48.5%	42.8%	8.7%	0.0%	A2
20						
21						
F Group 6 - Sludge treatment facilities						
22 Liquid disposal	0.0%	0.0%	0.0%	0.0%	0.0%	A2
23 Cake disposal	17.3%	33.3%	33.1%	7.5%	8.8%	A2
24 Compost disposal	16.2%	55.7%	21.3%	5.3%	1.5%	A2
25 Ash disposal	19.9%	31.9%	33.6%	11.2%	3.4%	A2
26 Other disposal	42.1%	51.8%	5.9%	0.2%	0.0%	A2
27						
28						
G Group 7 - Management and general						
29 Offices and laboratories (total area)	42.2%	57.8%	0.0%	0.0%	0.0%	A2
30 Depots and workshops (total area)	56.5%	0.0%	43.5%	0.0%	0.0%	A2
31 Vehicles						
32 Telemetry systems						
33 Computers						
34						
35						
36						
37 Sewerage service - summary asset information	35.3%	18.1%	15.6%	25.3%	4.8%	B3
38						

Table 30: Sewerage Service asset condition as a percentage of gross MEA

5.2.1. General Approach

5.2.1.1. Condition Grade assessments

273. Condition grades, where possible, have been assessed by on site survey at a sub-plant assembly level of detail.
274. Where site survey was deemed impractical a desktop assessment has been made either by site specific assessment or by a statistical method.
275. Table 31 is a summary of the condition grade assessment methodology.

Asset Group	Site Surveys	Desktop Surveys	Statistical method	Other
Sewage Treatment Works	92%	8%	-	-
Sludge Treatment Facilities	92%	8%		
Sewage Pumping Stations	71%	21%	8%	-
Sea Outfalls	100%	-	-	-
Critical and Non-critical Sewers	18% (CCTV)	-	82%	-
Sewage Pumping Mains	-	-	-	100% "Cohort"
Combined Sewer Overflows	24%	-	76%	-
Other Sewer Structures	8%	12%	80%	-

Table 31: Condition grade assessment methodology

276. Condition grade assessments for WWTW's, STF's, Sewage Pumping Stations, Sea Outfalls, CSO's and Other Sewer Structures were made to the criteria set out in Table 32.

Criteria	Condition	Visual	Remaining Life Expectancy	Increased Opex
1	Good.	As new	As new	None
2	Fair.	Superficial wear	Long	Minor
3	Adequate.	Significant wear and tear	Medium	Acceptable for Age
4	Poor.	Work required	Short	Becoming unacceptable
5	Awful.	Worn out	None	Unacceptable

Table 32: Operational above ground assets condition grades

277. Condition grade assessments for Critical and Non-critical sewers have been made using the criteria set out in the Sewer Rehabilitation Manual.

278. Condition grade assessments for Sewage Pumping Mains are based on the required methodology as laid out in the Ofwat company guidance. We have adopted a calibrated version of this methodology.

5.2.2. *Critical and Non-critical Sewers*

279. The condition profile for Critical and Non-critical sewers was determined using surveyed (by CCTV) sewer records and using an extrapolation method to map this across the whole sewer network.
280. A historical record of CCTV surveys of 5,383km of sewers was used. Of this, 3,567km are Critical sewers and 1,816km are Non-critical sewers. This has been updated for a further 18 months dataset since the DBP, which has led to a slight change in condition grade percentage. This is commented further in section 6.2.1.
281. The sewerage network database was stratified into groups by Critical/Non-critical, then by diameter, then by age band. For each group, the length of surveyed sewer within each condition grade was determined from the CCTV database. The resulting percentage split by length in each condition grade was then extrapolated across all sewers in the group. The sets of extrapolated results were summed together to determine the total lengths of sewer within each condition grade for Critical and for Non-critical sewers.
282. The approach of extrapolating by statistical groups was used to mitigate for the fact that the CCTV database is not a representative sample of the sewer network (as CCTV tends to focus around problem areas).
283. The percentage splits determined by the above methodology were applied to the total length of sewer reported in JR08 for Critical and for Non-critical sewers.

5.2.3. *Sewage Pumping Mains*

284. Following a number of trials using the methodology outlined in the Ofwat company guidance, it was determined that the methodology was not suitable for Sewage Pumping mains. It was found on each trial that all mains were allocated to condition grade 1, which was clearly unrealistic.
285. We have therefore adopted a “calibrated” version of the methodology as follows:-
- The burst rate per 1000km for sewage pumping mains was compared with that for the water network and found to be a ratio of 1:5.

- The expected number of bursts per cohort as defined in the guidance as 2.5 for mains up to 320mm and 1 for mains over 320mm were calibrated to 0.5 and 0.2 respectively by dividing by 5.
 - The criteria for assessing condition grades 1-5 were also calibrated by dividing by 5. For example, Condition Grade 4 – burst >500 and <=1000 per 1000km per year was calibrated to >100 and <200 per 1000km per year.
286. Cohorts were then devised using the calibrated tolerances. The cohorts were determined by grouping mains by diameter (<=320mm and >320mm) then by burst rate of Drainage Area Zone (DAZ), then by length. Mains were combined until the tolerances for cohort sizes were met. This resulted in 76 cohorts of mains.
287. The decision to develop cohorts using burst rate of DAZ as an attribute was to attempt to collect mains in similar demographic and topographical conditions and to account for “hotspots” of failure activity. Length of main was used because length has been determined to be a driver of bursts by modelling carried out by ourselves.
288. Cohorts were then mapped to the “calibrated” condition grade criteria by calculating the burst rate per 1000km for each cohort and assessing against the criteria to determine the grade.
289. The length in each condition grade was summed across the cohorts to give a total length within each condition grade. The percentage split by length was then calculated. This percentage split was applied to the total length of sewage pumping mains reported in JR08.
290. Figure 7 is a plot of cumulative average annual bursts versus cumulative mains length using results of the “calibrated” methodology.

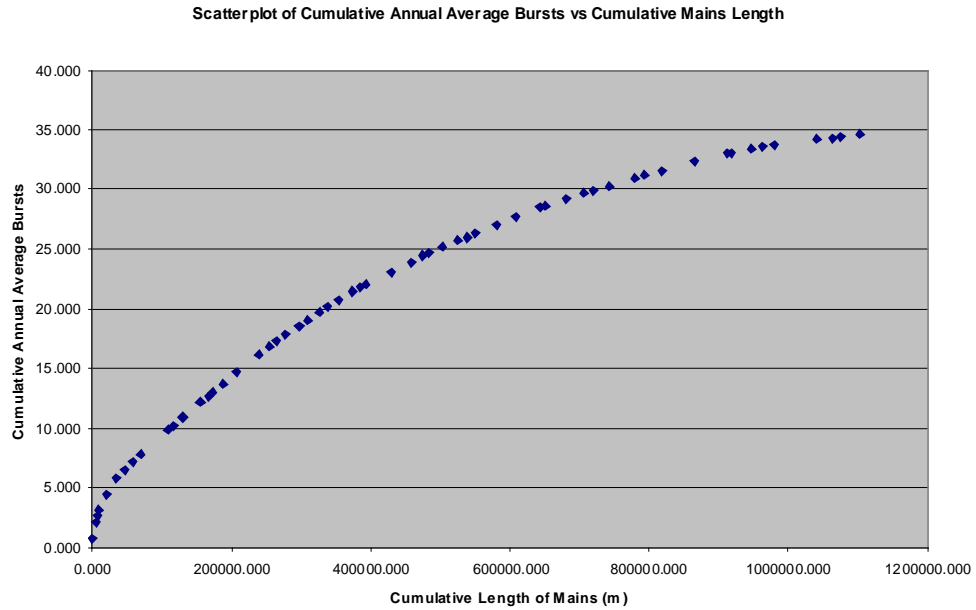


Figure 7: Cumulative annual average bursts versus cumulative mains length

291. The average annual burst rate over 5 years from June Return data is 39.8. However, the count of bursts associated with mains replaced or abandoned has been removed to give an average annual rate of 34.6.

5.2.4. Sewer Age Profile

292. For PR09 an age profile of the mains network is required and this is shown in Table 33.

Sewers		Pre 1880	1881-1900	1901-1920	1921-1940	1941-1960	1961-1980	1981-2000	2001-2020	CG
Sewers age profile (date of construction)	Km	2,684	1,982	4,025	8,051	4,025	4,818	3,568	1,342	B3

Table 33: Sewers network age profile

293. Age bands have been assessed for each pipe length as part of the BGASP modelling carried out.

294. BGASP age bands were mapped onto the required 20 year bands specified in the Ofwat company guidance. Where Yorkshire Water and Ofwat age bands did not align, the length of sewer in our age band was split equally into the number of years in the band. The length associated with each year was then allocated to the appropriate Ofwat age band.

295. Mapping to the “Pre 1880” and “1881-1900” bands were adjusted to take account of the fact that development in the 1800’s is weighted towards the

latter part of the century. This was estimated using historical urban area maps that show 46% of development took place in the last 20 years of the century.

5.2.5. *Sewer Structures – Combined and Emergency Overflows*

296. Condition grades of Electrical and Mechanical (E&M) equipment on CSO's were collected by site survey of 444 CSO's and extrapolated to the total of 664 with such equipment. The extrapolation used asset groups stratified by age and size to minimise errors in the extrapolation.
297. Condition grades of civil elements on CSOs were collected by site survey of 452 CSOs. There are 1,799 operational CSOs in total on AI2. The condition grade profile of the civil elements of these sites was determined by an extrapolation method from survey results of the 452 surveyed assets. The extrapolation used asset groups stratified by age to minimise errors in the extrapolation.
298. Estuarine overflows (EO's) have not been reported in the asset stock numbers as the banding requirements are not applicable. The 548 EO's have been included in the valuation and condition is assumed to be the same profile as CSO civils.

5.2.6. *Other Sewer Structures*

5.2.6.1. *Detention Tanks*

299. Condition grades for E&M elements of detention tanks with return pumping stations (58 installations) were assessed by site visit for a 25% sample of sites stratified by age. The remaining 75% were subject to a desktop survey assessment by area technicians. Statistical analysis of the 25% sample was then carried out to ensure that the results collected for the 75% were not significantly different.
300. For the remaining un-surveyed detention tanks the condition grade profile was determined by extrapolating from the results of the civil condition assessments of the 58 surveyed sites. These un-surveyed detention tanks did not contain significant E&M equipment and so these were assumed to be civil only. The extrapolation used asset groups stratified by age to minimise errors in the extrapolation.

5.2.6.2. *Storm Lakes*

301. The condition grade of Storm Lakes was assessed individually by engineers in the Area Asset Teams.

5.2.6.3. *Screen Chambers*

302. Screen Chambers are a new asset class representing installations for screening flows from one or more CSO discharges and are remote from the CSO's. These assets have not been included in the asset stock number as the banding requirements are not applicable. The 50 screening chambers have been included in the valuation and condition grading of Other Sewer Structures.

5.2.7. *Sewage Pumping Stations*

303. Sewage Pumping stations were surveyed by our framework consultants Ove Arup 71% were surveyed by site inspection and 21% were surveyed by a desktop approach. The desktop surveys were validated by sample site inspections.
304. For 8% of the sewage pumping stations surveys could not be completed, for example new pumping stations added to the inventory since surveys were carried out in 2007. For these sites condition grades were applied in proportion to the surveyed assets.
305. Between the DBP and FBP submissions ongoing data updates and improvements have been made to asset surveys. The significant change in the condition profile for terminal pumping stations is the result of updates made to the asset survey data for Hull East and Hull West pumping stations. It was identified that due to an AMP4 large scheme currently ongoing at these sites, surveys for were not sufficiently completed to provide an accurate valuation at DBP. These surveys have been updated for the FBP to reflect the assets as at 31 March 2008 and the data processed as a desktop exercise to obtain a more accurate valuation. These assets are of large value and generally in poor condition, accounting for the shift in condition grades in the terminal pumping station category between the DBP and FBP.
306. For operational buildings 888 were surveyed on site as part of the WWTW, STF's and Sewage Pumping station surveys. The proportions in each condition grade 1 to 5 were then applied to all Sewerage Service operational buildings.

5.2.8. *Waste Water Treatment Works*

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PART C3 – Asset Inventory

307. All WWTW surveys were undertaken by site inspection, with the exception of 40 small primary treatment only works and 20 sites where large AMP4 capital schemes (e.g. FFD sites) are currently being delivered. These site inspections were carried out by our Area Capital Partners.
308. The 40 primary treatment only sites were all works serving small populations with descriptive consents and in many cases septic tanks with access difficulties. These were assessed by a desktop approach.
309. The 20 AMP4 large scheme sites were surveyed by our AMP4 Large Scheme Consultants – Ove Arup. As these sites are subject to major schemes, many assets will be replaced during AMP4 so Arup were considered best placed to carry out these surveys for capital maintenance planning. However, for asset valuation purposes a desktop assessment was carried out of existing assets using age as an indicator of condition grade.
310. For operational buildings 888 were surveyed on site as part of the WWTW, STF's and Sewage Pumping station surveys. The proportions in each condition grade 1 to 5 were then applied to all Sewerage Service operational buildings.

5.2.9. Sea Outfalls

311. Sea Outfalls were surveyed by a diving contractor or by our Capital Partner Costain for outfalls which could be surveyed "on land". Diving contractor reports were reviewed within Yorkshire Water to determine a condition grade. Costain surveys included an assessment of the condition grade.

5.2.10. Sludge Treatment Facilities

312. All STF surveys were undertaken by site inspection, with the exception of 9 sites where large AMP4 capital schemes (e.g. FFD sites) are currently being delivered. These site inspections were carried out by our Area Capital Partners.
313. The 20 AMP4 large scheme sites were surveyed by our AMP4 Large Scheme Consultants – Ove Arup. As these sites are subject to major schemes many assets will be replaced during AMP4 so Arup were considered best placed to carry out these surveys for capital maintenance planning. However, for asset valuation purposes a desktop assessment was carried out of existing assets using age as an indicator of condition grade.

- 314. For operational buildings 888 were surveyed on site as part of the WWTW, STF and sewage pumping station surveys. The proportions in each condition grade 1 to 5 were then applied to all Sewerage Service operational buildings.

5.2.11. Management and General (M&G)

- 315. The same approach for Offices and Depots has been adopted for Sewerage Service assets, as for Water Services assets outlined in section 5.1.13.

6. CHANGES IN ASSET CONDITION

6.1. WATER SERVICE- CONDITION GRADES TREND

- 316. This section examines the reasons behind any major changes in asset condition data presented within Table C3.2. An extract of C3.2 is shown in Table 34.

Description	1997-98 Final					2002-03 Final					2007-08 Final				
	Asset condition % of Gross MEA					Asset condition % of Gross MEA					Asset condition % of Gross MEA				
	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5
A Group 1 - Water resources															
1 Dams and impounding reservoirs	14.2%	66.2%	19.2%	0.4%	0.0%	4.1%	89.2%	6.7%	0.0%	0.0%	0.4%	1.0%	54.2%	19.7%	24.7%
2 Raw water aqueducts	23.3%	61.9%	10.5%	4.0%	0.3%	24.1%	64.2%	6.0%	5.0%	0.7%	23.4%	61.6%	9.9%	5.1%	0.0%
3 Water resources expenditure as a % of its GMEA						4.05%					1.63%				
B Group 2 - Water treatment works															
4 SD treatment works											0.0%	0.0%	0.0%	0.0%	0.0%
5 W1 treatment works											7.0%	30.4%	53.5%	4.4%	4.7%
6 W2 treatment works											30.2%	32.9%	16.6%	12.8%	7.5%
7 W3 treatment works											14.8%	30.3%	35.3%	14.1%	5.0%
8 W4 treatment works											19.8%	35.8%	29.8%	11.0%	3.8%
9 Water treatment works expenditure as a % of its GMEA											13.44%				
C Group 3 - Water storage															
10 Service reservoirs	17.7%	28.9%	35.2%	9.8%	8.5%	11.4%	55.5%	17.3%	15.4%	0.4%	27.7%	22.0%	25.3%	20.1%	4.9%
11 Water towers	1.6%	49.6%	33.9%	7.5%	7.4%	1.0%	24.2%	31.2%	34.9%	8.7%	13.0%	40.1%	23.2%	22.9%	0.8%
12 Water storage expenditure as a % of its GMEA						6.40%					2.36%				
D Group 4 - Pumping stations															
13 Intake pumping stations	80.1%	8.6%	9.3%	2.0%	0.0%	24.7%	36.9%	36.2%	1.2%	1.0%	62.0%	14.0%	18.1%	5.9%	0.0%
14 Source pumping stations	11.6%	17.3%	25.6%	25.2%	20.3%	6.1%	24.2%	35.2%	33.6%	0.9%	14.3%	44.4%	33.9%	7.0%	0.4%
15 Booster pumping stations	33.1%	42.2%	15.7%	6.0%	3.1%	34.8%	37.1%	19.8%	7.4%	0.9%	52.3%	31.8%	12.8%	2.9%	0.2%
16 Pumping station expenditure as a % of its GMEA						1.98%					1.89%				
E Group 5 - Water mains															
17 Potable mains	34.2%	27.5%	26.2%	7.4%	4.7%	39.5%	35.7%	11.0%	12.3%	1.5%	56.8%	25.3%	13.8%	3.5%	0.5%
18 Other mains	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19 Ancillaries - customer (infrastructure)											21.7%	68.6%	8.8%	0.4%	0.5%
20 Ancillaries - customer (non-infrastructure)											89.0%	5.0%	5.0%	1.0%	0.0%
21 Water mains expenditure as a % of its GMEA						4.87%					1.30%				
F Group 6 - Management and general															
22 Offices and laboratories (total area)	84.40%	14.10%	1.50%	0.00%	0.00%	46.00%	29.10%	19.50%	5.40%	0.00%	42.2%	57.8%	0.0%	0.0%	0.0%
23 Depots and workshops (total area)	37.00%	49.70%	4.40%	8.90%	0.00%	7.30%	42.10%	39.50%	10.60%	0.50%	56.5%	0.0%	43.5%	0.0%	0.0%
24 Management and general expenditure as a % of its GMEA											45.60%				
25 Water service - summary asset information	26.30%	44.30%	21.10%	5.20%	3.00%	24.90%	53.10%	12.00%	7.80%	1.10%	39.4%	23.8%	22.5%	7.9%	5.4%
26 Water service expenditure as a % of its GMEA						66.03%					2.38%				

Table 34: Water Service asset condition trends

6.1.1. Dams and Impounding Reservoirs

- 317. The changes in the Dams and Impounding reservoirs profile reflect a difference in the way the data has been assessed and are not comparable. The condition of impounding reservoirs previously (PR99/ PR04) had been created based solely on compliance with the Reservoir Safety Act. New

assessments (PR09) quantifying risk of all other aspects of maintenance requirements show a significantly different profile.

318. This has resulted in a large increase in condition grades 4 and 5 but as highlighted above this is not comparable with the PR04 assessment.

6.1.2. *Raw Water Aqueducts*

319. The condition grade of the Raw Water Aqueducts has remained stable through AMP4 with regard to proportions of gross MEA value. When considered by length (see B3 section 3.4) an increase in condition grades 4 and 5 is shown. This is due to limited expenditure during the AMP4 period and increased understanding of the asset condition from increased surveying through the periodic review process.

320. Many of the aqueducts were constructed before the 1950's and many date back to the 19th century. Yorkshire Water does not have a history of frequent bursts on its aqueducts, but has an ageing asset stock.

6.1.3. *Water Treatment Works*

321. WTW's condition grades are generally incomparable due to the amalgamation of categories and the higher level of detail that the assets are now surveyed at.

322. Looking at an amalgamation of all WTW's, there is some evidence of a shift into condition grades 3, 4 and 5. This is explained by :-

- ⦿ Upcoming first time replacements – The early 1990's saw large quality investment and therefore assets with a 15-20 year asset life are predicted to fail in AMP5. At their current age it would be expected to see these assets moving through conditions as they approach first time replacement.
- ⦿ Higher granularity (detail) – potentially means more outliers, particularly in large processes, as overall processes/process elements (PR04 level of detail) may not be in condition grade 5 but particular plant items (PR09 level of detail) may well be.

6.1.4. *Service Reservoirs and Water Towers*

323. Service Reservoirs have been subject to a programme of improvements over the last AMP. However, these have focused on the replacement of two major assets. Overall the condition grade of the stock of service reservoirs is deteriorating with increased numbers of assets within the 3 to

5 grade. A larger programme of investment is proposed for the next AMP period to address this asset deterioration.

324. Water Towers are generally difficult to access and older structures, which makes temporary work very difficult and expensive. An improvement in condition grade has been seen based on the latest surveys.

6.1.5. *Intake Pumping Stations*

325. A general improvement has been seen for Intake Pumping stations although there has been a shift of some assets into condition grade 5. This is due to a small number of large assets in poor condition (including operational buildings) as well as the change in the level of detail as discussed within the WTW section.

6.1.6. *Source Pumping Stations*

326. A similar pattern can be seen to that of Intake Pumping stations. There has been a general improvement in condition grade but more assets are in condition grade 5, this is indicative of the change in level of detail and known poor condition of some larger cost assets.

6.1.7. *Booster Pumping Stations*

327. Condition grades 4 and 5 in Booster Pumping stations are relatively stable. Base maintenance expenditure and new booster stations installed as part of WTW rationalisation has seen increases in condition grade 1 and 2.
328. Similarly to other AGASP asset surveys, the change in level of detail will also have had an impact, making comparison to PR04 more difficult.

6.1.8. *Mains*

329. The current condition grade assessment used for PR09 was based on a Tynemarch study that was an UKWIR 'national' approach to condition grading. As the condition grading method is now different to that used for PR99 and PR04, it would be unsuitable to comment on any trends between present and past AMP periods shown on table 3.2. However, as seen in B3 section 3, using the condition grade technique that has been implemented when working out bursts / 1000km for June Return, it is clear that between JR03 and JR08, the number of mains in condition grade 3, 4 and 5 is increasing, therefore showing a deteriorating asset base.

6.1.9. *Ancillaries – customer (Infrastructure)*

330. The number of Communication Pipes estimated by the company for PR04 was 1,480,537 and has increased to a PR09 total of 1,602,782. This is an increase of 8.3%.
331. The actual numbers in each condition grades between PR04 and PR09 has changed very little. There has been a small increase in communication pipes in condition grades 1, due to the number of new properties built, with new communication pipes.

6.1.10. *Ancillaries – customer (Non-infrastructure)*

332. For revenue meters there has been no specific condition grade analysis by meter readers. This has meant the analysis been based on age. There are almost no meters in condition grades 4 or 5 but there has been a movement of 15% of the meters from grade 1 to 2. This is a reflection of the overall asset base becoming older.

6.1.11. *Management and General (M&G)*

333. The changes in the management and general condition grades reflect:
- ⦿ Reclassification of land and buildings as separate assets
 - ⦿ All land regarded as condition grade 1
 - ⦿ The investment in offices and depots that has taken place, to improve the condition of the assets and the working environment of employees.

6.2. *SEWERAGE SERVICE - CONDITION GRADE TREND*

334. This section examines the reasons behind any major changes in asset condition data presented within Table C3.4. An extract of C3.4 is shown in Table 35.

Description	1997-98 Final					2002-03 Final					2007-08 Final				
	Asset condition % of Gross MEA					Asset condition % of Gross MEA					Asset condition % of Gross MEA				
	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5
A Group 1 - Sewers															
1 Critical sewers	44.8%	11.6%	25.3%	13.1%	5.3%	43.1%	12.3%	25.4%	13.3%	5.9%	40.3%	10.6%	10.3%	33.4%	5.4%
2 Non-critical sewers	37.1%	12.7%	32.7%	15.9%	1.6%	36.0%	12.8%	16.2%	32.8%	16.2%	36.2%	11.9%	14.9%	31.1%	5.9%
3 Sewage pumping mains	4.4%	52.8%	35.4%	5.5%	1.9%	3.7%	45.8%	40.7%	6.7%	3.1%	64.9%	18.4%	10.9%	3.4%	2.4%
B Group 2 - Sewer structures															
4 Combined sewer & emergency overflows	59.9%	24.9%	11.1%	2.1%	2.0%	59.6%	24.9%	11.5%	1.8%	2.2%	58.0%	34.6%	6.5%	0.6%	0.3%
5 Other sewer structures (volume m ³)	34.0%	20.0%	38.0%	6.0%	2.0%	62.4%	25.2%	4.8%	5.7%	1.9%	45.2%	40.9%	9.3%	4.5%	0.1%
6 Sewerage expenditure as a % of its GMEA						0.67%					0.76%				
C Group 3 - Sewage pumping stations															
7 In-line pumping stations	19.3%	30.6%	28.3%	16.8%	5.1%	22.0%	32.3%	29.6%	10.9%	5.2%	26.2%	33.4%	27.8%	11.3%	1.3%
8 Terminal pumping stations											17.0%	26.8%	22.2%	14.1%	19.9%
9 Sewage pumping stations expenditure as a % of its GMEA						6.74%					5.17%				
D Group 4 - Sewage treatment works															
10 Preliminary treatment only	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11 Primary treatment only	18.8%	11.9%	43.0%	11.5%	14.8%	18.5%	30.6%	31.3%	12.9%	6.7%	29.9%	10.1%	30.1%	21.8%	8.1%
12 Secondary treatment only	18.5%	30.2%	33.2%	11.6%	6.5%	21.7%	29.7%	29.5%	12.5%	6.6%	25.2%	40.5%	25.6%	7.0%	1.7%
13 Tertiary treatment only	17.0%	36.3%	28.5%	10.6%	7.6%	23.3%	29.8%	28.9%	12.1%	6.2%	18.5%	43.1%	25.8%	11.8%	1.4%
14 Sewage treatment works expenditure as a % of its GMEA						4.86%					4.71%				
E Group 5 - Sea outfalls															
15 Short outfalls	3.0%	5.0%	67.0%	18.0%	7.0%	0.0%	8.6%	80.6%	10.8%	0.0%	0.0%	13.2%	29.8%	46.9%	10.1%
16 Long outfalls	31.0%	31.0%	21.0%	15.0%	2.0%	32.9%	29.0%	26.7%	0.0%	11.4%	0.0%	48.5%	42.8%	8.7%	0.0%
17 Sea outfalls expenditure as a % of its GMEA						3.15%					0.00%				
F Group 6 - Sludge treatment facilities															
18 Liquid disposal	9.0%	29.8%	49.3%	8.2%	3.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19 Cake disposal	29.7%	57.3%	9.1%	3.9%	0.0%	26.3%	45.9%	23.0%	4.6%	0.2%	17.3%	33.3%	33.1%	7.5%	8.8%
20 Compost disposal	23.7%	17.4%	48.9%	3.9%	6.0%	0.0%	8.7%	77.0%	14.3%	0.0%	16.2%	55.7%	21.3%	5.3%	1.5%
21 Ash disposal	4.4%	22.6%	60.3%	6.4%	6.3%	0.8%	14.3%	82.9%	2.0%	0.0%	19.9%	31.9%	33.6%	11.2%	3.4%
22 Other disposal	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	42.1%	51.8%	5.9%	0.2%	0.0%
23 Sludge treatment expenditure as a % of its GMEA						0.81%					4.76%				
G Group 7 - Management and general															
24 Offices and laboratories (total area)	70.4%	16.7%	12.9%	0.0%	0.0%	46.0%	29.1%	19.5%	5.4%	0.0%	42.2%	57.8%	0.0%	0.0%	0.0%
25 Depots and workshops (total area)	30.7%	44.9%	24.5%	0.0%	0.0%	7.3%	42.1%	39.5%	10.6%	0.5%	56.5%	0.0%	43.5%	0.0%	0.0%
26 Management and general expenditure as a % of its GMEA						89.41%					45.60%				
27 Sewerage service - summary asset information	35.3%	16.6%	30.3%	13.7%	3.7%	34.8%	16.7%	30.0%	13.7%	4.1%	35.3%	18.1%	15.6%	25.3%	4.8%
28 Sewerage service expenditure as a % of its GMEA						2.27%					1.99%				

Table 35: Sewerage Service asset condition trends

6.2.1. Critical and Non-critical Sewers

- 335. A new method was used to calculate the condition grade profile which is an improvement of the Weibull method used in PR04.
- 336. Since a new method has been employed a direct comparison with previous profiles cannot be made. Results show profiles broadly similar to those seen previously except that there is a shift from condition grade 3 into condition grade 4. This is in part due to deterioration of the sewer network but in the main due to an improvement in the method of calculating the condition grade profile.
- 337. Variations on the methodology employed have been trialled producing similar condition profiles.
- 338. Further work undertaken between DBP and final FBP submissions repeated the methodology with an updated historic CCTV dataset containing an additional 18 months of data. The results showed a slight deterioration in the overall condition grade profile.

6.2.2. *Sewage Pumping Mains*

339. As a result of a new method being specified in the Ofwat company guidance, the profile cannot be compared with that of PR99 and PR04.
340. The methodology has been repeated for FBP using a revised cohort grouping criteria. The results show a significant difference in profile compared with DBP. This demonstrates the difficulty in producing consistent results using this methodology.

6.2.3. *Combined Sewer and Emergency Overflows*

341. An overall improvement in condition grades is a reflection of the level of investment in the Unsatisfactory Intermittent Discharge (UID) quality programme over AMP3 and AMP4.

6.2.4. *Other Sewer Structures*

342. 60% of the detention tank assets have been constructed during AMP3 and AMP4. This is reflected in the proportion of assets assessed as grade 1 or 2. A significant increase in the total number of assets in this category means that proportionally the number of assets in grade 4 and 5 has decreased.

6.2.5. *Sewage Pumping Stations*

343. The PR09 condition grade proportion for Sewage Pumping stations reflects a deterioration of the condition grade in this part of the asset base during the last 5 years. The change in the result is due to inadequate funding for investment during the intervening period. This is also reflected in some other measures (pollution incidents and reactive maintenance) and this area of the asset base is the subject of a planned increase in investment as part of the FBP.
344. Between the DBP and FBP submissions ongoing data updates and improvements have been made to asset surveys. The significant change in the condition profile for terminal pumping stations is the result of updates made to the asset survey data for Hull East and Hull West pumping stations. It was identified that due to an AMP4 large scheme currently ongoing at these sites, surveys for were not sufficiently completed to allow an accurate valuation at the DBP. These surveys have been updated to reflect the assets as at 31 Mar 2008 and the data processed as a desktop exercise to obtain a more accurate valuation. These assets are of large value and generally in poor condition, accounting for the shift in condition grades (between DBP and FBP) in the Terminal Pumping station category.

6.2.6. *Waste Water Treatment Works*

345. There is some difficulty in understanding the trends in condition grades in WWTW's due to movement between the lines and the more detailed level of survey during the current assessment. However, the general trend is for a reduction of assets in condition grade 5, a stable or slightly reducing percentage in grade 4 and an overall increase in works in the grade 1-3 range. This reflects the risk based approach to capital maintenance in targeting the biggest areas of risk, one aspect of which relates to condition/performance grade, and the successive quality programmes through AMP2, AMP3 and AMP4.

6.2.7. *Sea Outfalls*

346. A survey of each outfall has been carried out for PR09 whereas for PR04 a desktop assessment was employed. The PR09 assessment is therefore more robust. Sea outfall condition shows an overall deterioration in the profile for both long and short sea outfalls. Hornsea long sea outfall, which was assessed as grade 5 at PR04 has since been replaced.

6.2.8. *Sludge Treatment Facilities*

347. A comparison of trends in condition grade for STF's is difficult. This is because the assessment for PR09 has been carried out at a significantly greater level of detail and therefore is a more accurate assessment. The previous assessment for PR04 was carried out as a higher level assessment which resulted in many assets receiving an average "3" grade. The profile indicates a higher number of assets now in condition grades 4 and 5 and such a trend is backed up by observations of deteriorating serviceability by our operational teams.

6.2.9. *Management and General (M&G)*

348. The changes in the management and general condition grades reflects:-
- Reclassification of land and buildings as separate assets
 - All land regarded as condition grade 1
 - The investment in offices and depots that has taken place, to improve the condition of the assets and the working environment of employees