

NATIONAL UNDERGROUND ASSETS GROUP

Capturing, recording, storing and sharing underground asset information

A review of current practice and future requirements

September 2006



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The National Underground Assets Group (NUAG) was set up in 2005 to champion better coordination between different organisations including highways agencies, utility companies, civil engineers, surveyors and regulators. The group is now working with the Department for Transport to develop standard processes to help coordinate activities which underpin the Traffic Management Act.

UK Water Industry Research Limited provides a framework for a common research programme to undertake projects, which are considered to be fundamental to water operators on 'one voice' issues. Its contributors are the water and sewerage companies and the water supply companies of England and Wales, Scottish Water and Northern Ireland's Water Service.

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Executive Summary

Background

The Traffic Management Act (TMA) is seeking to encourage all those with underground assets to exchange information to facilitate better street works cooperation. New technologies are emerging to help enable this. However, if asset data is recorded to different referencing standards, and on different media, its usefulness and reliability may be compromised, leading potentially to inefficiency and delay, which in turn could impact on safety. Facilitating the exchange of data will do nothing to improve the quality of what is exchanged. To meet the requirements of the TMA for more effective inter-organisational communications on street works activities and underground asset location, consistency is required in referencing and recording asset information

There is a need for people working in the street to access information about their own and other organisations' assets easily and quickly. There is a Code of Practice issued by the Highway Authorities and Utilities Committee (HAUC), and Guidelines and Recommendations published by National Joint Utilities Group (NJUG). However, these are advisory, not statutory, and consequently there is variability within the 'street works communities' on timescales and approaches to capturing, recording and storing asset data, and sharing information.

The National Underground Assets Group

The National Underground Assets Group (NUAG) is a group of relevant stakeholders, including utilities and local authorities, established to support the Department for Transport (DfT) in achieving the relevant Traffic Management Act targets, and to act as a point of focus and single voice for everyone involved with underground, and appropriate associated above ground assets. To help move towards achieving its Vision, NUAG is sponsoring the National Referencing Standards Project (NRS), the milestones of which align with current DfT target dates for a revised Records Code of Practice. Phase 1 of the project aims to develop methodologies, standards and best practices that address the short-term standardisation needs to 2008.

User Survey

This report describes the work of the Phase 1 Working Group in developing and carrying out a User Survey of a representative sample of utilities and highway authorities to better understand:

- The range of practices in place currently to gather, record and store asset data, and share asset information;
- how these practices may change in the future, as organisational improvements are made, and new technologies become more widespread, and

- what practitioners would like to see in the future, and reactions to the concept of a mandatory revised Code of Practice

Results

Results are presented as both quantitative and qualitative data. Quantitative data covers responses to a standard questionnaire on details of current practice, and aspects of future practice, using the current Code of Practice as a benchmark. Qualitative data includes descriptions of current practice and future plans; issues surrounding current practice; issues associated with any changed future practice, and issues generated by the concept of a mandatory revised Code of Practice.

Conclusions

1. Significant variations exist in practices, approaches, attitudes and emphases, within and between utilities and highway authorities, for the recording, storing and sharing of underground asset information, leading to, *inter alia*: variable accuracy; incomplete records; a wide range of map bases; excessive timescales and inconsistent approaches to third party and legacy data.
2. The lack of a statutory-based Code of Practice is seen as a key contributor to the current position.
3. There is strong support across utilities and highways sectors for a change to a more effective standardised approach and mandatory Code of Practice.
4. There are likely to be cost and resource issues associated with the deployment of a new Code.
5. Unless a more consistent and compatible approach is employed to recording, storing and sharing asset record information, the possibility of achieving any future anticipated benefits of new technology will be threatened, and the technology-based aspirations of the Traffic Management Act are likely to be compromised.

Recommendations

To achieve targets set out in the Traffic Management Act, NUAG recommends that:

1. A revised Records Code of Practice must be developed and deployed on a mandatory basis.
2. A mandatory national standard high-level framework, with effective ownership and management, for capturing, recording, storing and sharing buried asset information must be in place to enable the effective deployment of the revised Records Code of Practice.
3. Each utility and highways organisation must have clearly-defined processes compatible with the national standard framework, with effective ownership and management, for the implementation and use of revised Records Code, and achievement of the Code's standards.

4. The revised Records Code of Practice must include a set of minimum standards to be achieved, as follows:
 - a. All below ground assets must be recorded, together with associated above ground assets.
 - b. Asset data must be captured during all types of work: planned, urgent and emergency. (Planned and immediate).
 - c. Data must be captured and recorded for assets in any location.
 - d. Data must be recorded for all new, replacement, amended or abandoned assets.
 - e. All previously-unrecorded existing assets, belonging to the organisation carrying out the work, should be recorded if found during work.
 - f. Any unidentified third party asset found in the course of work must be captured, and recorded as an Unidentified Buried Object (UBO), by the organisation finding it.
 - g. Any historical discrepancies between recorded and actual data found during work should be reported to the asset's owner, including third parties.
 - h. Attributes that must be captured are: location (x and y); top of asset (z); diameter (including any changes); material (including any changes), and pipe or cable run.
 - i. Asset data must be captured and recorded at a minimum standard of accuracy of +/- 100 mm in x, y and z dimensions.
 - j. Location data must be recorded using relative and absolute referencing.
 - k. All geospatial data must be recorded using an agreed framework and agreed scales (DNF).
 - l. Asset data must be available for external inspection within one month of capture.
 - m. Record information must be made available in electronic form through a web-based service.
 - n. Each organisation is responsible for managing their responses to requests for record information.
5. The revised Code of Practice must include standard data definitions and data standards.
6. There must be an annual review process to measure performance against the Code's standards, leading to the deployment of appropriate improved minimum standards.
7. Any resource and cost implications associated with the new Code must be managed effectively to ensure a successful deployment.

8. The national high level standard framework and the revised Records Code must be fully implemented within a mandatory timetable.

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1 Introduction

1.1 Background

The scope and extent of underground utility and local authority assets in the UK are massive:

- 275,000 km of gas mains;
- 353,000 km of sewers;
- 396,000 km of water mains;
- 482,000 km of electricity cable;
- an estimated 2,000,000 km of telecommunication cables;
- highway drains and surface water sewers;
- traffic management cabling (lights, signs, etc.);
- utility service connections to property;
- Network Rail's assets including signalling, drainage, power and telecommunications, electrification and plant, and
- nationally-important oil pipelines.

(Source: M Farrimond, UKWIR. 2006)

Most of this essential public service infrastructure was installed in the last two hundred years, to various levels of constructional quality, and with different geographical referencing, depending on age.

The need to know what plant is buried and where is well recognized by utility companies and highways authorities. Section 79 of the New Roads and Street Works Act 1991 (NRSWA) sets out requirements for apparatus owners to establish, maintain and make available records of all underground apparatus in the street (subject to certain exemptions). The Street Works (Records) (England) Regulations 2002, effective from 1 May 2003, set out the manner and form in which records should be kept.

Section 79 is supported by the *Code of Practice for recording of underground apparatus in streets* (Department for Transport, 2002). This is a non-statutory document. The Highway Authorities and Utilities Committee (HAUC), which comprises representatives of both utilities and highway authorities, has agreed that the principles in this code, and the accompanying regulations, should be adopted not only by all undertakers carrying out street works under NRSWA, but also by highway authorities in recording of their own apparatus.

The Code's principles are further supported in two documents published by the National Joint Utilities Group (NJUG): *Guidelines on the positioning and colour coding of utilities' apparatus* (2003), and *Recommendations for the exchange of records of apparatus between utility companies* (2003).

Information on buried apparatus has been recorded in many different forms over time, in some cases over many years. The first records were paper-based – and still are in many organisations – and many have been digitised in some way over the past thirty years, together with some old maps and other topographical background information. Not all of this information is recorded against the Ordnance Survey (OS) National Grid; much was originally recorded with reference to contemporary street features, many of which have been changed or removed. Approaches to making data available vary; currently, some organisations make data available to others via secure web sites, some via CD-Roms, some via microfiche, and some via faxed copies of paper records.

A 2000-01 NJUG sponsored records exchange pilot in Cheshire discovered that the variety of records (scanned pre-National Grid maps, vector mapping and networks), their availability and the accessibility of buried asset information significantly hampered the ability to integrate works, exchange records and generally improve the effectiveness of street operation and minimise disruption to the local community and traffic.

A feasibility study carried out by Amtec Consulting Limited for the Department for Transport (DfT) into the potential for utilising information technology (IT) in aspects of highway and street works management identified the keeping and exchanging of apparatus records as an area where a greater or more standardised application of IT could potentially bring benefits. The report (2003) concluded that “...a National Framework must be established for co-ordinating the setting of standards and for improving the flow of information to assist in achieving the objective of reducing disruption.” Amongst its recommendations, the report states: “Asset location records should be made available electronically and will benefit all stakeholders.”

The need for a common information framework was also stated by the Institution of Civil Engineers (ICE) and Institution of Civil Engineering Surveyors (ICES) Geospatial Engineering Board in November 2004. Their Buried Services Working Group produced a report in 2005 that included key findings relating to more effective recording and referencing of geospatial and location data.

The Traffic Management Act 2004 (TMA) seeks to encourage owners of underground assets to exchange information to facilitate more effective co-operation between everyone involved in street works. A review of the Records Code of Practice is currently planned to commence in mid-2007 (date to be confirmed) (Ben Still DfT, May 2006), and the Act currently proposes that all owners of underground apparatus will need to provide digital (GIS) asset location data, on request, from June 2008.

However, if asset data continues to be recorded to different standards, held on different media and shared in an inconsistent manner, its usefulness and reliability will be compromised, leading potentially to inefficiencies, delays and impacts on safety. Failure to move to a more consistent standardised approach may jeopardize the TMA’s intentions and militate against achieving the benefits offered by the application of ever-improving technology as described, for example, in *Buried asset data collection and field trials* (UKWIR Report 06/WM/12/9. 2006).

It is against this background that the National Underground Assets Group (NUAG) was formed, and the work described in this report carried out.

1.2 The National Underground Assets Group

The National Underground Assets Group (NUAG) is a group of relevant stakeholders, including utilities and local authorities, established to support the Department for Transport in achieving the relevant Traffic Management Act targets, and to act as a point of focus and single voice for everyone involved with underground, and appropriate associated above ground assets. As shown below, NUAG complements the existing arrangements between DfT and HAUC:

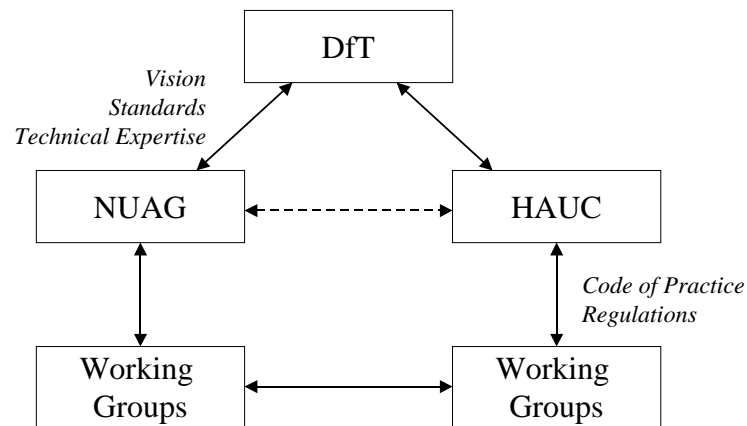


Figure 1 NUAG in context

The group consists of prominent figures representing the following organisations:

- Department for Transport
- National Joint Utilities Group
- Highways Authorities and Utilities Committee
- Institution of Civil Engineers / Institution of Civil Engineering Surveyors
- UK Water Industry Research (UKWIR)
- Pipeline Industry Guild (PIG)
- Ordnance Survey
- Association for Geographic Information (AGI)
- County Surveyors Society (CSS)

- National Street Works Highways Group (NSWHG).

NUAG's work forms part of a much wider range of activities focussed on improving the way that asset data is gathered, recorded, stored and shared and information used, as shown below:

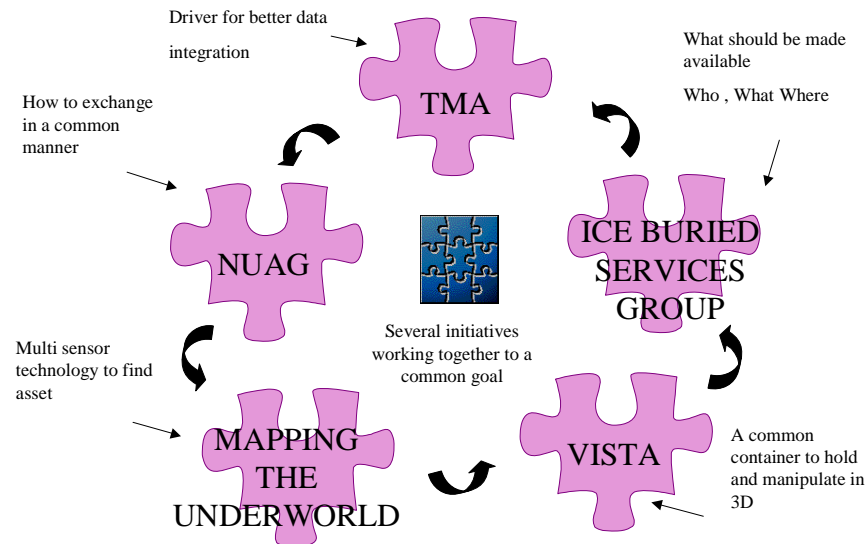


Figure 2 The Buried Assets 'Jigsaw'

1.2.1 NUAG's Vision:

All information on underground assets, and appropriate associated above ground assets, will be shared between stakeholders in a consistent way, on demand.

1.2.2 NUAG's Aims:

To support the Department for Transport in achieving the relevant Traffic Management Act targets by:

- Delivering agreed data definitions, data standards, protocols and processes, and a timetable for their implementation, leading to the most effective and efficient means of recording, storing, sharing and displaying information on underground assets, and appropriate associated above ground assets.
- Ensuring that everything is in place to enable the successful delivery of the Vision.

To inform and represent the wider stakeholder community.

1.3 The National Referencing Standards Project

To help move towards achieving the Vision, NUAG is sponsoring the National Referencing Standards Project (NRS), the milestones of which align with current DfT target dates for a revised Records Code of Practice. This is a two-phase project: Phase 1 will develop methodologies, standards and best practices that address the short-term standardisation needs to 2008. Phase 2 will build on the outputs from Phase 1 to develop the capability that delivers the vision through technology-based solutions.

1.4 Phase 1 Working Group

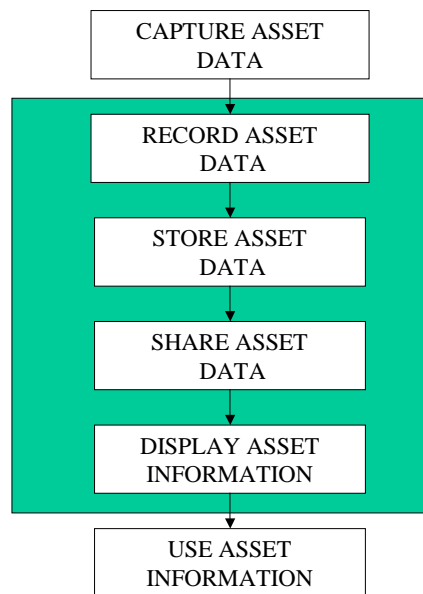


Figure 3 Scope of Phase 1

A Phase 1 Working Group has been set up, comprising experts in the field, nominated by Steering Group members representing the range of stakeholders in the buried assets process. Phase 1 *Processes* focuses on the four processes highlighted in Figure 3, to deliver definitions, standards, protocols and processes, with associated measurement and management systems, documentation, training material and support systems.

Appendix 1 contains details of Steering and Working Group members.

2 The User Survey

2.1 Purpose of the Survey

For Phase 1 to deliver outputs that best meet a balanced stakeholder consensus view, it is essential to understand:

- The range of practices in place currently to gather, record and store asset data, and share asset information;

- how these practices may change in the future, as organisational improvements are made and new technologies become more widespread, and
- what practitioners would like to see in the future.

Although Phase 1 is essentially ‘paper-based’, to enable the definition and deployment of sound processes and practices as an enabler of future technology-based capability (in Phase 2), it has to be viewed against a background of available technologies and likely future developments.

Consequently, the Working Group carried out a User Sampling Survey, described in the following sections, designed to:

- Capture information on current practices.
- Record plans for the future.
- Identify issues surrounding both current practices and future plans.
- Explore the concept of a future mandatory Code of Practice.

2.2 The data gathering process

Given that there are well over 500 organisations in England and Wales gathering, holding and sharing asset information, the Working Group designed a process to gather data through an interview-based representative sampling exercise.

This was a pragmatic response to the large population size and limited available resources, built on the understanding that outputs would be shared with a much larger body of opinion, which would allow the original sample to be validated and built on.

For utilities, criteria for the representative sample included a range of organisation sizes from electricity, gas, telecommunications and water sectors in different geographic areas. For highways, criteria included a range of urban and rural authorities, of different sizes in different geographic areas.

Organisations taking part in the survey are shown in Appendix 2.

The process was as follows:

- Contact was made with an appropriate person in an organisation, inviting them and colleagues covering the whole asset data process in their organisation to participate.
- A briefing note was sent to give interviewees background on NUAG and the NRS Project.
- Data was, in the vast majority of cases, gathered through a face-to-face interview (via an email correspondence in the rest), using a standard questionnaire.

The amount of data gathered varied between organisations, and not all organisations chose to answer all questions.

2.3 The Questionnaire

The questionnaire (shown in Appendix 3) was developed to gather a mix of quantitative and qualitative data. The quantitative element was included as a checklist of topics to be covered, to allow meaningful data analysis and presentation. A qualitative approach was essential to allow interviewees a full opportunity to describe current practice, reflect on future positions and associated issues, and address the concept of a future Code of Practice.

When developing the questionnaire, the Working Group agreed that rather than ‘redeveloping the wheel’, the most logical approach was to use the *Code of Practice for Recording of Underground Apparatus in Streets* (DfT/HAUC) as the benchmark, supported by the relevant sections of *Guidelines on the positioning and colour coding of utilities’ apparatus* (NJUG) and *Recommendations for the exchange of records of apparatus between utility companies* (NJUG). These documents were reviewed to identify potential questions for both current and future situations.

2.3.1 Gathering Quantitative Data

Topic Areas used in the Checklist elements of the questionnaire are shown below, with references to related sections of the Code of Practice. For clarity, the description relates to the current situation; unless specifically stated, the essence of the question asked for the future situation remains the same, but with the tense altered from ‘what is...’ to ‘what should be...’

Topic Area		Description
1	Plan area where assets are recorded.	Whilst assets may be regarded typically as lying within the street (Code 1.1), and its surrounding area i.e. adjacent to the carriageway or footway, some assets lie away from these areas e.g. pipelines in rural areas. This area looks at the locations within which assets are recorded.
2	Time from data capture to being available for inspection.	The Code (1.1) sets out the requirement to make information available. This area looks at the timescale between asset data capture and information on that asset being available for inspection by a third party.
3	Recording third party assets	The Code (1.2) exempts from recording any apparatus whose ownership is unclear. This area seeks to identify the scale to which data associated with assets not owned by the organisation finding them in the course of their work is recorded by them.
4	Commercial sensitivity – A problem?	This area seeks to establish whether sharing of data and information relating to an asset may be seen to be prejudicial to commercial interests (Code 1.4).
5	Recording asset details when placed within existing assets.	New or replacement apparatus may be placed within an organisation’s existing asset(s). This area seeks to understand how much of this data is captured (code 1.4).

Topic Area		Description
6	Age of assets recorded.	The Code (1.4) exempts from recording any apparatus placed in the street prior to its implementation date (May 2003). This area seeks to understand how widely this exemption applies.
7	Gathering asset data	The Code (1.4) exempts from recording any asset located during the course of emergency and urgent work. This area seeks to understand how widely this exemption applies.
8	Recording above ground asset data.	The Code (1.4) exempts from recording any apparatus not installed underground. This area seeks to understand how widely this exemption applies.
9	Highway authority imposing conditions on street work licences. (Current situation only)	The Code (1.5) describes how street authorities should require licensees (undertakers) to follow the Code as far as standards and creation of records are concerned. This area seeks to identify how widely this applies.
10	Mandatory Code of Practice. (Future situation only)	The Code of Practice is, currently, non-statutory (2.1). This area seeks to gauge support for a mandatory revised Code of Practice, with associated standards.
11	Approach to legacy data.	The Code (2.5) does not cover records of apparatus installed in the street before May 2003, subject to certain circumstances. This area seeks to identify practice in place for recording such 'legacy' data.
12	Making records available.	The Code (2.6) specifies that records be made available. This area seeks to establish in what form records are made available.
13	Holding records.	The Code (3.4, 3.5) specifies various forms in which records should be held. This area seeks to understand the degree to which paper and electronic systems are used.
14	Capturing data.	This area seeks to understand, in broad terms, methods in use in the field for the capture of record data.
15	Form of referencing.	This area seeks to understand the types of referencing systems in use.
16	Scales.	This area seeks to understand the scales used for capture and storing of data, and sharing of information.
17	Form of data recording.	The Code (3.5) sets out various forms for recording data. This area seeks to understand what forms are used.

Topic Area		Description
18	Problems in the field caused by the Code's standard of accuracy. (Current situation only)	The Code (3.6) sets out minimum accuracy values for measuring and recording apparatus. This area seeks to understand the scale of any problems in achieving these values.
19	Minimum standard of accuracy to be adopted. (Future situation only)	The continuing evolution of electronic equipment and GPS-based systems may allow more accurate measurement and recording. This area seeks to establish whether future standards of accuracy should differ from the current Code (3.6).
20	Guarantees on accuracy.	The Code (3.7) advises on an approach to guaranteeing the accuracy of location information. This area seeks to establish the approaches in use.
21	Time to make or amend records.	The Code (3.10) advises that records be made or amended as soon as reasonably practicable after work etc. This area seeks to understand how this is interpreted in practice.

2.3.2 Gathering Qualitative Data

Data was gathered in four areas, through the following questions:

1. Can you please describe in broad terms how your organisation records, stores and shares records of apparatus.
2. We would like to understand key attributes, strengths, and any areas for improvement, with reference to both new and legacy assets, and to the Current DfT Code of Practice for Recording of Underground Assets in streets.
3. Can you please describe how your organisation sees the future development of recording and sharing record information, given the stated need (by DfT/HAUC in the Code, and NJUG) for continual review in the light of new technologies, and how you plan to respond to the associated challenges?
4. We are also interested to hear your views on what should be included in a revised Code of Practice, whether compliance with it should be a mandatory and, if it was made mandatory, what implications it might have.

2.4 Data analysis

Quantitative data was processed through an Excel spreadsheet, to produce the graphical and tabular results shown in section 3.3.3. Full Qualitative data for each organisation is included in Appendix 4.

Both Quantitative and Qualitative data are sub-divided into utilities and highways sector groupings.

3 Survey Results

3.1 Quantitative Data

This section sets out, in both graphical and tabular form, the analysis of the quantitative data from the survey checklist (see Appendix 3 for the questions used).

The results are set out in Topic Area order, as described in Section 2.3.1, with one chart (or table), or set of charts, for each Topic Area, with an accompanying data table. Each Topic Area includes a description and, unless otherwise indicated, both current and future results. For clarity, the description relates to the current situation; unless specifically stated, the essence of the question asked for the future situation remains the same, but with the tense altered from ‘what is...’ to ‘what should be...’

There are two types of chart:

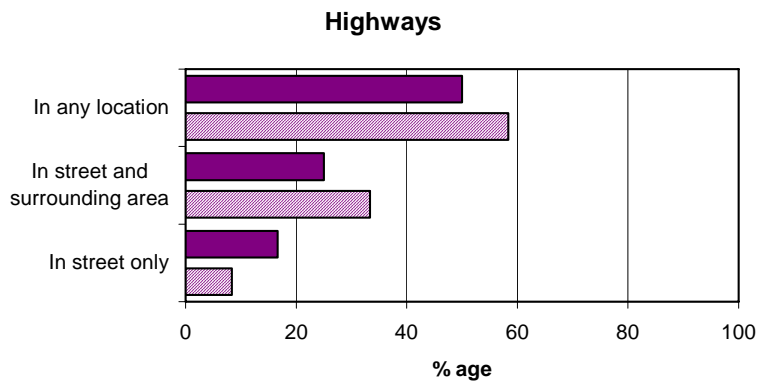
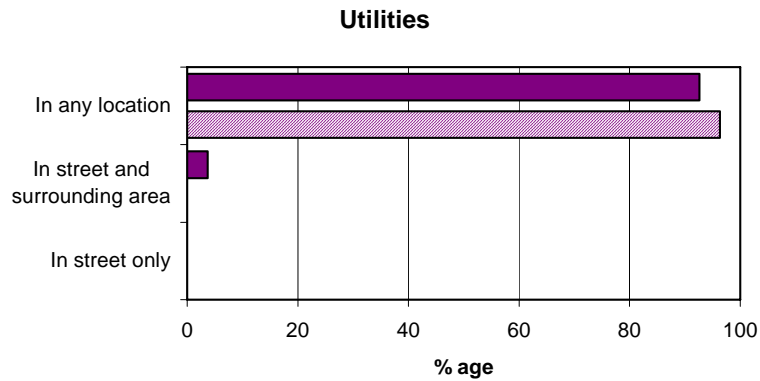
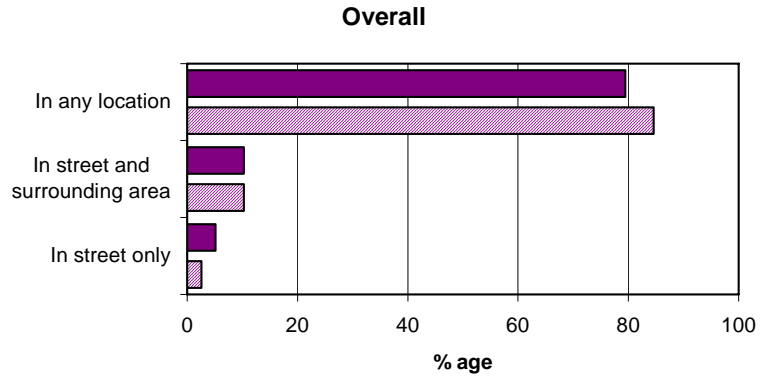
1. Displaying responses to a multi-option question (e.g. Topic Area 8 question: What above ground asset data is recorded?). Results are presented as percentages of responses answering ‘Yes’ for each option. This type is indicated by the use of (% YES) in the Topic Area title.
2. Displaying responses to a ‘closed’ question (e.g. Topic Area 3 question: Are third party assets recorded?). Results are presented as percentages of responses answering ‘Yes’ or ‘No’. This type is indicated by the use of (Y/N) in the Topic Area title.

The following points apply to the charts:

- Some values may be affected by rounding.
- There may not be a 100% response in each Topic Area, or part of an Area.
- In some Topic Areas e.g. Topic Area 12 Making Records Available, one organisation may answer ‘yes’ to more than one option to reflect the mix of options used.

Topic Area 1 PLAN AREA WHERE ASSETS ARE RECORDED (% YES)

Whilst assets may be regarded typically as lying within the street (Code 1.1), and its surrounding area i.e. adjacent to the carriageway or footway, some assets lie away from these areas e.g. pipelines in rural areas. This area looks at the locations within which assets are recorded.

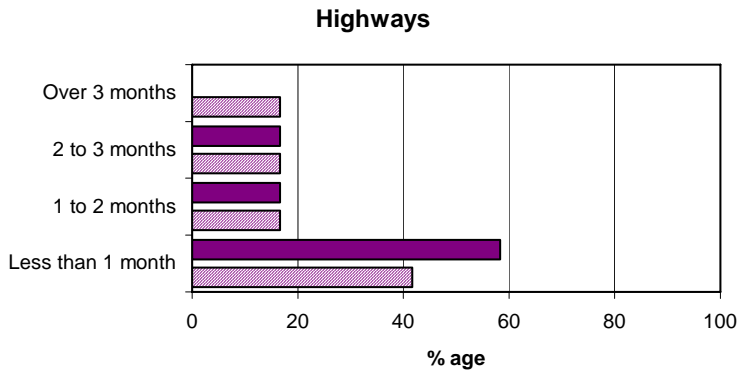
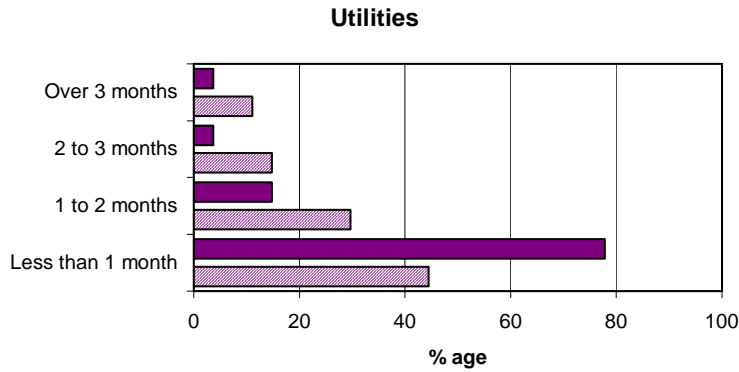
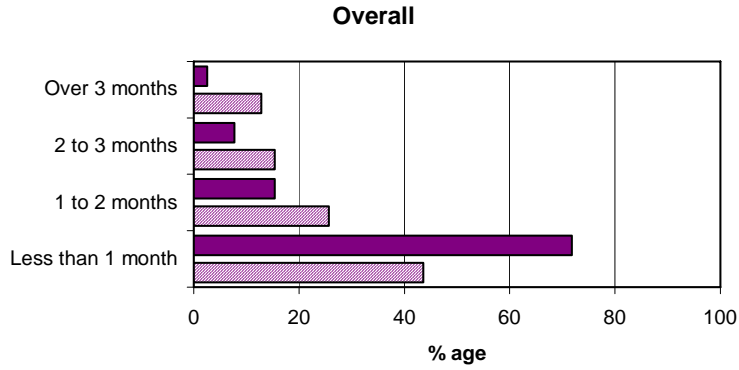


Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
In street only	0	8	3	0	17	5
In street and surrounding area	0	33	10	4	25	10
In any location	96	58	85	93	50	79

Topic Area 2 TIME FROM DATA CAPTURE TO BEING AVAILABLE FOR INSPECTION (% YES)

The Code (1.1) sets out the requirement to make information available. This area looks at the timescale between asset data capture and information on that asset being available for inspection by a third party.

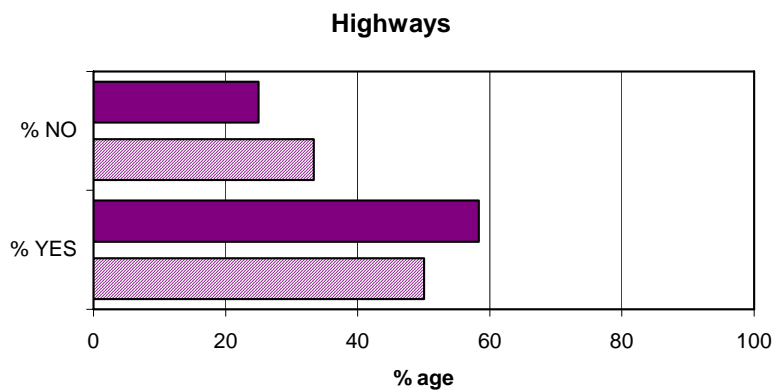
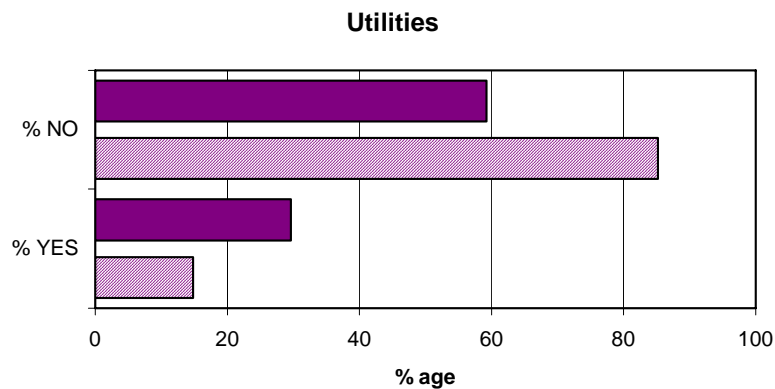
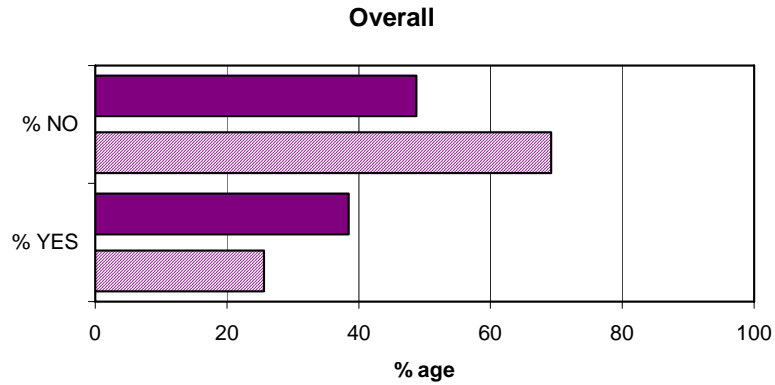


Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
Less than 1 month	44	42	44	78	58	72
1 to 2 months	30	17	26	15	17	15
2 to 3 months	15	17	15	4	17	8
Over 3 months	11	17	13	4	0	3

Topic Area 3 RECORDING THIRD PARTY ASSETS (Y/N)

The Code (1.2) exempts from recording any apparatus whose ownership is unclear. This area seeks to identify the scale to which data associated with assets not owned by the organisation finding them in the course of their work is recorded by them.

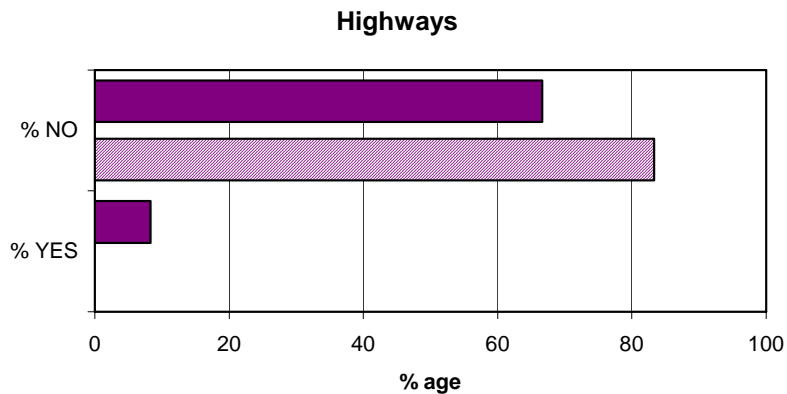
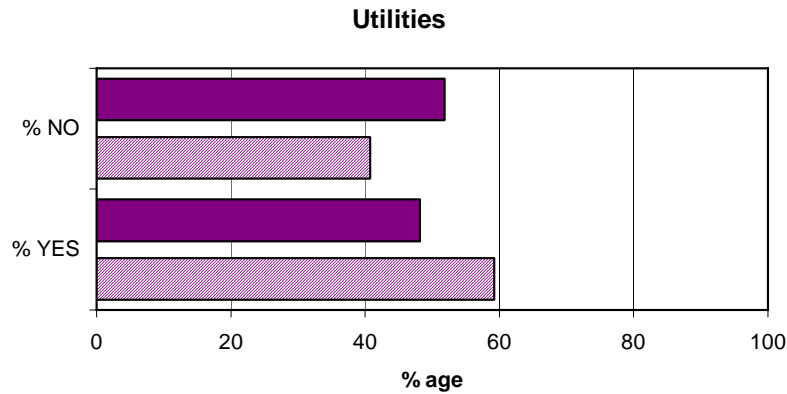
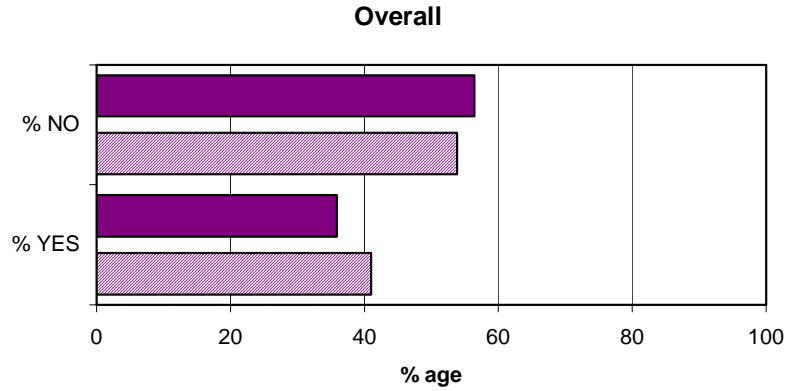


Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
% YES	15	50	26	30	58	38
% NO	85	33	69	59	25	49

Topic Area 4 COMMERCIAL SENSITIVITY - A PROBLEM? (Y/N)

This area seeks to establish whether sharing of data and information relating to an asset may be seen to be prejudicial to commercial interests (Code 1.4).

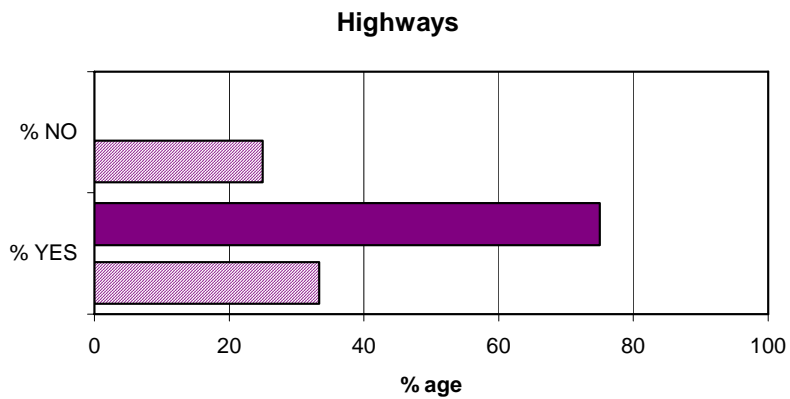
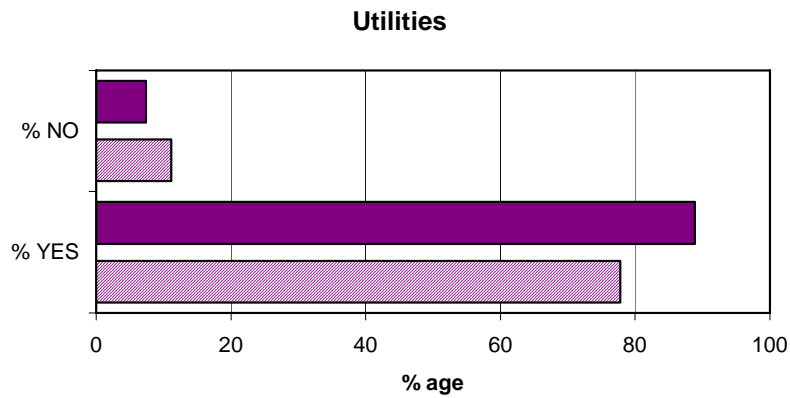
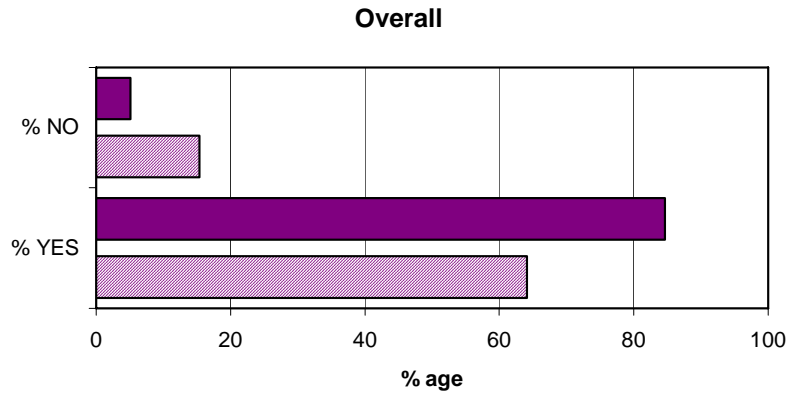


Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
% YES	59	0	41	48	8	36
% NO	41	83	54	52	67	56

Topic Area 5 RECORDING ASSET DETAILS WHEN PLACED WITHIN EXISTING ASSET(S) (Y/N)

New or replacement apparatus may be placed within an organisation's existing asset(s). This area seeks to understand how much of this data is captured (code 1.4).

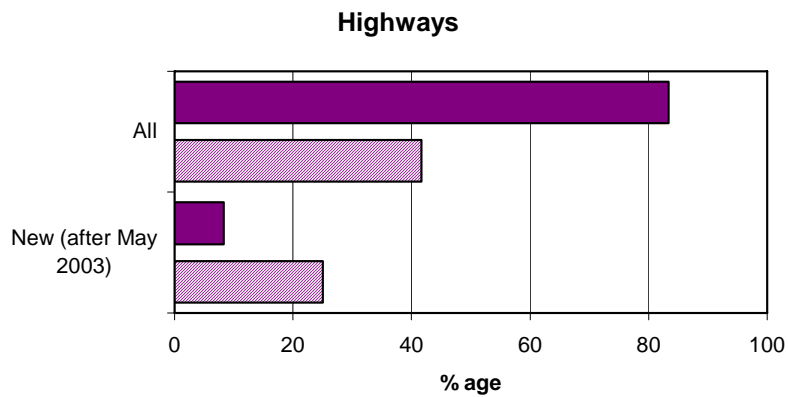
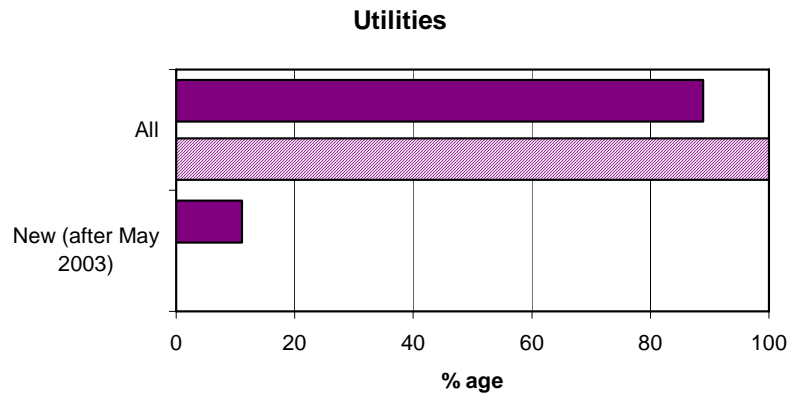
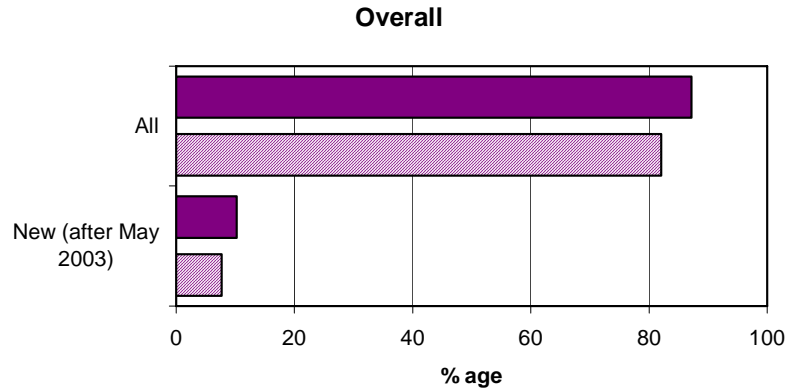


Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
% YES	78	33	64	89	75	85
% NO	11	25	15	7	0	5

Topic Area 6 AGE OF ASSETS RECORDED (%YES)

The Code (1.4) exempts from recording any apparatus placed in the street prior to its implementation date (May 2003). This area seeks to understand how widely this exemption applies.

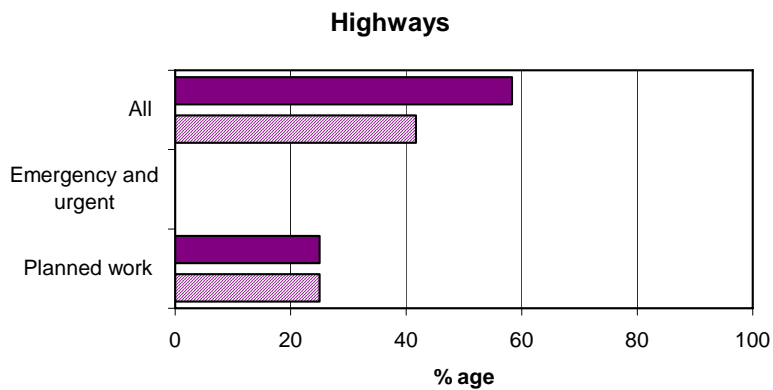
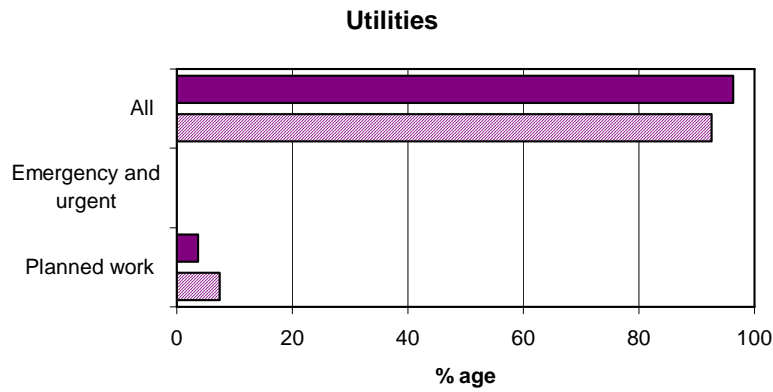
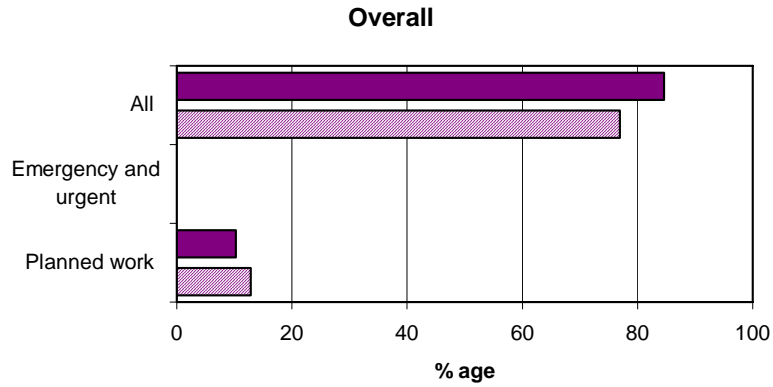


Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
New (after May 2003)	0	25	8	11	8	10
All	100	42	82	89	83	87

Topic Area 7 GATHERING ASSET DATA (%YES)

The Code (1.4) exempts from recording any asset located during the course of emergency and urgent work. This area seeks to understand how widely this exemption applies.



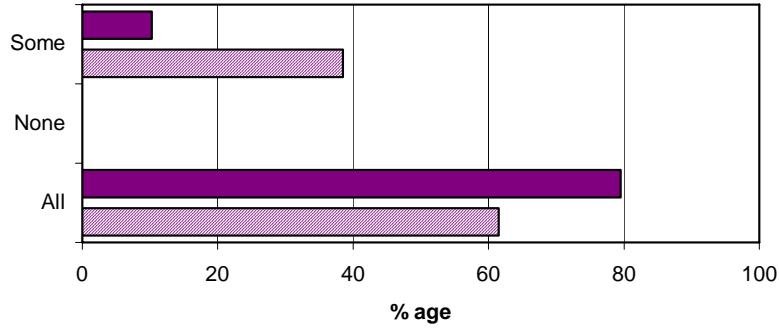
Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
Planned work	7	25	13	4	25	10
Emergency and urgent	0	0	0	0	0	0
All	93	42	77	96	58	85

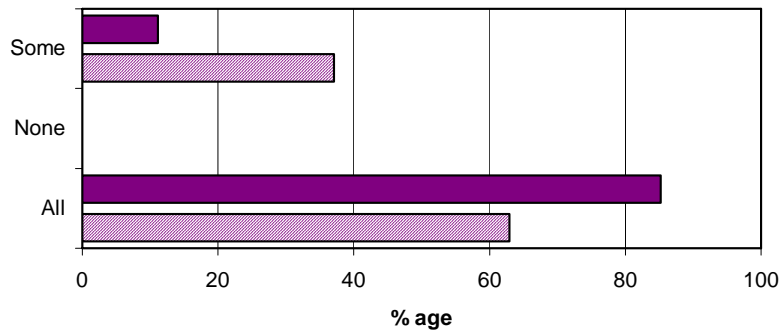
Topic Area 8 RECORDING ABOVE GROUND ASSET DATA (%YES)

The Code (1.4) exempts from recording any apparatus not installed underground. This area seeks to understand how widely this exemption applies.

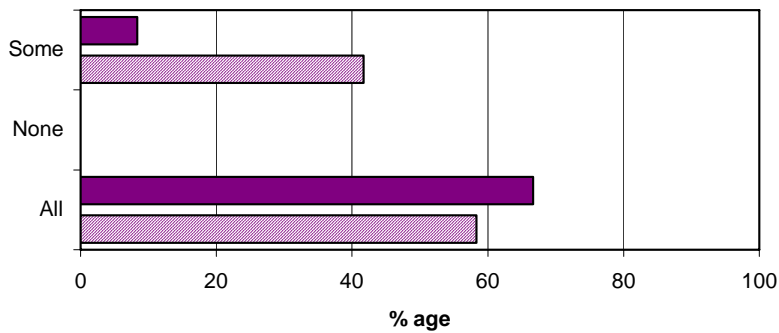
Overall



Utilities



Highways



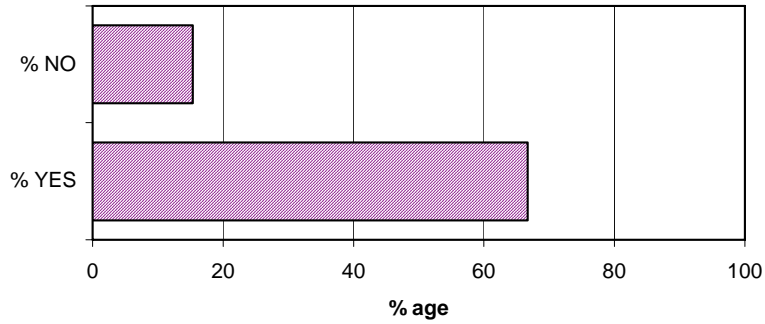
Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
All	63	58	62	85	67	79
None	0	0	0	0	0	0
Some	37	42	38	11	8	10

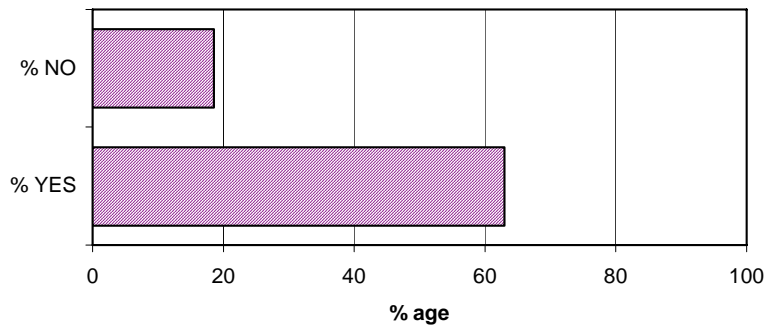
Topic Area 9 HIGHWAY AUTHORITY IMPOSING CONDITIONS ON STREET WORK LICENCES (Y/N)

The Code (1.5) describes how street authorities should require licensees (undertakers) to follow the Code as far as standards and creation of records are concerned. This area seeks to identify how widely this applies.

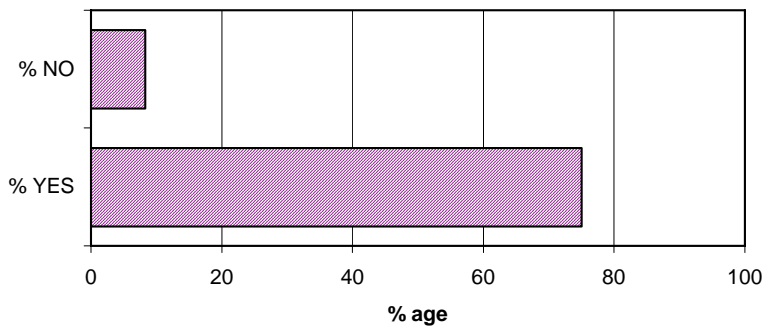
Overall



Utilities



Highways



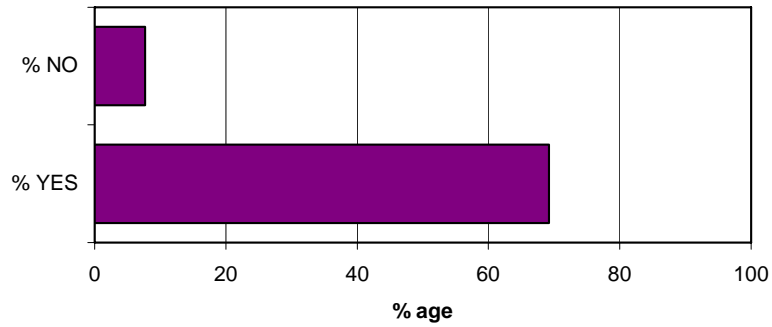
 Current

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
% YES	63	75	67			
% NO	19	8	15			

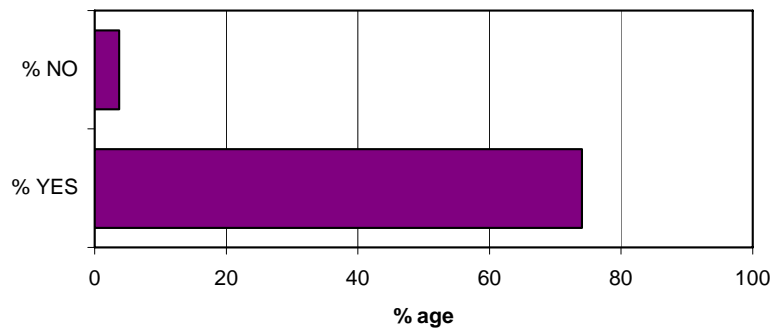
Topic Area 10 MANDATORY CODE OF PRACTICE (Y/N)

The Code of Practice is, currently, non-statutory (2.1). This area seeks to gauge support for a mandatory revised Code of Practice, with associated standards.

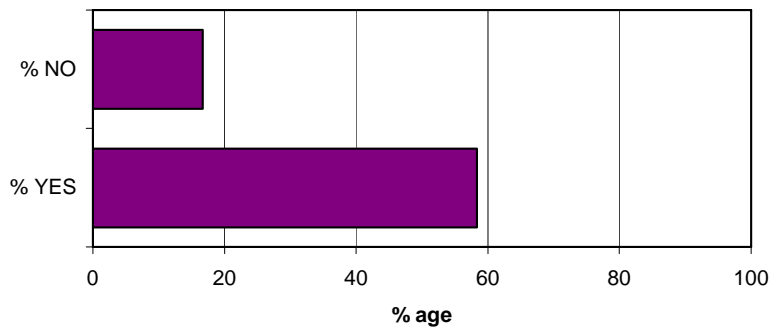
Overall



Utilities



Highways

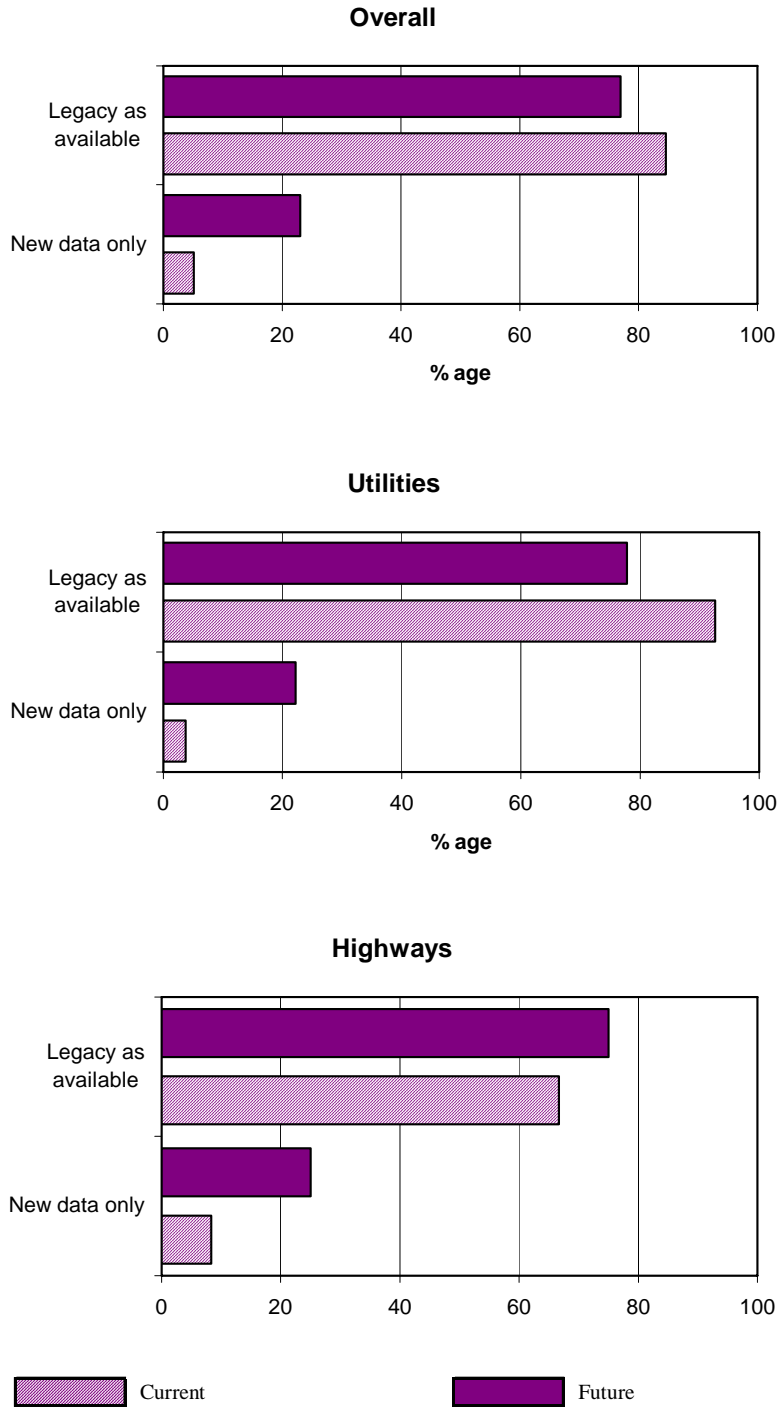


 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
% YES				74	58	69
% NO				4	17	8

Topic Area 11 APPROACH TO LEGACY DATA (%YES)

The Code (2.5) does not cover records of apparatus installed in the street before May 2003, subject to certain circumstances. This area seeks to identify practice in place for recording such 'legacy' data.

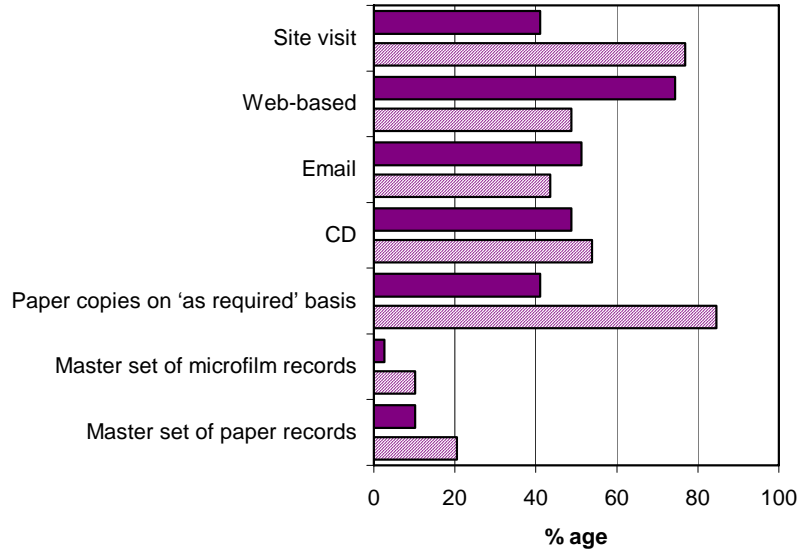


	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
New data only	4	8	5	22	25	23
Legacy as available	93	67	85	78	75	77

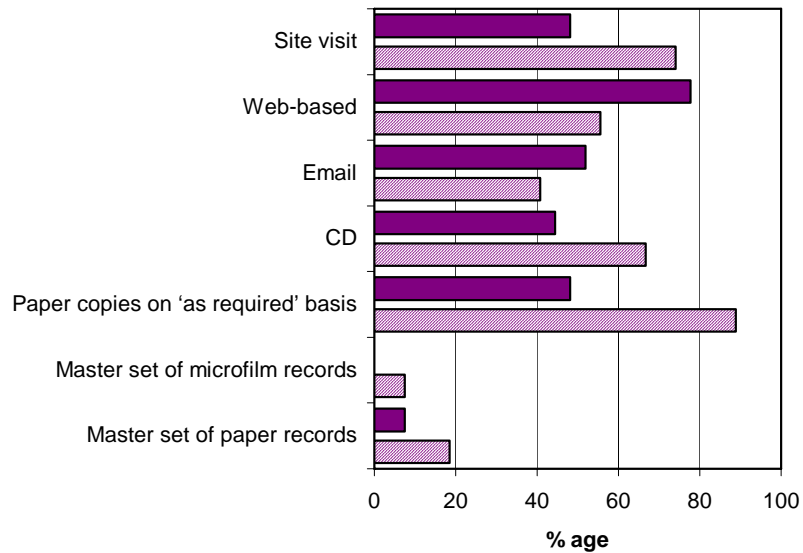
Topic Area 12 MAKING RECORDS AVAILABLE (% YES)

The Code (2.6) specifies that records be made available. This area seeks to establish in what form records are made available.

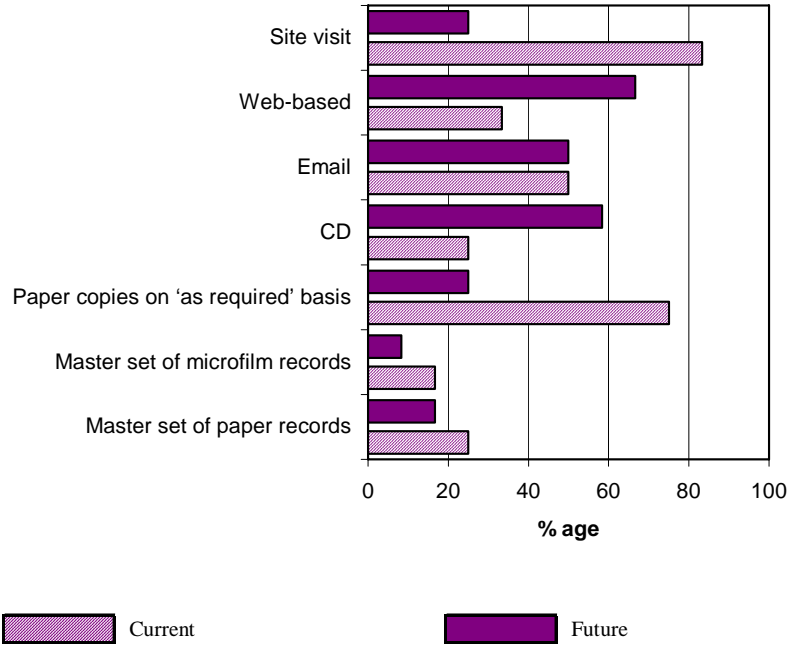
Overall



Utilities



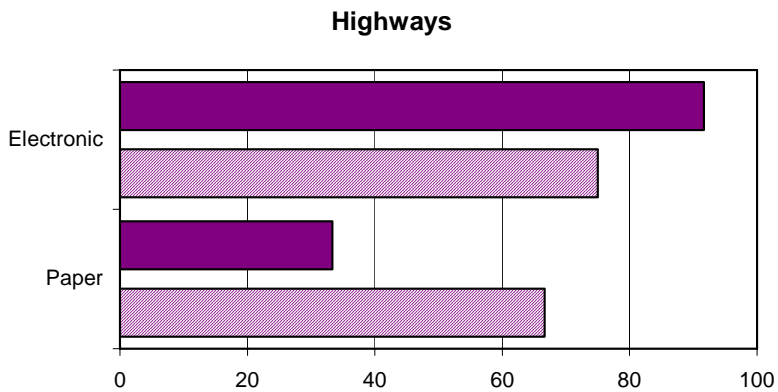
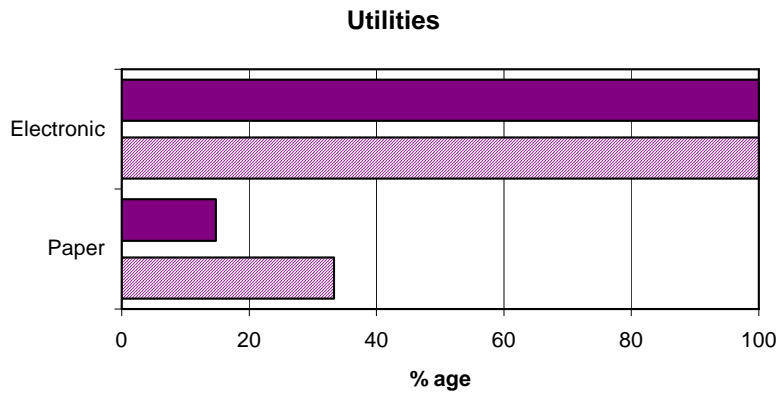
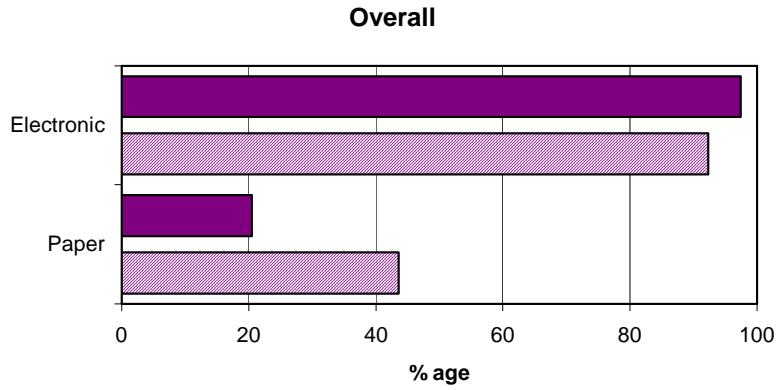
Highways



	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
Master set of paper records	19	25	21	7	17	10
Master set of microfilm records	7	17	10	0	8	3
Paper copies on 'as required' basis	89	75	85	48	25	41
CD	67	25	54	44	58	49
Email	41	50	44	52	50	51
Web-based	56	33	49	78	67	74
Site visit	74	83	77	48	25	41

Topic Area 13 HOLDING RECORDS (%YES)

The Code (3.4, 3.5) specifies various forms in which records should be held. This area seeks to understand the degree to which paper and electronic systems are used.

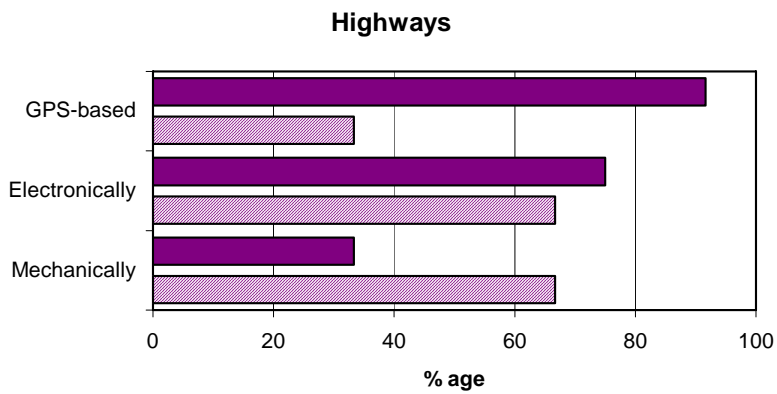
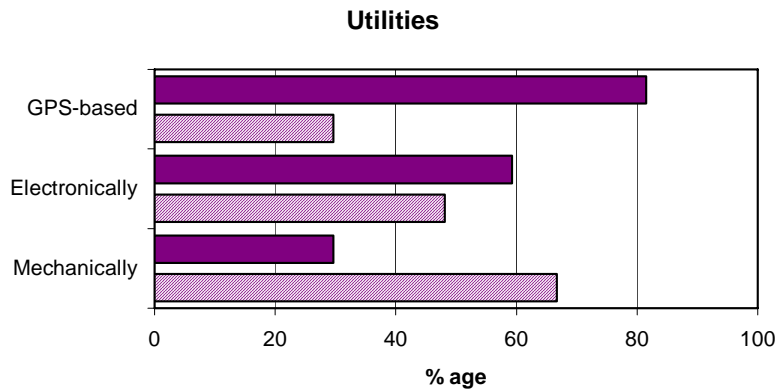
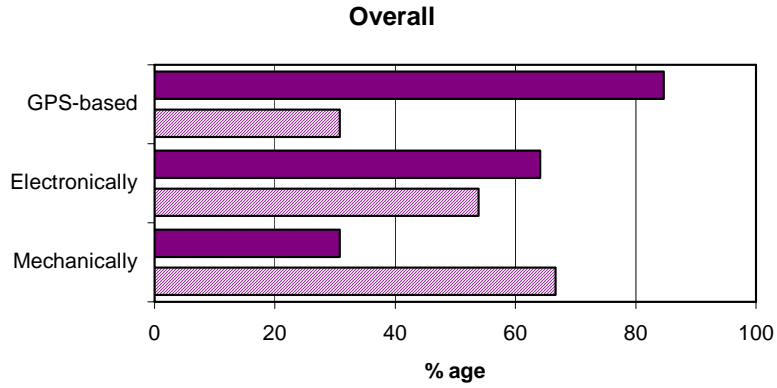


Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
Paper	33	67	44	15	33	21
Electronic	100	75	92	100	92	97

Topic Area 14 CAPTURING DATA (%YES)

This area seeks to understand, in broad terms, methods in use in the field for the capture of record data.

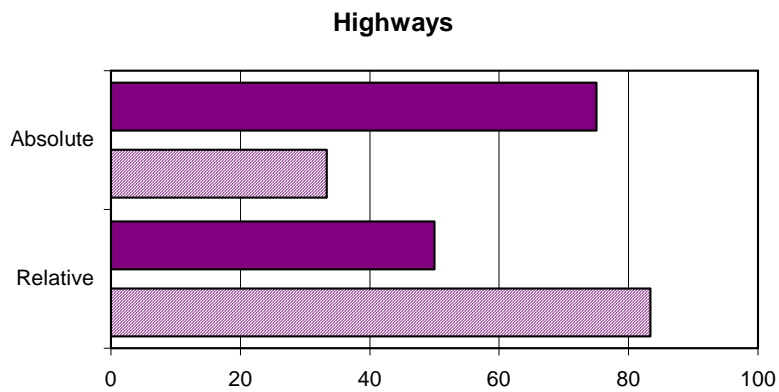
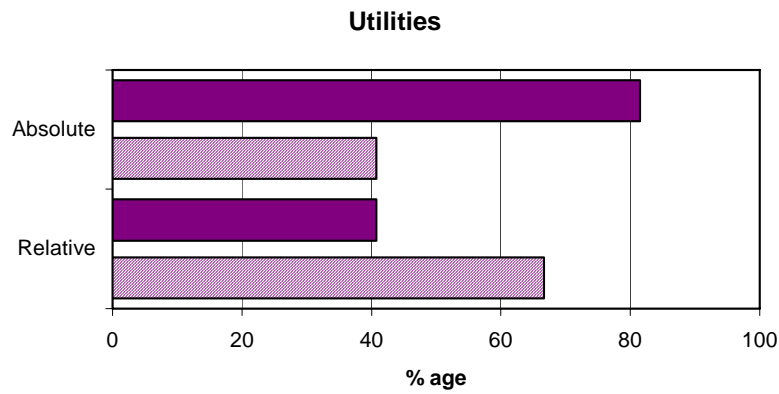
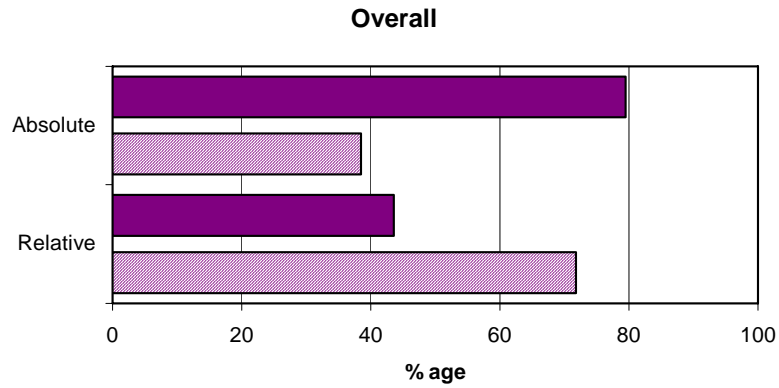


Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
Mechanically	67	67	67	30	33	31
Electronically	48	67	54	59	75	64
GPS-based	30	33	31	81	92	85

Topic Area 15 FORM OF REFERENCING (%YES)

This area seeks to understand the types of referencing systems in use.



Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
Relative	67	83	72	41	50	44
Absolute	41	33	38	81	75	79

Topic Area 16 SCALES

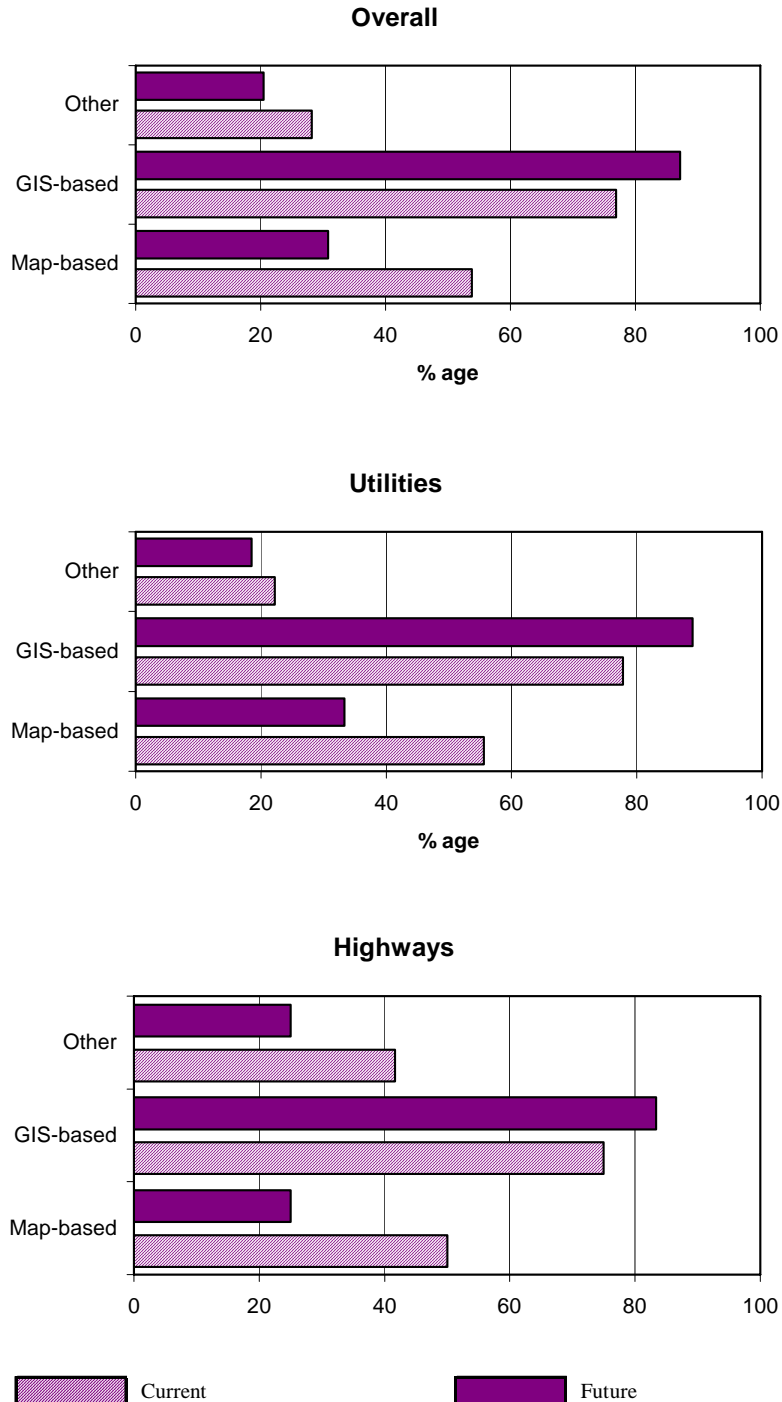
This area seeks to understand the scales used for the capture and storing of data, and the sharing of information.

Scale	CURRENT						FUTURE					
	Capturing		Storing		Sharing		Capturing		Storing		Sharing	
	Utilities	Highways	Utilities	Highways	Utilities	Highways	Utilities	Highways	Utilities	Highways	Utilities	Highways
1:1	3		3				4		4		0	
1:50							1					
1:500	10		8		12		7	2	5		7	1
1:1000					1		4					
1:1250	7		7		7	1	3	1	4		6	1
1:2500	2	1	3	2	4		1		1		3	1
1:10000			2								1	
Various	1	4	2	4	2	4	1	1	3		2	
As required			2		2				1		4	
GIS		1		1		1		1				1
GPS	1						1		1			

This table shows the number of responses received against each scale used. Some organizations use a number of different scales.

Topic Area 17 FORM OF DATA RECORDING (% YES)

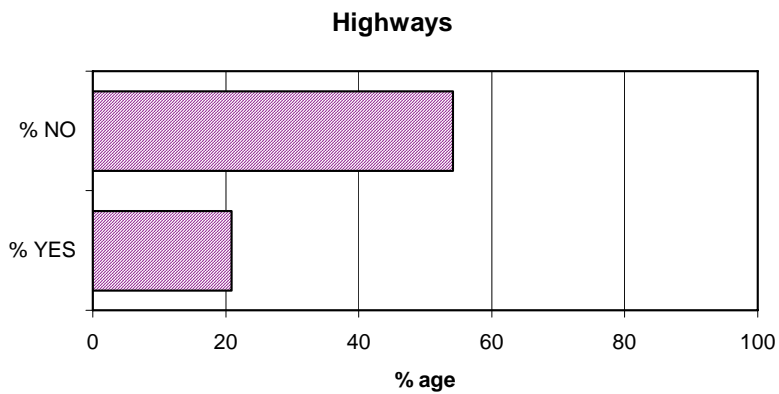
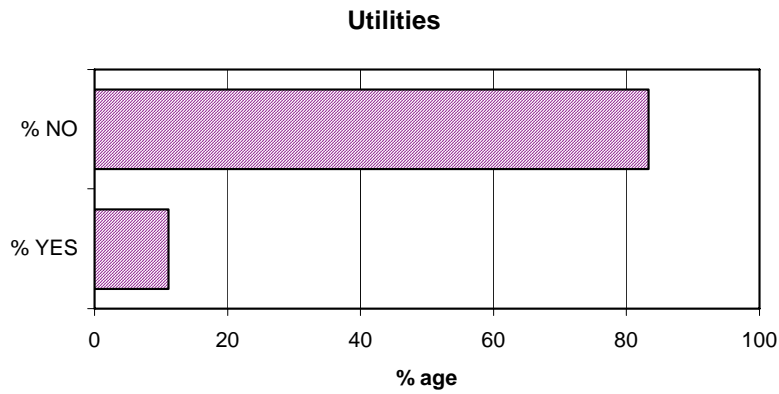
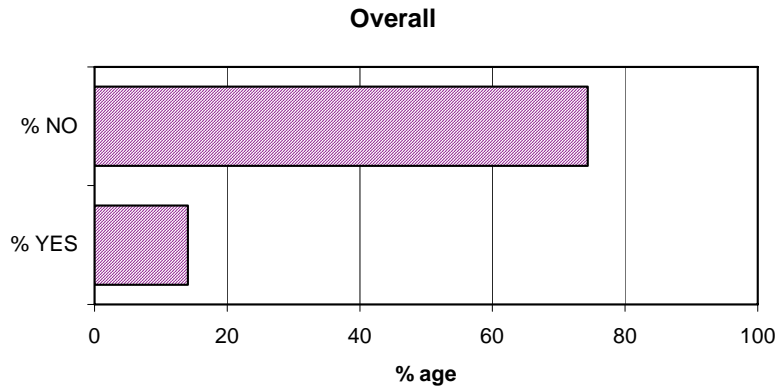
The Code (3.5) sets out various forms for recording data. This area seeks to understand what forms are used.



	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
Map-based	56	50	54	33	25	31
GIS-based	78	75	77	89	83	87
Other	22	42	28	19	25	21

Topic Area 18 PROBLEMS IN THE FIELD CAUSED BY THE CODE'S STANDARD OF ACCURACY (Y/N)

The Code (3.6) sets out minimum accuracy values for measuring and recording apparatus. This area seeks to understand the scale of any problems in achieving these values.



Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
% YES	11	21	14			
% NO	83	54	74			

Topic Area 19 MINIMUM STANDARD OF ACCURACY TO BE ADOPTED

The continuing evolution of electronic equipment and GPS-based systems may allow more accurate measurement and recording. This area seeks to establish whether future standards of accuracy should differ from the current Code (3.6).

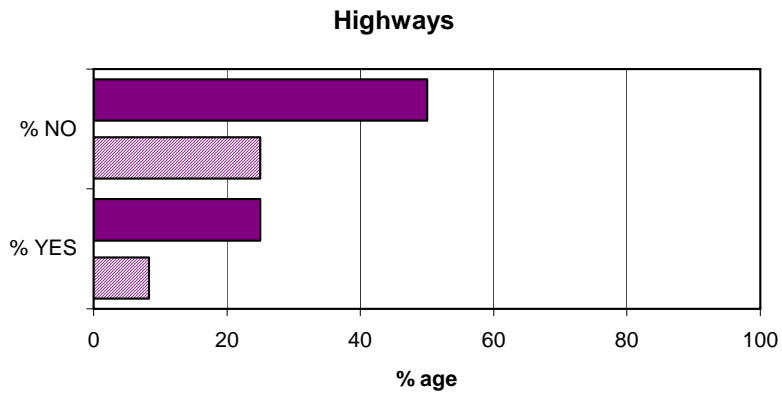
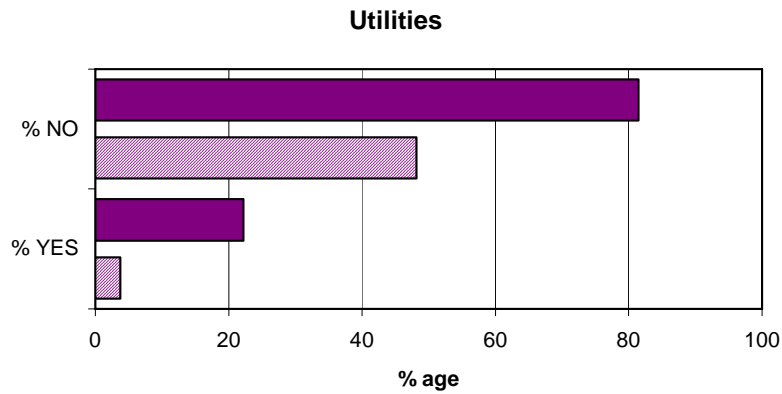
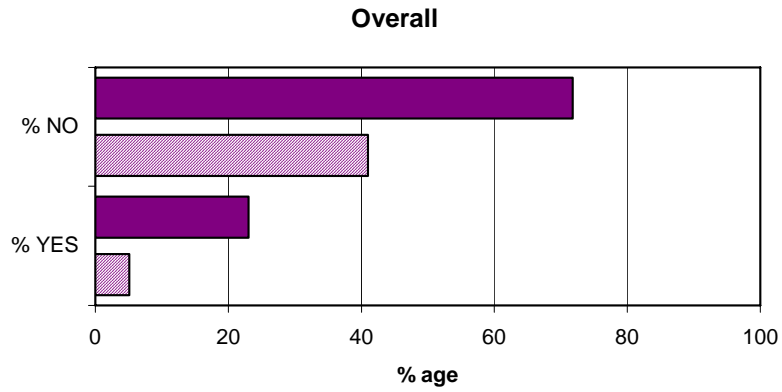
	X and Y accuracy +/-							Z accuracy +/- 100 mm
	Absolute	100 mm	300 mm	500 mm	1000 mm	Existing Code	Own standard	
Utilities	2	6 *	3	2 **		5	2 ***	3
Highways			1	2	1	1	1****	

- * Includes 1 GIS and 1 New Asset only
- ** Include 1 Legacy only
- *** Includes 1 Depends on OS map accuracy
- **** Depends on nature of asset

Existing code: +/- 300 mm measured; +/- 500 mm recorded

Topic Area 20 GUARANTEES OF ACCURACY (Y/N)

The Code (3.7) advises on an approach to guaranteeing the accuracy of location information. This area seeks to establish the approaches in use.

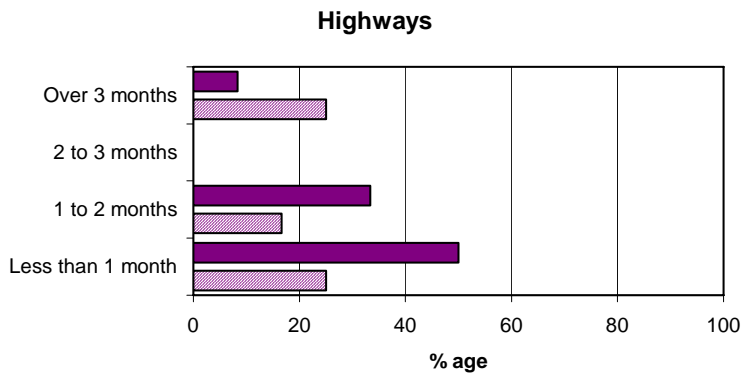
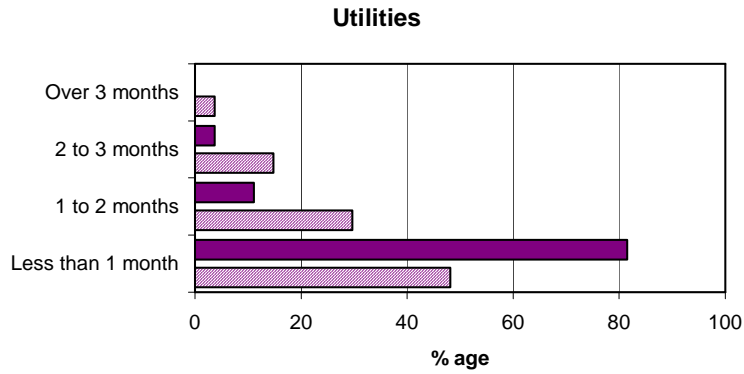
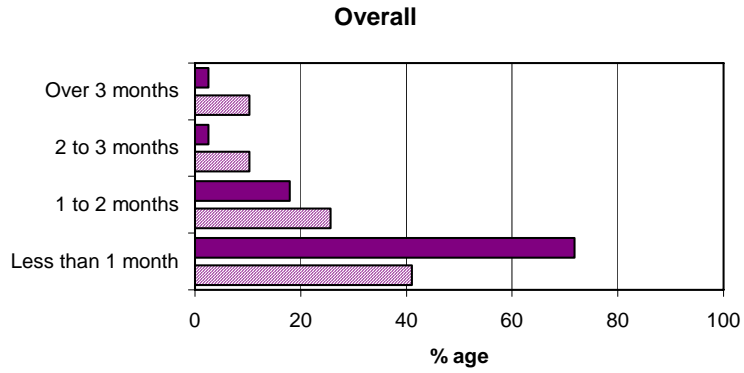


Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
% YES	4	8	5	22	25	23
% NO	48	25	41	81	50	72

Topic Area 21 TIME TO MAKE OR AMEND RECORDS (% YES)

The Code (3.10) advises that records be made or amended as soon as reasonably practicable after work etc. This area seeks to understand how this interpreted in practice.



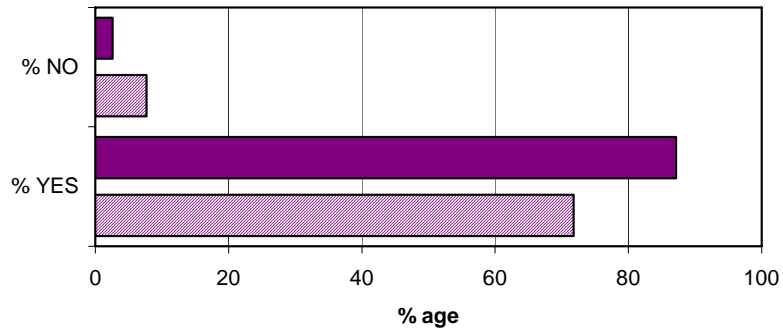
Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
Less than 1 month	48	25	41	81	50	72
1 to 2 months	30	17	26	11	33	18
2 to 3 months	15	0	10	4	0	3
Over 3 months	4	25	10	0	8	3

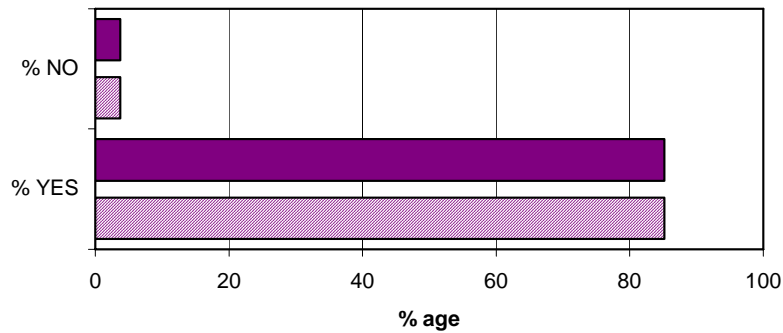
Topic Area 22 HOLDING DETAILS OF ABANDONED AND/OR REMOVED ASSETS (Y/N)

This area seeks to understand approaches to recording and storing details of assets that are abandoned and/or removed.

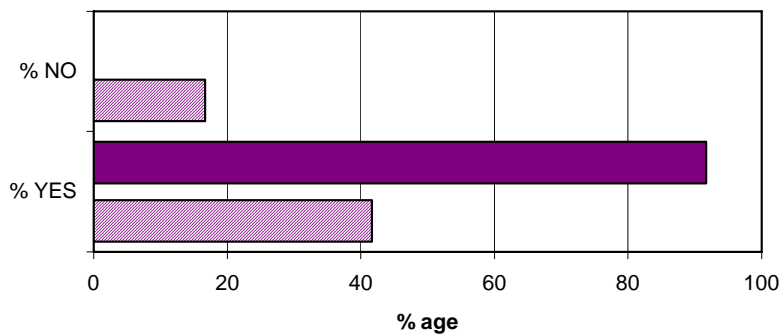
Overall



Utilities



Highways



Current
 Future

	CURRENT			FUTURE		
	Utilities	Highways	Overall	Utilities	Highways	Overall
% YES	85	42	72	85	92	87
% NO	4	17	8	4	0	3

3.2 Qualitative Data

Detailed responses are included in Appendix 4. This section presents the recorded issues, grouped into three categories:

1. Current Issues: issues relating to an organisation's current practices, and more general issues relating to the current Code of Practice.
2. Future Issue: issues relating to how an organisation sees its practices developing in the future, and more general issues.
3. Code of Practice: organisation's views on the nature of any future Code, and issues surrounding a mandatory Code.

Separate results for utilities and highways are presented in each category. The future issues category is set out for each Topic Area (as described in section 2.3.1), even where there were no issues recorded for a particular Area.

3.2.1 Current Issues – Utilities

This section includes verbatim comments recorded from utility respondents on issues relating to their organisation's current practices, and more general issues relating to the current Code of Practice:

- The company and its contractors are in favour of computerising as much of these systems/processes as possible.
- Anything that NUAG can do to make the current system more robust would help all parties.
- Time from data capture to being made available is variable, depending on type of information and source.
- Commercial sensitivity is a problem on some aspects only.
- Commercial sensitivity is a problem on telecoms side only.
- The company has concerns over complete transparency of shared information.
- As proposal details are held on the same plans, then there are potential competitor issues.
- Commercial sensitivity is not a problem; data already provided to other utilities, etc. on CD.
- The medium for records associated with new developments is always paper as developers will not invest in electronics.
- Gaps in GPS availability (off street) can make it difficult to trace exact location.

- The company has major concerns with regard to positional accuracy, brought about by map base variations employed by different companies and is watching closely the PAI programme of Ordnance Survey.
- The Code of Practice's standard of accuracy can only be accurate in relation to the background map; users only have topography to reference against.
- Time taken to create or amend records depends on the source of the data.

3.2.2 Current Issues – Highways

This section includes verbatim comments recorded from highways respondents on issues relating to their organisation's current practices, and more general issues relating to the current Code of Practice:

- Because it is not mandatory for Highway Authorities to maintain records in any particular manner, it has become something of a free for all, with records of varying detail and accuracy being kept in various locations and formats.
- Councils are all looking at Transport Asset Management Plans (TAMPs) and really investigating the data held, its importance and priorities for gathering data.
- Drainage is a major issue where minimal data is currently held.
- Not aware of Code of Practice.
- Commercial sensitivity is not a problem, but security may be.
- Commercial sensitivity could be a problem for some, but unlikely.
- The authority does not have to work to the voluntary NRSWA Code of Practice, as indeed is the case for all other authorities and utilities. The current Code is of little use and with the widespread lateral tolerances and no indication of depth for recording data the information supplied by such records is an indication only of what is in the ground. As in all cases with excavation the assumption in health and safety terms has to be that there is apparatus in the ground whether shown on a plan or not.
- The sharing of information is a necessity with health and safety issues but the information given and the speed with which it is given is of little relevance as most is inaccurate and no one in their right mind would rely on it on site other than as an indication of what may be in the ground.

3.2.3 Future Issues – Utilities

This section includes verbatim comments recorded from utility respondents on issues relating to how an organisation sees its practices developing in the future, and more general issues.

General Issues

- The challenge is that often the legislation is not well thought through (the TMA is an example). This means that we don't know what we are supposed to do and cannot therefore prepare sensibly.
- The use of open standards is critical to avoid potential development costs in the future. This may be an issue for those companies on bespoke systems.
- As regards future developments we are driven by corporate requirements, not outside influences.
- As a small company many of the work activities are manual. The introduction of technology would need to bring commercial advantages. Improvements in current timescales would probably only be driven if safety became an issue. Consideration needs to be given to any costs associated to new requirements; smaller companies could go out of business.
- As a minimum there should be more a robust method for exchanging gas and electric data, preferably electronic and primarily for safety reasons.
- All information should be available on request from a central access point. To create this access system the funding should be provided by the Government.
- The company and its contractors are in favour of computerising as much of these systems/processes as possible.
- Anything that NUAG can do to make the current system more robust would help all parties.

Issues within Topic Areas

1. Plan area where assets are recorded

- Capturing all service data would be beneficial but would need to be automated.

2. Time from data capture to being available for inspection

- Timescales from capture to being available for inspection are dependent on data type.
- Time from data capture to being available for inspection should be less than 24 hours.
- Time from capture to being available for inspection: Strategy view – within 1 week if GPS in use; Policy view – 3 months because the onus should be on the person on site, if they see scarring, to contract utilities again. (Current update schedule for CDs and operational workforce is quarterly).
- Would prefer to receive as-laid details 2 weeks prior to commissioning, as this would allow digitization / import onto GIS before / at the time of commissioning.

- No benefit would accrue if current update schedules are reduced, because of refresh timescales for own workforce.

3. Recording third party assets

- Maintaining each others' i.e. third party assets, just results in replication and would be very expensive.
- Third party assets need not be recorded if data is shared openly.
- Third party records should be held, with a disclaimer.
- Red lining by 3rd parties.
- Recording third party assets should be optional.

4. Commercial sensitivity – A problem?

- Information needs to be read only.
- Commercial sensitivity will be a big problem area for telecoms companies
- If proposal details are held on the same plans, then there are potential competitor issues.
- Security of information is more critical than commercial sensitivity.
- Commercial sensitivity will be a problem for telecoms only.

5. Recording asset details when placed within existing assets

- No comments recorded.

6. Age of assets recorded

- No comments recorded.

7. Gathering asset data

- Asset data should be gathered during construction.
- Data should be gathered when commissioned, planned for internal use, or assets found as part of emergency work.

8. Recording above ground asset data

- Above ground assets not in own land e.g. pipe work and apparatus at compressor stations should be recorded.
- Above ground asset data for assets within own sites, etc. should only be for internal use, but need to be recorded (somewhere).

9. Highway authority imposing conditions on street work licences

- No comments recorded.

10. Mandatory Code of Practice

- See section 3.2.5.

11. Approach to legacy data

- Look at the issue of volume of legacy data as against new lay.
- Although legacy data is available, it is held in a different format and for smaller businesses the resources are not available (people or finance). However, if moved to GIS then it is a possibility. Also, as assets are new and in discrete locations, it is not an issue internally.
- All legacy data should be retained.

12. Making records available

- With regard to technology, our replacement strategy for GIS includes the appropriate technologies for sharing information, as and when this is required. An issue may be the cost (when the time comes).
- Data must be usable information by recipient, however it is collected and referenced.
- Access to web-based system would need to be carefully monitored and a full audit trail kept.
- All information should be available on request from a central access point. To create this access system the funding should be provided by the Government.
- Making records available: web-based is the ideal, but can only be paper because of current limitations.
- Provision of information to others: commercial users i.e. those that connect to our network, require diameter, material, pressure regime and dimensional information of assets; general enquiries given only location of live assets
- Electronic transfer of data.
- Instant access by third parties to GIS (within 24 hrs).
- Site visit would still be relevant.
- Site visits as required by the customer.

13. Holding records

- Once on-site details have been accepted and information added to GIS and verified / accepted, original drawings should be destroyed.

- Digitisation of all our records.

14. Capturing data

- On-line access needed for data capture to create a live updating process which in turn will reduce the time in making information available.
- All future assets should be recorded using a GPS system.
- If pipe / asset locations are captured using GPS, the x, y & z coordinates should be captured and stored.
- The future of recording data is seen as being more GPS-based. The challenge with this is that we currently capture data relative to OS background plans which are at an accuracy of +/- 1 metre for urban tiles and +/- 2.5 metre for rural tiles.
- Data should be captured via GPS-based sensor based asset recognition; asset would be tagged and therefore no need to capture the data.
- Data capture should ideally be GPS-based fit for purpose.
- GPS coordinates must be available for use and displayed. End users must have the ability to find an asset; therefore, the relative position should be recorded / displayed.
- GPS-based capture and recording.
- Data capture methods dependent on map base used for referencing purposes.
- Depth of Cover should be captured and recorded

15. Form of referencing

- We need to move to an absolute referencing system to improve speed of surveying. Accuracy is of lesser importance due to problems with legacy data.
- Common referencing is the key, not specific accuracy.
- Absolute referencing should be used if using GPS.
- Form of referencing should be dependent on the business need.
- Both forms of referencing needed for locating asset.

16. Scales

- Scale(s) used should preferably be against Ordnance Survey background.
- Scale(s) to be used depend on mapping base adoption by all parties.
- Choice of scale(s) doesn't matter if captured by GPS and stored / shared electronically.

17. Form of data recording

- Pre-Positional Accuracy Improvement (PAI) OS Landline: the positioning will be out of sync when mapped against post-PAI Master Map. This is an issue for all companies that have been using the pre-PAI map and will be looking to move to MasterMap.
- Ever greater standards are being aimed for, but until everyone adopts the same standard map base there is no value in striving for increased accuracy.
- Asset data recording should ideally be GIS-based, but needs to be a financial benefit.
- Recording the position of assets in GIS should not be critical – section 3.6 of Code requires recording at +/- 500mm.
- In future, hold coordinates for service connections and meter position (OS MasterMap). Not practical to hold location graphically with appropriate dimensions, etc.
- Recorded position of asset should not be critical in GIS, but dimensional information from geographic feature to asset must be accurate (to 100mm).
- Data should be GIS-based for sharing.
- Electronic downloads to GIS.
- All utilities using common Mapbase and symbology.

18. Problems in the field caused by the Code's standard of accuracy

- No comments recorded.

19. Minimum standard of accuracy to be adopted

- Internal standards require capture of more detailed information at better accuracy than the current minimum standard.
- Minimum standard of accuracy should be as per codes of practice but relative to map.
- Obviously GPS will be more accurate and the DFT code of practice states a minimum of +/- 0.5 metre, so already there is an issue with the accuracy.
- Minimum standard of accuracy depends on OS background accuracy.
- Minimum standard of accuracy should be as per UKWIR report 06/WM/12/9 *Buried Asset Data Collection and Exchange Field Trials*.
- Minimum standard of accuracy should be as per existing NJUG standard, although difficult to ensure as this is the responsibility of the developer. However, auditors have recently been employed to monitor quality of work. Dimensions captured

including at road crossing, change of diameter and end closures; very rarely captures depth of cover.

20. Guarantees on accuracy

- Guarantees should be given on accuracy of record data, but legacy data will be a problem.
- Guarantees on accuracy of record data depend on how the data has been captured, and legacy will always be a problem. However, needs to be sufficient to locate assets and use of technology e.g. ground penetrating radar. Need to consider if penalties would be issued.
- Dimensions must be captured accurately and when shown on drawings / in GIS, etc. then guarantees should be given.
- Warning only should be given on accuracy of record data, not guarantee.
- Guarantees should be given on accuracy of record data for safety reasons.

21. Time to make or amend records

- Timescales should be in place to make or amend records as per existing because of update schedule for own field workers.
- Records should be made or amended within 24 hours.
- Only see need to improve current timescales for making or amending records if safety issues have been identified.

22. Holding details of abandoned and/or removed assets

- No comments recorded.

3.2.4 Future Issues – Highways

This section includes verbatim comments recorded from highways respondents on issues relating to how an organisation sees its practices developing in the future, and more general issues.

General Issues

- Expansion of electronic data including electronic transfer subject to any Local Government rules and regulations.
- Records, including abandoned and removed assets, should be held centrally.
- Highway Authorities face a major challenge particularly with respect to surface water drainage. Very few have any idea on the location of many culverts, french drains, and pipes particularly in rural areas. Authorities will need to develop a strategy for accurately recording these as they are re-discovered.

- A cost benefit analysis needs to be carried out to ensure that the costs involved in Highway Authorities accurately recording, storing, and accessing data brings a greater benefit in other areas, such as reduced damages or instances of flooding.
- The new accounting regulations on Asset Management will be an incentive to record much of this data.
- Where pipes or ducts are not at the usual depths for the type of utility service then perhaps these could be flagged, particularly if they are shallower than normal.
- Accurate records of plastic pipes should be kept but some method to enable the tracing of this type of pipe should be found.
- Services buried in concrete cause a problem for our Contractors at present and this should be investigated to overcome this problem.
- For any system to be useful, it would have to map accurately to minute tolerances not only what goes into the highway but what is already there – much of it for over a 100 years. Without that level of accuracy and historic data the rest of the information that the proposed new records code is meant to deliver is of minimal use in carrying out works on site.
- The vast majority of apparatus is already in the ground and is unrecorded – and it is not just utility apparatus in the ground – what about cellars, natural caves, streams, archaeological items, etc. Those framing the TMA may well believe that there is a utopia whereby accurate information is electronically issued at the press of a button to those on site who will then be able to dig their way rapidly around identified apparatus and swiftly complete their work. The reality is that without the accurate historic data it will never happen and unless someone comes up with a way of accurately plotting everything that is already in the highway and at a cost that is affordable that is going to remain the case.

Issues within Topic Areas

1. Plan area where assets are recorded.

- No comments recorded.

2. Time from data capture to being available for inspection

- No comments recorded.

3. Recording third party assets

- No comments recorded.

4. Commercial sensitivity – A problem?

- No comments recorded.

5. Recording asset details when placed within existing assets

- No comments recorded.

6. Age of assets recorded

- All new apparatus should be captured and recorded to a national standard.
- Aim to record all assets where possible; could have categories <1980, 1980-2000?

7. Gathering asset data

- New asset data should always be gathered when installed/replaced.

8. Recording above ground asset data

- No comments recorded.

9. Highway authority imposing conditions on street work licences

- No comments recorded.

10. Mandatory Code of Practice

- See section 3.2.6.

11. Approach to legacy data

- Old records should be maintained and included into the new system, but for say, information only.

12. Making records available

- Should be working towards electronic, preferably web-based availability but this will take a long time.

13. Holding records

- Data should be recorded in electronic databases, then displayed as map/GIS based

14. Capturing data

- Accuracy of data should be improved with the requirement for a GPS (for example) method of capturing the data.

15. Form of referencing

- No comments recorded.

16. Scales

- No comments recorded.

17. Form of data recording

- Data should be recorded in electronic databases, then displayed as map/GIS based

18. Problems in the field caused by the Code's standard of accuracy

- No comments recorded.

19. Minimum standard of accuracy to be adopted

- Minimum standard of accuracy depends on risks attached to the assets.
- Minimum standard of accuracy should depend on the nature of the asset.

20. Guarantees on accuracy

- Guarantees on accuracy should be given, but within limits.

21. Time to make or amend records

- No comments recorded.

22. Holding details of abandoned and/or removed assets

- Details of abandoned assets should be recorded, but not abandoned assets.

3.2.5 Code of Practice Issues – Utilities

This section includes verbatim comments recorded from utility respondents on their organisation's views on the nature of any future Code, and issues surrounding a mandatory Code:

- Unless it is mandatory, companies have no incentive to invest to comply – asset intensive organisations will always have something they would rather be spending their money on (or not spending money). If made mandatory then what is mandatory must be clear and unambiguous and with reasonable timescales to implement. It should also apply to all not just the commercial sector. Some Local Government areas see it as an income generator, which therefore drives unhelpful behaviour.
- The company is not driven by Codes but focused on internal procedures and processes. The company will meet its legislative obligations.
- As regards the new code, it is difficult to form an answer without seeing the legislative and cost demands of the specific document. Increased costs would be passed on to the Regulator, so there would be a reluctance for the company to sign up.
- As regards the new code, a mandatory imposition would not present problems, considering the current code as the base document. Accuracy requirements and sharing of data are not problems.
- The current Code of Practice is already considered to be a mandatory requirement that should have been in place since Nov 2002. Implications of insisting on a more

aggressive approach to ensure compliance will result in cost overheads and does the technology exist (i.e. a competitively priced handheld GPS) that delivers co-ordinates meeting the accuracy standards specified? What would seem practical would be the declaration of specific "road maps" from each utility including expected implementation dates.

- There would be concerns if penalties were introduced as part of any mandatory requirements in the Codes of Practice.
- A (revised) Code of Practice should be mandatory, with positional record of all pipes and control mechanisms.
- The Code of Practice would need to be reviewed as part of a joint utility working group. The consideration of mandatory and non-mandatory requirements would form part of the outputs of the group
- It should be mandatory to ensure compliance. If third parties' assets need to be recorded, then the cost/resource issue will need to be signed off by the Regulator.
- Timescales should be reduced to i.e. within 1 week - Current IIP legislation already states 14 days recording timescales.
- Existing internal standards for data collection exceed those in the Codes of Practice. However, all contractors, agents and sub-contractors installing and/or maintaining assets should all be bound by the same rules e.g. the provision of cable drawings must be provided before commissioning. (This is more applicable to transmission due to the size of asset and duration of project).
- Decision as to whether it should be mandatory would depend on the detailed requirements of the code at the time of enactment. The view of the company would depend on the cost implications and practicality of the prescribed detail.

3.2.6 Code of Practice Issues – Highways

This section includes verbatim comments recorded from highways respondents on their organisation's views on the nature of any future Code, and issues surrounding a mandatory Code:

- The code should be mandatory and apply across the board, highway authorities included. Compliance should be mandatory. The revised code should make it a requirement for all owners of apparatus to maintain records, whether underground, above ground, abandoned or any adjustment made to existing apparatus. The manner in which the data is captured and recorded should be to a national standard. A time period should be imposed requiring all to be using GPS type capturing and web based recording, say two years from introduction of the code revisions. Records should be maintained / updated on a regular basis; this should be to a standard that is fixed within the code. The responsibility for this should be controlled within one specific area and not spread throughout an organisation.
- Should be mandatory.

- Careful thought needs to be given to a Code of Practice making compliance with the code mandatory. For local authorities that currently allocate limited resources and funding to record, maintain and disseminate information about their underground asset, the implications of a mandatory requirement, in the short term, would be one of budget, and resource being diverted from other current statutory requirements.
- Mandatory recording of such new data would be welcome but the resource and cost implications should not be overlooked.
- A Code of Practice is best practice, not mandatory
- Recording of all assets should be mandatory and preferably GIS-based and made available via the web. Abandoned assets and changes should also be recorded. Time periods for recording and making available records of new assets should be stipulated but whether records of existing apparatus can be collected may be more contentious. There would be considerable resource implications in making this information available if compliance is made mandatory

4 Review of Results

4.1 Current Practice

The main findings of the survey are presented below, in terms of the overall view i.e. utilities and highways combined; where there are significant differences from this view from either utilities or highways, these are included:

- There is significant variation between different organisations' practices, ranging from those using more traditional data capture methods with paper-based storage and sharing, to those using more 'state of the art' GPS-based capture, GIS-based electronic storage with web-based access. This variation is particularly evident across the utilities sector, but also exists in the highways sector.
- Within utilities, asset information activities are focused on all areas, not just on the street. Unsurprisingly, highways' activities are focused more within the street.
- Less than half of organisations make data available within one month of capture; a number take longer than 3 months.
- Only a quarter of organisations collect third party records; highways are more active in this area than utilities.
- There appears to be an ambivalence amongst utilities over the issue of commercial sensitivity. Unsurprisingly, it is not seen as an issue by highways, although reference was made to the issue of national security.
- Overall, two thirds of organisations capture data when assets are placed within existing ones, with utilities being stronger in this area than highways.
- Utilities, and almost half of highways, do not distinguish between 'old' and 'new' assets i.e. before and after May 2003.

- Utilities capture data at all opportunities (during planned, urgent and emergency work); highways are less active in this area, and a number do so only as part of planned work.
- Two thirds of organisations record and hold data on above ground assets.
- In general, Highway Authorities impose conditions on Street Work Licences.
- In general, organisations capture legacy data on an ‘as available’ basis. (This relates to the lack of discrimination between ‘new’ and ‘old’ assets reported above).
- Organisations make their records available in many different ways, and in different combinations. The most popular methods appear to be paper-based and CD, supported by site visit, although electronic approaches using email and web-based sharing are almost as popular.
- All utilities, and a significant number of highways respondents predominantly use electronic systems to hold data, with paper systems also in use, albeit at a lower level.
- Mechanical and electronic data capture predominates, with a third of organisations using GPS-based methods.
- Overall, the ratio between users of relative and absolute referencing is two to one in favour of the former.
- There does not appear to be any clear pattern in scales used to capture, store and share data, with various (map-based) scales in use.
- GIS-based recording is the most common form used, with half of organisations also using map-based methods.
- The current Code of Practice accuracy standards cause no real problems.
- No guarantees of accuracy are given
- Less than half of organisations make or amend records within one month of work being done; a number take longer than 3 months.
- Most organisations hold details of abandoned and / or removed assets.
- There are concerns over accuracy in relation to any background map used, and positional accuracy brought about by the Ordnance Survey’s PAI programme. The lack of a mandatory Code of Practice is cited as a reason for variations in practice, particularly in the highways sector. The highways sector faces a particular challenge with drainage records, where minimal data is held currently.

4.2 A view of the Future

The main findings of the survey are presented below, in terms of the overall view i.e. utilities and highways combined; where there are significant differences from this view from either utilities or highways, these are included:

- As with current practice, there are variations in organisations' future plans. Whilst some organisations recorded no changes at present to current practice, the trend appears to be towards electronic GPS-based capture, electronic GIS-based storage and web-based sharing.
- There is strong support, particularly from utilities, for recording assets in any location.
- There is strong support for making data available for inspection within one month of capture.
- There is some support for recording third party assets in future.
- The proportion of organisations seeing commercial sensitivity as a problem in the future is less than those seeing it as a problem currently.
- There is strong support for capturing data when new assets are placed within existing ones. There is also strong support for recording all assets i.e. 'old' and 'new' (before and after May 2003).
- There is strong support for capturing data at every opportunity (during planned, urgent and emergency work).
- There is strong support for recording above ground assets.
- Over two thirds of respondents supported the introduction of a mandatory (revised) Code of Practice, with the strongest support from utilities.
- There is some support for a change to current practice in recording legacy data.
- There is strong support for a move from 'traditional' paper-based record sharing to web-based sharing. Although at a lower level than at present, there is still support for site visits (possibly on an as required basis).
- Electronic storage is seen as the future approach, with significantly reduced paper records.
- There is strong support for the future use of GPS-based data capture.
- There is strong support for a move to absolute referencing. Overall, the ratio between users of relative and absolute referencing is approximately two to one in favour of the latter. However, it is recognized that both forms of referencing are needed for accurate location and recording.
- There does not appear to be any clear pattern in scales suggested to be used to capture, store and share data, with various (map-based) scales and combinations of scales are suggested.
- There is strong support for GIS-based recording.

- Whilst there is support for retaining the current Code's minimum standard of accuracy, there is equal support, primarily from utilities, for a minimum standard of accuracy (x and y) of +/- 100 mm, with a similar accuracy for the vertical dimension (z).
- Whilst there is some increased support for guaranteeing accuracy, significant opposition remains to such a move.
- There is strong support for making or amending records within one month of work being done.
- There is strong support for holding details of abandoned and / or removed assets.
- Whilst there is a strong consensus of support for a move to more robust technology-based approaches, there are concerns over cost and resources associated with such a move. This applies particularly to smaller organisations, including contractors and developers who supply records.
- There may be conflict between any reduced target timescales for making records and making them available and an organisation's own internal standards. Although there is increased support for recording third party assets in the future, it is probably insufficient to justify 'blanket' recording.
- There is strong support for the use of GPS- and GIS-based systems, but there appears to be a lack of clarity on map bases, scales and referencing that need to be resolved to enable effective use and optimal benefit.
- Whilst support for a mandatory (revised) Code of Practice is strong across both utilities and highways sectors, there is a clear message that any associated resource and cost issues need to be addressed with regulators.

5 Conclusions

1. Significant variations exist in practices, approaches, attitudes and emphases, within and between utilities and highway authorities, for the recording, storing and sharing of underground asset information, leading to, *inter alia*: variable accuracy; incomplete records; a wide range of map bases; excessive timescales and inconsistent approaches to third party and legacy data.
2. The lack of a statutory-based Code of Practice is seen as a key contributor to the current position.
3. There is strong support across utilities and highways sectors for a change to a more effective standardised approach and mandatory Code of Practice.
4. There are likely to be cost and resource issues associated with the deployment of a new Code.
5. Unless a more consistent and compatible approach is employed to recording, storing and sharing asset record information, the possibility of achieving any future

anticipated benefits of new technology will be threatened, and the technology-based aspirations of the Traffic Management Act are likely to be compromised.

6 Recommendations

To achieve targets set out in the Traffic Management Act, NUAG recommends that:

1. A revised Records Code of Practice must be developed and deployed on a mandatory basis.
2. A mandatory national standard high-level framework, with effective ownership and management, for capturing, recording, storing and sharing buried asset information must be in place to enable the effective deployment of the revised Records Code of Practice.
3. Each utility and highways organisation must have clearly-defined processes compatible with the national standard framework, with effective ownership and management, for the implementation and use of a revised Records Code, and achievement of the Code's standards.
4. The revised Records Code of Practice must include a set of minimum standards to be achieved, as follows:
 - a. All below ground assets must be recorded, together with associated above ground assets.
 - b. Asset data must be captured during all types of work: planned, urgent and emergency. (Planned and immediate).
 - c. Data must be captured and recorded for assets in any location.
 - d. Data must be recorded for all new, replacement, amended or abandoned assets.
 - e. All previously-unrecorded existing assets, belonging to the organisation carrying out the work, should be recorded if found during work.
 - f. Any unidentified third party asset found in the course of work must be captured, and recorded as an Unidentified Buried Object (UBO), by the organisation finding it.
 - g. Any historical discrepancies between recorded and actual data found during work should be reported to the asset's owner, including third parties.
 - h. Attributes that must be captured are: location (x and y); top of asset (z); diameter (including any changes); material (including any changes), and pipe or cable run.
 - i. Asset data must be captured and recorded at a minimum standard of accuracy of +/- 100 mm in x, y and z dimensions.
 - j. Location data must be recorded using relative and absolute referencing.

- k. All geospatial data must be recorded using an agreed framework and agreed scales (DNF).
 - l. Asset data must be available for external inspection within one month of capture.
 - m. Record information must be made available in electronic form through a web-based service.
 - n. Each organisation is responsible for managing their responses to requests for record information.
5. The revised Code of Practice must include standard data definitions and data standards.
 6. There must be an annual review process to measure performance against the Code's standards, leading to the deployment of appropriate improved minimum standards.
 7. Any resource and cost implications associated with the new Code must be managed effectively to ensure a successful deployment.
 8. The national high level standard framework and the revised Records Code must be fully implemented within a mandatory timetable.

7 Acknowledgements

NUAG wishes to express its gratitude to all those people and organisations involved in this survey.

8 References

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Appendix 1 NUAG Steering Group and Working Group members

Steering Group

Name	Representing
James Brayshaw	Institution of Civil Engineers and Institution of Civil Engineering Surveyors
Mike Farrimond	UK Water Industry Research
Ray Gercans	Department for Transport
Les Guest	National Joint Utilities Group
Marc Hobell	Ordnance Survey - NUAG Convenor
Andrew Jackson	Pipeline Industries Guild
Nigel Mason	Association for Geographical Information
Frank O'Dwyer	County Surveyors' Society
Chris Overton	NUAG Facilitator
Dave Turnbull	Highways Authorities & Utilities Committee

Phase 1 Working Group – Current Membership

Name	Organisation	Representing
Ian Ackerman	Hampshire County Council	Highways
David Blyth	EDF Energy	Utilities - Electricity
Graham Cocksey	The Clancy Group	Contractors
Jonathan Harrod Booth	Highways Agency	Highways
Martin Hobbs	Highways Agency	Highways
Marc Hobell	NUAG Convenor	
Roger Hunt	Ordnance Survey	Ordnance Survey
Bob Lloyd	Worcestershire County Council	Highways
Karen Mears	National Grid	Utilities – Gas and Electricity

Name	Organisation	Representing
Chris Overton	NUAG Facilitator	
Matthew Rowlatt	Three Valleys Water	Utilities – Water and Pipelines
Andrew Sherry	Transport For London	Highways
Alexandra Spence	Leeds City Council	Highways
Sue Taylor	BT	Utilities – Telecoms
Fasar Zarif	Network Rail	Utilities – Rail

Appendix 2 Organisations consulted

UTILITIES

Gas

GTC

Independent Pipelines

National Grid Distribution

National Grid UK Transmission

Northern Gas Networks

Southern Gas Networks

Wales and West Utilities

Electricity

EDF Energy (EPN)

EDF Energy (LPN)

EDF Energy (SPN)

National Grid Transmission

Northern (NEDL)

Yorkshire (YEDL)

Western Power Distribution

Telecoms

Affiniti

BT

Thus

Water

Anglian

Portsmouth

Severn Trent

South East

Southern

Thames

Three Valleys

Yorkshire

Other

Leeds Metro/Trueform

Network Rail

Oil Pipelines

HIGHWAYS

Birmingham City Council

Camden Council

Hampshire County Council

Herefordshire County Council

Highways Agency

Lancashire County Council

Leeds City Council

London Borough of Hackney

Northumberland County Council

Nottinghamshire County Council

Southampton City Council

Transport For London

Worcestershire County Council

Appendix 3 Questionnaire

PART 1 – THE CURRENT SITUATION

Can you please describe in broad terms how your organisation records, stores and shares records of apparatus.

We would like to understand key attributes, strengths, and any areas for improvement, with reference to both new and legacy assets, and to the Current DfT Code of Practice for Recording of Underground Assets in streets.

PART 2 – THE FUTURE

Can you please describe how your organisation sees the future development of recording and sharing record information, given the stated need (by DfT/HAUC in the Code, and NJUG) for continual review in the light of new technologies, and how you plan to respond to the associated challenges?

We are also interested to hear your views on what should be included in a revised Code of Practice, whether compliance with it should be a mandatory and, if it was made mandatory, what implications it might have.

PART 1 ISSUES CHECKLIST

Within what plan area are assets recorded?	In the street only	Y	N
	Street and surrounding area	Y	N
	In any location	Y	N
How long from capture to being available for inspection?	Less than 1 month	Y	N
	1 to 2 months	Y	N
	2 to 3 months	Y	N
	Over 3 months	Y	N
Are third party assets recorded?		Y	N
Is commercial sensitivity a problem?		Y	N
Are asset details recorded when an asset is placed within existing asset(s)?		Y	N
What age of asset is recorded?	New (after May 2003)	Y	N
	All	Y	N
When is asset data gathered?	Planned work	Y	N
	Emergency and urgent	Y	N
What above ground asset data recorded?	All	Y	N
	None	Y	N
	Some	Y	N
Does the highway authority impose conditions on street work licences?		Y	N
Is there an approach to legacy data	New data only	Y	N
	Legacy as available	Y	N
How are records made available?	Master set of paper records	Y	N
	Master set of microfilm records	Y	N
	Paper copies on 'as required' basis	Y	N
	CD	Y	N
	Email	Y	N
	Web-based	Y	N
	Site visit	Y	N
On what media are records held?	Paper	Y	N
	Electronic	Y	N
How is data captured?	Mechanically	Y	N
	Electronically	Y	N
	GPS-based	Y	N
What form of referencing is used?	Relative	Y	N
	Absolute	Y	N
What scale(s) are used?	Capture		
	Storing		
	Sharing		
In what form is asset data recorded?	Map-based	Y	N
	GIS-based	Y	N
	Other?	Y	N
Does the Code of Practice's standard of accuracy cause any problems in capturing data in the field?		Y	N
Does the Code of Practice's standard of accuracy cause any problems in using data in the field?		Y	N
Are any guarantees given on accuracy of record data?		Y	N
What timescales are in place currently to make or amend records?	Less than 1 month	Y	N
	1 to 2 months	Y	N
	2 to 3 months	Y	N
	Over 3 months	Y	N
Are details of abandoned/removed assets stored/archived?		Y	N

PART 2 ISSUES CHECKLIST

Within what plan area should assets be recorded?	In the street only	Y	N
	Street and surrounding area	Y	N
	In any location	Y	N
How long should it take from capture to being available for inspection?	Less than 1 month	Y	N
	1 to 2 months	Y	N
	2 to 3 months	Y	N
	Over 3 months	Y	N
Should third party assets be recorded?		Y	N
Will commercial sensitivity be a problem?		Y	N
Should asset details be recorded when an asset is placed within existing asset(s)?		Y	N
What age of asset should be recorded?	New (after May 2003)	Y	N
	All	Y	N
When should asset data be gathered?	Planned work	Y	N
	Emergency and urgent	Y	N
What above ground asset data should be recorded?	All	Y	N
	None	Y	N
	Some	Y	N
Should a (revised) Code of Practice, with associated standards, be mandatory?		Y	N
What should be the approach to legacy data	New data only	Y	N
	Legacy as available	Y	N
How should records be made available?	Master set of paper records	Y	N
	Master set of microfilm records	Y	N
	Paper copies on 'as required' basis	Y	N
	CD	Y	N
	Email	Y	N
	Web-based	Y	N
	Site visit	Y	N
On what media should records be held?	Paper	Y	N
	Electronic	Y	N
How should data be captured?	Mechanically	Y	N
	Electronically	Y	N
	GPS-based	Y	N
What form of referencing should be used?	Relative	Y	N
	Absolute	Y	N
What scale(s) should be used?	Capture		
	Storing		
	Sharing		
In what form should asset data be recorded?	Map-based	Y	N
	GIS-based	Y	N
	Other?	Y	N
What minimum standard of accuracy should be adopted?			
Should guarantees be given on accuracy of record data?		Y	N
What timescales should be in place to make or amend records?	Less than 1 month	Y	N
	1 to 2 months	Y	N
	2 to 3 months	Y	N
	Over 3 months	Y	N
Should details of abandoned/removed assets be kept/archived?		Y	N

Appendix 4 Qualitative Data by organisation

UTILITIES - WATER

Company 1

Current Practice

Data is recorded in various ways: our field systems device (FIS) which sends back burst locations, valve operations and redlining for amendments to our network; Developer Services supply us with proposal drawings and as-laid for new developments on raster background plans. Data is stored in a corporate GIS system (Smallworld) along with various Oracle databases.

All of this data along with extra datasets from external companies is made available to all our employees through a desktop application. There is also a web mapping application available to all developers and other utility companies to enable them to view mains location information. All above ground asset data is held in a separate system.

Future Plans

Current Issues

Future Issues

- The future of recording data is seen as being more GPS-based. The challenge with this is that we currently capture data relative to OS background plans which are at an accuracy of +/- 1 metre for urban tiles and +/- 2.5 metre for rural tiles.
- Obviously GPS will be more accurate and the DfT code of practice states a minimum of +/- 0.5 metre, so already there is an issue with the accuracy.
- Third party assets need not be recorded if data is shared openly.
- Absolute referencing should be used if using GPS.
- Minimum standard of accuracy depends on OS background accuracy.

Code of Practice

Company 2

Current Practice

Records of all underground apparatus are stored and maintained in an Intergraph FRAMME AM/FM system sitting on top of an enterprise Oracle database. The system was implemented in 1995 and is highly bespoke. The data includes both water and wastewater assets and associated attribution, which describe the assets, as well as large scale mapping (LandLine) from Ordnance Survey. In addition, site level assets are also held in this system, but at site level only, e.g. the water treatment works is shown as a site but the equipment within the site is recorded in SAP.

This information is distributed nightly to an intranet-viewing tool, which is used by the wider business to view and plot the information. A copy of this distributed data is made available on mobile terminals (for field-based staff) and an Internet viewing tool for secure external customer access. Current user base is as follows:

- Data capture & maintenance - FRAMME Enterprise FM/AM: 30 users
- Intranet based viewing tool: 1,400 users
- Mobile viewing: 250 users
- Internet access: 2,500 users

Attribution is clearly dependent upon the asset type. The business defines key attributes as: material type; diameter; liquid type; installed data and condition code.

Data quality and completeness have been key focus areas for the business for the last 3 years, and substantial amounts have been invested to improve the situation. In addition, business units have targets in relation to the number of data edits notified to the central data maintenance team. Over the last 15 months, great effort has been put into improving cross-business processes with an objective to ensure that the central team receives 100% (and error free) of any additions and changes to the asset base.

We are more than happy to share our information and in terms of sewers, this is a legislative requirement already. We make our underground asset information available in a secure way to whoever asks (sometimes within an administrative charge).

Future Plans

The current enterprise system (FRAMME) is circa 1995 vintage. This is being completely replaced with go-live in Sept 2006. The data model that underpins the enterprise system is 1992 vintage. This is also being replaced as part of the enterprise replacement. This will allow additional attribution (e.g. depth) to be captured.

Significant data replication is prevalent and this will be reduced to a minimum as part of an overall GIS application portfolio replacement from a single supplier and working off a single Oracle database. Non-GIS data is currently recorded in SAP e.g. Sites. This will change with all asset creation taking place from GIS and then passed to SAP and other systems as required. The new system will record orphaned assets.

Current Issues

Time from data capture to being made available is variable, depending on type of information and source.

The Code of Practice's standard of accuracy can only be accurate in relation to the background map; users only have topography to reference against.

Time taken to create or amend records depends on the source of the data.

Future Issues

Maintaining each others (third party) assets just results in replication and would be very expensive.

Minimum standard of accuracy should be as per codes of practice but relative to map.

Guarantees should be given on accuracy of record data, but legacy data will be a problem.

With regard to technology, our replacement strategy for GIS includes the appropriate technologies for sharing information, as and when this is required. An issue may be the cost (when the time comes).

The challenge is that often the legislation is often not well thought through (the TMA is an example). This means that we don't know what we are supposed to do and cannot therefore, prepare sensibly.

The use of open standards is critical to avoid potential development costs in the future. This may be an issue for those companies on bespoke systems; luckily for us, we are adopting GIS technology that is OGC compliant.

Code of Practice

Unless it is mandatory, companies have no incentive to invest to comply – asset intensive organisations will always have something they would rather be spending their money on (or not spending money). If made mandatory then what is mandatory must be clear and unambiguous and with reasonable timescales to implement. It should also apply to all not just the commercial sector. Some local government areas see it as an income generator, which therefore drives unhelpful behaviour.

Company 3

Current Practice

Records are recorded electronically via a GIS process. All assets are mapped and backed up by paper/CD where required. Most information is now digitised. The company still maintains a paper and microfilm archive. Information arrives in three ways:

- for major capital works: as-laid drawings, or GIS updated by the contractor at source.
- for new developments: received on paper, then digitized internally.
- errors in recorded data found by own operatives: sent in electronically.

Most enquiries are replied to by paper with occasional replies by CD, e.g. sewer records to Local Authorities.

Map base used is Landline but will migrate to Mastermap next year when a new GIS system comes on line.

Future Plans

The company intends to strive for increased accuracy and system improvements to increase resolution.

Current Issues

The company has concerns over complete transparency of shared information.

The medium for records associated with new developments is always paper as developers will not invest in electronics.

Future Issues

Ever greater standards are being aimed for, but until everyone adopts the same standard map base there is no value in striving for increased accuracy.

Common referencing is the key, not specific accuracy.

Look at the issue of volume of legacy data as against new laid.

Scale(s) to be used depend on mapping base adoption by all parties.

Code of Practice

As regards the new code, a mandatory imposition would not present problems, considering the current code as the base document. Accuracy requirements and sharing of data are not problems.

Company 4

Current Practice

Absolute positions and depth of all mains and fittings are recorded on as-laid drawings, so any asset can be relocated precisely from the original taped measurement. These paper records are archived, with over 20 years of asset positions recorded in this manner. These record drawings are then used to locate the asset onto GIS map backgrounds.

Mains material, size and age are recorded, and there is a methodology for collecting asset condition as remedial works are completed.

Future Plans

Future strategy has not yet been defined and is under review.

Current Issues

Future Issues

Code of Practice

Company 5

Current Practice

Data is held in a company asset information base: below surface – GIS; above ground – list format AIB.

Future Plans

Within 2 years: recording delivery of data from service partner (frame work) to statutory record within 24 hours, with absolute referencing for new assets, relative referencing for legacy assets.

By 2010: R&D to enable the asset can ‘speak’: the asset tells you where it is and outlines its presence, reports its performance and condition, and risk in terms of at what scale of capacity.

By 2020: central control and performance is reported automatically. 4D virtual recording.

Current Issues

Future Issues

Time from data capture to being available for inspection should be less than 24 hours.

Site visits as required by the customer.

Data should be captured via GPS-based sensor based asset recognition; asset would be tagged and therefore no need to capture the data.

Form of referencing should be dependent on the business need.

Minimum standard of accuracy should be as per UKWIR report 06/WM/12/9 *Buried Asset Data Collection and Exchange Field Trials*.

Records should be made or amended within 24 hours.

Code of Practice

Company 6

Current Practice

To capture data, contractors use sketch, paper and pen, own personnel use electronic mobile GIS units. Timescales from capture to being available for inspection, and to make or amend records are dependent on what the nature of the data, and if several internal departments are involved. CDs containing sewer data are issued quarterly to local authorities, and as required to others.

Future Plans

Current Issues

Commercial sensitivity is a problem on some aspects only.

Future Issues

Timescales from capture to being available for inspection are dependent on data type.

Data capture methods dependent on map base used for referencing purposes.

Code of Practice

Company 7

Current Practice

The company has moved significantly forwards with a web-based information sharing process, with paper based copies sent out as required. CD and e-mail requests are also complied with in certain cases. Records are amended within 24 hours if electronic, or 3 days for paper copies.

Future Plans

Current Issues

Future Issues

As regards future developments we are driven by corporate requirements, not outside influences.

We need to move to an absolute referencing system to improve speed of surveying. Accuracy is of lesser importance due to problems with legacy data.

Code of Practice

The company is not driven by Codes but focused on internal procedures and processes. The company will meet its legislative obligations.

As regards the new code, it is difficult to form an answer without seeing the legislative and cost demands of the specific document. Increased costs would be passed on to the Regulator, so there would be a reluctance for the company to sign up.

UTILITIES - TELECOMS

Company 1

Current Practice

Data is recorded by the contractor, and then stored and shared on paper copies.

Future Plans

Currently no clear objectives on future developments are laid down – we will study new technology before making any decisions.

Current Issues

Future Issues

Code of Practice

Company 2

Current Practice

Currently trialling web-based record availability with some councils.

Future Plans

Current Issues

Gaps in GPS availability (off street) can make it difficult to trace exact location.

Future Issues

Commercial sensitivity will be a big problem area for telecoms companies

Pre-Positional Accuracy Improvement (PAI) OS Landline: the positioning will be out of sync when mapped against post-PAI Master Map. This is an issue for all companies that have been using the pre-PAI map and will be looking to move to MasterMap.

Code of Practice

Company 3

Current Practice

Assets are recorded on an A55 form drawn up by engineers in the field at the time that the job is done. This is a legal record showing what is/was planned and how the job was/is to be done. These are then sent to eRecords to update the network plant information stored on PRM Databases.

Asset data is stored electronically on the PRM and PIPeR databases. A55s are filed under exchange area and stored indefinitely.

Sharing records of apparatus (internally): Planning and Recording Modernisation (PRM) is a database of primary plant records on Ordnance Survey maps (duct and copper cable diagrams). The PRM Smallworld system enables the computerisation of Local Network Records through a national networked system, enabling users to view and amend plant on screen. The system gives the user access to all records, which can be viewed and printed as necessary and amended by eRecords team members. The main network records, map, duct and cable, are available in a read only format via the Intranet in a system called PRM (I).

Sharing records of apparatus (externally): Maps by Email (MBE) is a service offered to all utilities, so that they can obtain details of the company's plant over the Internet. The utility will request details of our plant on map by accessing a web page, entering in their user-id and password, then typing in either map reference, grid reference or address, their email address, and how large an area they require. The request is then submitted, and a unique id for their request is displayed. A return email is sent, thanking them for using MBE, with an attachment containing the area of plant they requested, on a map, for viewing and printing.

Future Plans

Physical Inventory for Planning and eRecords (PIPeR) is underway and set to fully replace PRM as the main product for storing plant record data. The PIPeR programme involves the implementation of a new planning and recording system called Network Engineer that will hold converted data from PRM as well as generated data from INS and CSS. PIPeR is one of three programmes known collectively as the Network Engineering Journey (NEJ); the other two are Twenty-First Century Planning (TCP) and the Bearer Management System (BMS). PIPeR will become the main repository for physical line plant data and will be fully intelligent, making use of the latest OS map base technology. This forms the fundamental building block to providing access to our data by way of sharing records with other utilities. Network Engineer meets industry standards and should enable integration of data sets, which has been a major issue in the past. Legacy data, primarily held on raster based PRM, will be maintained until data is transferred to PIPeR. The transformation process includes the recovery of any outstanding recording backlogs. MBE will be enhanced to use both data sets during the transition.

Current Issues

Future Issues

Code of Practice

The current Code of Practice is already considered to be a mandatory requirement that should have been in place since Nov 2002. Implications of insisting on a more aggressive approach to ensure compliance will result in cost overheads and does the technology exist (i.e. a competitively priced handheld GPS) that delivers co-ordinates meeting the accuracy standards specified? What would seem practical would be the declaration of specific "road maps" from each utility including expected implementation dates.

UTILITIES - GAS

Company 1

Current Practice

All mains pipes and service pipes are recorded, with the exception of small diameter low pressure services. Other gas transporters' assets are provided for emergency, but not recorded in GIS. A read-only application displays the site boundaries and as-laid drawings are available for those with the appropriate access.

Asset data is gathered during installation/at commissioning. Assets found following emergency are investigated (DR4) and recorded where necessary. Governor kiosk and above ground pipes recorded, but not risers or above ground lateral pipes (services to flats, etc.)

Old Ordnance Survey maps have been archived. Assets abandoned/removed after 2003 are retained in GIS on separate layers. As-laid drawings are retained for the life of the asset (paper records are held for life of asset). Data is captured via on-site measurement; a GPS trial is underway currently.

1:500 is preferred for capture and sharing although MAPS, CDs and web allows for printing at pre-determined scales (1:500, 1:1250 & 1:2500).

Future Plans

Management and maintenance of multiple systems is costly and time consuming; analysis is currently ongoing regarding replacement / streamlining of existing applications. A web-based system will be implemented to handle plant enquiries; this will drive consistency in responses, manage responses more efficiently and keep an audit of all requests/responses.

Current Issues

Future Issues

Recording the position of assets in GIS should not be critical – section 3.6 of Code requires recording at +/- 500mm.

Dimensions must be captured accurately and when shown on drawings / in GIS, etc. then guarantees should be given.

If pipe / asset locations are captured using GPS, the x, y & z coordinates should be captured and stored.

GPS coordinates must be available for use and displayed. End users must have the ability to find an asset; therefore, the relative position should be recorded / displayed.

Depth of Cover should be captured and recorded

Provision of information to others: commercial users i.e. those that connect to our network require diameter, material, pressure regime and dimensional information of assets; general enquiries given only location of live assets

In future, hold coordinates for service connections and meter position (OS MasterMap). Not practical to hold location graphically with appropriate dimensions, etc.

Time from capture to being available for inspection: Strategy view – within 1 week if GPS in use; Policy view – 3 months because the onus should be on the person on site, if they see scarring, to contract utilities again. (Current update schedule for CDs and operational workforce is quarterly).

Once on-site details have been accepted and information added to GIS and verified / accepted, original drawings should be destroyed.

Recorded position of asset should not be critical in GIS, but dimensional information from geographic feature to asset must be accurate (to 100mm).

Code of Practice

A (revised) Code of Practice should be mandatory, with positional record of all pipes and control mechanisms.

Company 2

Current Practice

Pipe record information is recorded on an asset database, and on a graphical MAPS system. Recorded on the asset database as a minimum are: position (with reference to background geography); depth; diameter; material; pressure; lay method; Unique Pipe Object Number and crossing pipes/connections.

The asset database is updated manually by users, with changes to existing pipes, or upon the commissioning of new pipes. Information to update the asset database is taken from as-laid maps produced in the field. From the asset database, information flows electronically through to the graphical MAPS system. In addition the as-laid maps are sent via post to the site of the graphical MAPS system hub. Once this information on the asset database has crossed the interface between the two systems, and the as laid maps are at the graphical hub, the graphical MAPS editor can make manual changes using the information supplied. This results in a database and graphical system record of the asset. In addition, original paper copies of the as-laid maps are kept, scanned and archived.

This information is shared internally on desktop versions of the graphical maps system and can be viewed on desktop database applications. Employees working outside of main offices access the information on laptops, using controlled CD copies taken from the graphical maps system.

Access to this information for third parties is given in printed copies of graphical maps. In some circumstances, CD copies of the graphical maps system can be issued to external people or organisations.

Future Plans

Areas of improvement may include direct access to records via the Internet rather than through CD. This would make a common platform appropriate to enable all utilities' apparatus to be viewed simultaneously.

The Company supports the principles of sharing record information. Systems that are currently used are being upgraded and will continue to be digitally-recorded, graphically-based records. As such, it is likely that the systems will be compatible with future technology developments.

Current Issues

Future Issues

Code of Practice

The Code of Practice would need to be reviewed as part of a joint utility working group. The consideration of mandatory and non-mandatory requirements would form part of the outputs of the group.

Company 3

Current Practice

The records process is built around the use of a developer's drawing to design and produce a proposed mains and service layout. This drawing is produced both electronically, and in paper form. As the development proceeds, the paper record is updated in the field by operatives by measurement on site from physical landmarks, or kerb lines, and returned to a records agency who use the dimensional detail from the paper record to update the electronic format converting the proposal drawing to an as-laid. Services are also shown. A copy of the as-laid should be left with the developer so that he is aware of what is live on his land. All the work at this stage is typically not in highway land, but eventually it will become so when the estate is adopted. Typically, the update process is much less than a month behind physical activity, as the contractor is not paid unless a record is received. Once the record is electronic it is circulated within the company on a single CD on a monthly update frequency.

When a connection is made to a parent main, normally operated by a DNO but occasionally another IGT, the final connection process requires a sketch of the detail of the connection to be sent to National Grid Gas for digitising within 5 days of completion. Any errors found in the existing record trigger a mains error DR4 record being made out. Details of third party plant discovered are not recorded. Once the main is live a copy of the as-laid within its polygon boundary is sent electronically to National Grid as part of the Emergency Cover Agreement. This polygon drawing should then be available to emergency operatives.

There is no engineering asset database. Records are held currently of, approximately 5000 individual networks, with the background geography remaining the developer's drawing (typically, Ordnance Survey maps showing details of new developments are not available at the time of the work)

Third parties requesting plant location are provided with paper copies, although for very urgent situations we can offer a site meeting if our plant is at significant danger of being damaged.

Future Plans

No specific changes are intended to current practice. The obvious improvement area would be to have the network shown on the digital record of the host DNO record with, if necessary, a disclaimer over accuracy if the DNO did not feel comfortable to issue a copy of the plan with a third party record upon it.

Current Issues

Future Issues

Code of Practice

Company 4

Current Practice

Asset data is collected at every 15 – 18 metres (at welded joints) along the pipeline by contractors, during installation and following diversion, etc. using GPS. Contractors produce strip maps (pipeline route) at 1:1250 scale and profile / elevation plans at 1:500 scale, and provide drawings and CAD files. When the full pipeline has been installed and commissioned details are captured in a GIS system

Strip maps and profiles are held electronically as TIFF files and are for internal use only. Pipeline routes are digitised in GIS against an Ordnance Survey LandLine background. The internal SLA for data capture is 42 days from commissioning to recording on GIS.

Third party assets are not recorded in the GIS system, but they are captured and recorded as part of the pipeline profile. The latter is for internal use only. Above ground asset data is recorded in the GIS system at any point a pipeline is exposed, although pipelines in own sites are not held in GIS.

Highway authority imposes conditions on street work licences where pipelines cross the public highway.

All information related to a pipeline / route is retained on strip maps, profiles and elevation plans and the routes have been verified in GIS.

Records are made available to others, as follows:

- UKT pipelines are contained on CDs which are issued to named organisations.
- Responses to plant enquiries are printouts from internal MAPS system (read only) and site visit if required.
- Aerial surveillance also picks up other works in the vicinity of pipelines.
- Master set of records provided to HSE for planning.

Asset data is recorded on strip maps and profiles provided as hard copies from contractors, scanned as TIFF files and available on internal intranet site (user name and password protected). A CAD file is now also requested for download into GIS. Original as-laid drawings are retained and assets abandoned after Dec 2003 are retained in GIS.

Future Plans

The vision for transmission is to have gas and electric assets recorded and maintained on same system and separate from gas distribution system.

Current Issues

Commercial sensitivity is not a problem; data already provided to other utilities, etc. on CD.

Future Issues

Security of information is more critical than commercial sensitivity.

Asset data should be gathered during construction.

Above ground assets not in own land e.g. pipe work and apparatus at compressor stations should be recorded.

All legacy data should be retained.

Information needs to be read only.

Data must be usable information by recipient, however it is collected and referenced.

Choice of scale(s) doesn't matter if captured by GPS and stored / shared electronically.

Data should be GIS-based for sharing.

Internal standards require capture of more detailed information at better accuracy than the current minimum standard.

Warning only should be given on accuracy of record data, not guarantee.

Code of Practice

Company 5

Current Practice

Currently data is captured in the field by conventional paper processes. However, from August 06, a new electronic process called ESRI, which is a digital spatial system will be introduced, allowing operatives to record information on site using a ruggedised electronic notepad.

Paper copies are still the main form of information exchange, with CDs going out to “partners”, i.e. contractors etc on a regular basis, updated and managed by a third party contractor.

Data is stored electronically and no legacy paper records are retained.

Future Plans

Current Issues

Future Issues

Code of Practice

Company 6

Current Practice

Plans provided by the developer, not OS maps, are used to record asset data against, only. Plans hold the locations/routes of both proposed and/or live gas pipes. All information is kept in black and white.

Low pressure pipes are marked with diameter & material (text), medium and intermediate pressure with diameter & material plus MP or IP (text). Details of all mains pipes are recorded plus MP service pipes. Dimensions to locate pipes are shown, but very few depths of cover.

Records are held on paper (700 old map plans) and electronic media – more recent developer plans are scanned and held in TIFF format; Autoroute is also used to locate sites. Asset details are recorded on a developer plan; plans are scanned and held in AutoCAD.

The majority of plant enquiries are received in the post, with some by email. All are logged on a system and paper plans sent out with applicable safety notices and conditions. Internally, developer plans are scanned and kept in AutoCAD format and available via a FTP server.

Although the company has a fairly large share of the independent gas network, its sites are comparatively small and discrete; many of the plant enquiries and requests for information received do not impact its sites.

Future Plans

Working towards PAS55 Accreditation (Asset Management).

Current Issues

As proposal details are held on the same plans, then there are potential competitor issues.

Future Issues

As a small company many of the work activities are manual. The introduction of technology would need to bring commercial advantages. Improvements in current timescales would probably only be driven if safety became an issue. Consideration needs to be given to any costs associated to new requirements; smaller companies could go out of business.

If proposal details are held on the same plans, then there are potential competitor issues.

Although legacy data is available, it is held in a different format and for smaller businesses the resources are not available (people or finance). However, if moved to GIS then it is a possibility. Also, as assets are new and in discrete locations, it is not an issue internally.

Making records available: web-based is the ideal, but can only be paper because of current limitations.

Data capture should ideally be GPS-based fit for purpose.

Scale(s) used should preferably be against Ordnance Survey background.

Asset data recording should ideally be GIS-based, but needs to be a financial benefit.

Minimum standard of accuracy should be as per existing NJUG standard, although difficult to ensure as this is the responsibility of the developer. However, auditors have recently been employed to monitor quality of work. Dimensions captured including at road crossing, change of diameter and end closures; very rarely captures depth of cover.

Guarantees on accuracy of record data depend on how the data has been captured, and legacy will always be a problem. However, needs to be sufficient to locate assets and use of technology e.g. ground penetrating radar. Need to consider if penalties would be issued.

Only see need to improve current timescales for making or amending records if safety issues have been identified.

Code of Practice

There would be concerns if penalties were introduced as part of any mandatory requirements in the Codes of Practice.

Company 7

Current Practice

Data is gathered on commissioning, and all mains pipes and services pipes are recorded, with the exception of small diameter low pressure services. It takes 30 working days from commissioning to asset information being available on the graphical system. Exchange of data is currently via CD, but will be moving to web browser. Third party assets recorded as a polygon drawn to show boundary of 'other gas transporters' site, and as-laid site drawings held for emergency purposes. Commercial sensitivity is managed by restricted access to data

Old drawings are archived, and abandoned/removed assets, from 2003/04, are retained on separate layer in GIS system. Additional process for dealing with found assets (DR4).

Records are made available via a web browser for internal users, and external users must sign licence agreement and have own user-id and password. Own field workers receive monthly updates for laptops via LAN. Paper copies and site visits are used for plant enquiries.

For new connections the x and y coordinates of services are requested, but not mandatory.

Future Plans

Current Issues

Future Issues

As a minimum there should be more a robust method for exchanging gas and electric data, preferably electronic and primarily for safety reasons.

Capturing all service data would be beneficial but would need to be automated.

No benefit would accrue if the current update schedules are reduced, because of refresh timescales for own workforce.

Third party records should be held, with a disclaimer.

Data should be gathered when commissioned, planned for internal use, or assets found as part of emergency work.

Guarantees should be given on accuracy of record data for safety reasons.

Timescales should be in place to make or amend records as per existing because of update schedule for own field workers.

Code of Practice

UTILITIES - ELECTRICITY

Company 1

Current Practice

All assets are recorded on site in paper format, and transferred electronically onto a raster map set. All attributes are held in a central network database, allowing sharing of information across various business applications. Information is provided in either paper or CD (TIFF images) for third party use.

Future Plans

Projects are underway to make information available via a web site.

Current Issues

Future Issues

All future assets should be recorded using a GPS system.

On-line access needed for data capture to create a live updating process which in turn will reduce the time in making information available.

All information should be available on request from a central access point. To create this access system the funding should be provided by the Government.

Code of Practice

Company 2

Current Practice

Site recording by is carried out by field staff and contractors. All cable records are held on a common mapping system – Smallworld GI (NetMAP). Information is shared through EMAPS (third parties internet solution), hard copies (NRSWA requests) and data extracts (large utilities).

Future Plans

Current Issues

Future Issues

GPS-based capture and recording.

Electronic downloads to GIS.

Red lining by 3rd parties.

All utilities using common Mapbase and symbology.

Electronic transfer of data.

Instant access by third parties to GIS (within 24 hrs).

Digitisation of all our records.

Code of Practice

It should be mandatory to ensure compliance. If third parties' assets need to be recorded, then the cost/resource issue will need to be signed off by the Regulator.

Timescales should be reduced to i.e. within 1 week - Current IIP legislation already states 14 days recording timescales.

Company 3

Current Practice

The company generally aims to capture and record within one month. Turn round of information following requests is very rapid, usually within 3 days of request, provided on paper, with some CDs to specified organisations. 500 CDs are issued per month. Time from capture to being available for inspection and to make or amend records is 30 days for services, 12 days for mains. Data is captured in the field mechanically using pen and paper; in office captured electronically, GPS when ideal. Data is captured via a dimensioned sketch, stored full size, and shared on 1:500 paper or CD.

Future Plans

Current Issues

Commercial sensitivity is a problem on telecoms side only.

The company has major concerns with regard to positional accuracy, brought about by map base variations employed by different companies and is watching closely the PAI programme of Ordnance Survey.

Future Issues

Commercial sensitivity will be a problem for telecoms only.

Recording third party assets should be optional.

Code of Practice

Decision as to whether it should be mandatory would depend on the detailed requirements of the code at the time of enactment. The view of the company would depend on the cost implications and practicality of the prescribed detail.

Company 4

Current Practice

The supplier captures assets details using GPS and provides as-laid drawing (hard copy) after commissioning. As-laid drawings are submitted to a second contractor to produce an electronic record of route, and capture asset attributes. Shape files are returned and added to a GIS system. Gas transmission assets are overlaid on transmission (electric) GIS. GIS has live links to detailed drawings, etc.

All contractors are issued with a DVD containing asset locations, on a 1:10:000 OS background. All enquiries for transmission are managed centrally, and if anyone is working in the vicinity of transmission cables then National Grid will attend site.

It takes the supplier, anything between 1 – 2 months to provide as-laid drawings (no SLA in place). However, the time taken from receipt of relevant as-laid drawings to data being recorded electronically is 1 week.

Planned routes are captured in GIS system. As-laid / live data is captured when cables are commissioned. Emergency work would generally require temporary diversions and these are also captured. Any cables / overhead lines decommissioned for emergency work would be recorded as live. Overhead live lines and boundaries of sub stations, etc. are recorded in GIS there are linked to more detailed drawings / aerial photos. All legacy data is retained (paper and / or electronic). It takes 1 week to make or amend records, providing data has been provided by supplier.

Future Plans

Transmission gas and electric assets are maintained in different GIS system; in the future both may be recorded and maintained in the same system.

Current Issues

Future Issues

Would prefer to receive as-laid details 2 weeks prior to commissioning, as this would allow digitization / import onto GIS before / at the time of commissioning.

Above ground asset data for assets within own sites, etc. should only be for internal use, but need to be recorded (somewhere).

Access to web-based system would need to be carefully monitored and a full audit trail kept.

Site visit would still be relevant.

Both forms of referencing needed for locating asset.

Code of Practice

Existing internal standards for data collection exceed those in the Codes of Practice. However, all contractors, agents and sub-contractors installing and/or maintaining assets should all be bound by the same rules e.g. the provision of cable drawings must be provided

before commissioning. (This is more applicable to transmission due to the size of asset and duration of project).

Company 5

Current Practice

All asset information is captured in paper form and transferred electronically onto an AUTODESK/VISION GIS system using vector mapping. All asset attribute information is stored in a GIS database confined to the system. Third party information is provided in both paper format and via a web site by user name and password.

Future Plans

Current Issues

Future Issues

All future assets should be recorded using a GPS system.

On-line access needed for data capture to create a live updating process which in turn will reduce the time in making information available.

All information should be available on request from a central access point. To create this access system the funding should be provided by the Government.

Code of Practice

OTHER UTILITIES

Company 1

Current Practice

The company contracts all its work out to third parties. The main work done on its behalf that affects the highways is the installation of bus shelters. Over 500 shelters are installed/moved every year for the whole of the company's area. Contractors apply for all opening and closing notices.

Future Plans

Current Issues

One contractor wished to use Mayrise electronic street works notice system. The process for setting this up was surprisingly difficult and there seems a lack of knowledge across Local Authorities as to how a new contractor can tap into the e-system of issuing opening and closing notices.

Contractors from time to time find underground assets not at the depth they were advised, or in a slightly different location

Future Issues

The company and its contractors are in favour of computerising as much of these systems/processes as possible.

Anything that NUAG can do to make the current system more robust would help all parties.

Code of Practice

HIGHWAYS

Authority 1

Current Practice

The aim is for all available data to be recorded, although there are variations across different asset groups; this includes above ground assets. Data is captured manually, recorded in a database and displayed via GIS. Inventory data is stored along the length, with no allowance for gradient or height. Spot items such as bridges, lights are grid referenced.

Future Plans

Trying to move towards electronic methods, including GPS, for all data capture. Aiming for fully integrated system where new / amended assets will be in the system as soon as the work is complete. Microfiches will be digitised soon but will not be web-based / GIS for a long time, because of the high costs involved. Moving towards grid referencing for all assets.

Current Issues

Commercial sensitivity could be a problem for some, but unlikely.

Councils are all looking at Transport Asset Management Plans (TAMPs) and really investigating the data held, its importance and priorities for gathering data.

Drainage is a major issue where minimal data is currently held.

Not aware of Code of Practice.

Future Issues

Aim to record all assets where possible; could have categories <1980, 1980-2000?

New asset data should always be gathered when installed/replaced.

Should be working towards electronic, preferably web-based availability but this will take a long time.

Data should be recorded in electronic databases, then displayed as map/GIS based

Minimum standard of accuracy depends on risks attached to the assets.

Guarantees on accuracy should be given, but within limits.

Details of abandoned assets should be recorded, but not abandoned assets.

Code of Practice

A Code of Practice is best practice, not mandatory.

Authority 2

Current Practice

Asset records are generally associated with the highways and its surrounds. In principle, all assets (above ground) are captured, with local variations in practice, normally in relation to planned or proposed schemes. Some problems exist in achieving Code of Practice accuracy. Data is held centrally, in various formats (with local variations) and maintained, but this data set is known to contain errors and be aged in some areas. Capturing of underground assets is not centrally controlled and there is no central data repository and, therefore, local variations are inevitable leading to non-systematic approaches. Some third party assets are recorded, but not systematically. Legacy data should, in principle, be held and available. As underground asset information is held locally, and the change of contracts is known to result in the loss of information, the historical records will not be robust. As the information is held locally it is probable that data is available in most of these formats dependent on how it is held locally. For above ground assets relative referencing predominates (Chart – section/chainage). Timescales are variable, by geography. Again, for underground apparatus, local variations exist – no known central directive for underground apparatus exists.

Future Plans

A mixed approach to referencing is under development. Relative referencing will continue to be the predominant approach in the medium term.

Current Issues

Commercial sensitivity is not a problem, but security may be.

Future Issues

Records, including abandoned and removed assets, should be held centrally.

Minimum standard of accuracy should depend on the nature of the asset.

Code of Practice

Authority 3

Current Practice

Future Plans

Current Issues

Because it is not mandatory for highway authorities to maintain records in any particular manner, it has become something of a free for all, with records of varying detail and accuracy being kept in various locations and formats.

Future Issues

All new apparatus should be captured and recorded to a national standard.

Old records should be maintained and included into the new system, but for say, information only.

Accuracy of data should be improved with the requirement for a GPS (for example) method of capturing the data.

Code of Practice

The code should be mandatory and apply across the board, highway authorities included. Compliance should be mandatory. The revised code should make it a requirement for all owners of apparatus to maintain records, whether underground, above ground, abandoned or any adjustment made to existing apparatus. The manner in which the data is captured and recorded should be to a national standard. A time period should be imposed requiring all to be using GPS type capturing and web based recording, say two years from introduction of the code revisions. Records should be maintained / updated on a regular basis; this should be to a standard that is fixed within the code. The responsibility for this should be controlled within one specific area and not spread throughout an organisation.

Authority 4

Current Practice

At present the council holds limited records for drainage and electric cables; all traffic signals information is currently available. The organisation generally does not hold records of its underground apparatus, although for large highway improvement schemes and new development work paper records are kept. No as-built drawings are available. It is rare that new private electric cables are put in and efforts are being made to trace those cables already there; these are stored in a street lighting management system. Information can be supplied, but Utilities do not ask us for our records. The electrical apparatus records are to Statutory Instrument 2002 No. 2665 The Electric Safety, Quality and Continuity Regulations 2002.

Future Plans

Current Issues

Future Issues

Where pipes or ducts are not at the usual depths for the type of utility service then perhaps these could be flagged, particularly if they are shallower than normal.

Accurate records of plastic pipes should be kept but some method to enable the tracing of this type of pipe should be found.

Services buried in concrete cause a problem for our contractors at present and this should be investigated to overcome this problem.

Code of Practice

Recording of all assets should be mandatory and preferably GIS-based and made available via the web. Abandoned assets and changes should also be recorded. Time periods for recording and making available records of new assets should be stipulated but whether records of existing apparatus can be collected may be more contentious. There would be considerable resource implications in making this information available if compliance is made mandatory.

Authority 5

Current Practice

Assets owned and managed by the Council include: traffic signal loops, cables & poles; Private apparatus (S50 NRSWA licences) – Council's own heat & power, warden intercoms, CCTV, computer networks; surface water drainage – culverts, watercourses, drains, gullies; street lighting cables (owned by the Council), columns, bollards, illuminated signs, high masts, variable message signs; road signs (non illuminated); other street furniture (bollards, barriers etc); highway trees and grass cutting & other highway inventory (e.g. coloured surfacing).

There is a variable approach to managing assets and records across different departments; a lack of corporate strategy in this area results in different departments operating in differently. There is, however, a corporate GIS team.

Data is often gathered as a separate exercise, after assets are created or changed.

Future Plans

Current Issues

Future Issues

Highway authorities face a major challenge particularly with respect to surface water drainage. Very few have any idea on the location of many culverts, french drains, and pipes particularly in rural areas. Authorities will need to develop a strategy for accurately recording these as they are re-discovered.

A cost benefit analysis needs to be carried out to ensure that the costs involved in highway authorities accurately recording, storing, and accessing data brings a greater benefit in other areas, such as reduced damages or instances of flooding.

The new accounting regulations on asset management will be an incentive to record much of this data.

Code of Practice

Mandatory recording of such new data would be welcome but the resource and cost implications should not be overlooked.

Authority 6

Current Practice

A computerised street lighting and sign asset records and mapping system is in use.

Future Plans

Current Issues

Future Issues

Expansion of electronic data including electronic transfer subject to any local government rules and regulations.

Code of Practice

Authority 7

Current Practice

No apparatus is recorded currently.

Future Plans

The aim is to record all lighting, Section 50s, highway drainage etc. on a database linked to a GIS system. Section 50s will be recorded as the licence is processed, the other information will be updated as they are maintained (i.e. not a proactive survey).

Current Issues

Future Issues

Code of Practice

Authority 8

Current Practice

Drawings are printed and filed after sending copies to contractors.

Future Plans

Current Issues

Future Issues

Code of Practice

Should be mandatory.

Authority 9

Current Practice

Apparatus data is stored on GIS layers and in databases. It is made available to others on paper plans.

Future Plans

The council is in the process of developing a system make data available through a GIS system on the web.

Current Issues

Future Issues

Code of Practice

Authority 10

Current Practice

In the late 1980s consultants were employed to carry out a major inventory collection exercise. Data was recorded against CHALIST, a system of links and sections referencing the highway network. Data was stored on a RAPPORT database and used thereafter to provide information for the formulation of cyclic maintenance contracts and general information to the local highway offices. In the 1990s, databases for bridges, traffic signals and street lighting were developed as well as those for traffic counts and condition surveys.

Some of the databases evolved from paper systems to electronic storage using bespoke systems which are in operation today. However, as a result of changes to the corporate IT infrastructure, the highway data collected in the late 1980s became unsupported and the data was transferred to a storage database. The data is still stored in text file format but has not been updated for a number of years.

There is no formal data management regime in place and the completeness and reliability of data is not formally checked and reported on.

Future Plans

The development of levels of service within the Council's Traffic Asset Management Plan (TAMP) action plan will help determine and prioritise the future requirements for data and much of the data presently collected or available could be used to develop levels of service. A complete review of data is a high priority in the action plan and it will have to relate to levels of service and the department's business requirements. It is essential to have the ability to combine, view and use data from various sources. A great deal of work has already been completed in this area, developing compatible IT systems. However there are legacy systems in operation that may require review and a more coordinated approach to data management. The review will consider what we collect, how we collect it and sustainable ways to manage that data.

Current Issues

Future Issues

Code of Practice

Careful thought needs to be given to a Code of Practice making compliance with the code mandatory. For local authorities that currently allocate limited resources and funding to record, maintain and disseminate information about their underground asset, the implications of a mandatory requirement, in the short term, would be one of budget, and resource being diverted from other current statutory requirements.

Authority 11

Current Practice

Present locational information is recorded on as built drawings. The accuracy of these is determined by who draws together the site information.

Future Plans

As new technologies come about and reduce in price the recording of asset information will become easier and probably more accurate. The authority will no doubt take on the requirements of any developments but for a variety of reasons this is not seen as being the most vital matter in the authority's priorities at the moment.

Current Issues

The authority does not have to work to the voluntary NRSWA Code of Practice, as indeed is the case for all other authorities and utilities. The current Code is of little use and with the wide spread lateral tolerances and no indication of depth for recording data the information supplied by such records is an indication only of what is in the ground. As in all cases with excavation the assumption in health and safety terms has to be that there is apparatus in the ground whether shown on a plan or not.

The sharing of information is a necessity with health and safety issues but the information given and the speed with which it is given is of little relevance as most is inaccurate and no one in their right mind would rely on it on site other than as an indication of what may be in the ground.

Future Issues

For any system to be useful, it would have to map accurately to minute tolerances not only what goes into the highway but what is already there – much of it for over a 100 years. Without that level of accuracy and historic data the rest of the information that the proposed new records code is meant to deliver is of minimal use in carrying out works on site.

The vast majority of apparatus is already in the ground and is unrecorded – and it is not just utility apparatus in the ground – what about cellars, natural caves, streams, archaeological items, etc. Those framing the TMA may well believe that there is a utopia whereby accurate information is electronically issued at the press of a button to those on site who will then be able to dig their way rapidly around identified apparatus and swiftly complete their work. The reality is that without the accurate historic data it will never happen and unless someone comes up with a way of accurately plotting everything that is already in the highway and at a cost that is affordable that is going to remain the case.

Code of Practice