Rural Development Commission

PROVISION OF BASIC UTILITIES IN RURAL ENGLAND

Report

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The Provision of Basic Utilities in Rural Areas

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Executive Summary

1. This report presents findings of a study into the extent, location and consequences for rural areas of non-supply from the mains of the basic utility services of electricity, water and sewerage.

2. Enquiries covered the whole of rural England. Four case study locations were selected for more detailed investigation in North Norfolk, South Devon, parts of Shropshire and North Yorkshire.

3. All English electricity and water utilities and all English rural Counties and Districts were approached for information on the scale of non-supply in their areas, and for any details that they had of problems arising from non-supply. Accurate and detailed information is nowhere available, but from replies received and from the evidence of the case studies the following estimates of non-supply in England have been made:

   - **Electricity**  About 2,430 unconnected properties. These are almost exclusively in rural areas. They represent about 0.01 percent of national connections. There are unconnected properties in all regions, but they exceed 0.03% of total connections only in the North-East and South-West. It was impossible to estimate the extent of single-phase connections rather than three-phase.

   - **Water**  About 150,000 properties have private water supplies. Again, these are virtually all to be found in rural areas. They represent about 0.8% of national connections. Many of these private supplies are on small systems supplied by boreholes and serving small communities or individual properties. Most other sources are abstractions from streams in rural areas. The largest concentrations of non-supply from the mains are to be found in the South West where as many as 5% of all households lack mains supply.

   - **Sewerage**  Around 750,000 properties are without mains sewerage equal to 4.0% of national connections. Again the highest concentrations are to be found in the South-West where as many as 15% of households are not connected to the mains sewerage system. These properties are mostly to be found in rural areas but non-connection is common in areas of urban expansion.

4. The principal explanation for non-mains supply to existing households and businesses of electricity and water is the high cost of first-time connection to isolated areas. Under existing legislation, water and electricity consumers may requisition the utilities to provide a supply, but there are charges for these connections.
5. As regards the non-connection to mains sewerage and drainage, there are, in addition to problems arising from isolation, capacity constraints in treatment works. These have arisen from historical under investment by the utilities, rural re-population and diversion of resources by Water Authorities to meet increasing standards of service provision for existing consumers. These constraints have inhibited Water Authorities from agreeing to make connections for new developments unless the developers make a substantial financial contribution to the Authority. These capacity constraints at treatment works are scattered geographically and are not restricted to isolated areas.

Issues

6. Costs faced by potential consumers and developers for first-time supply are usually prohibitive. For water and sewerage, the charges often appear to be arbitrary and unrelated to actual costs incurred by the utility in any specified case.

7. The costs of alternative supplies for electricity and water are invariably higher than most urban and rural consumers are charged for mains supply. There are, in addition, several inconvenience factors e.g. the need for regular petrol or diesel deliveries and the noise and inconvenience of local electricity generation, and the variability of water flows from shallow boreholes and streams. Alternative solutions to mains sewerage such as cess pits, septic tanks and small scale package sewerage schemes often are cost-effective. In certain localities physical conditions such as high water tables preclude the use of soakaways making local sewerage alternatives very expensive to install and operate.

8. Alternative supplies of water from boreholes can usually be made safe for drinking and meet the directives of the EEC with comparatively modest amounts of treatment. Other private water supplies are more likely to require substantial treatment to meet directives particularly if they involve surface run-offs. Apart from the problems associated with meeting directives, alternative water supplies suffer from discolouration.

9. The consequences of non-mains supply may be divided into two basic types of issue:

(i) Rural deprivation, where non-mains supplies are just one of a number of factors which contribute to the comparatively low standards of living of existing rural dwellers in isolated area.

(ii) Limitation on economic development arising from non-supply in the remote rural areas.
10. Rural deprivation issues centre on the non-availability of mains electricity and water, since these are the services to existing domestic consumers for which alternative supplies can sometimes be costly and in the case of water, fail to meet directives. The failure to meet water directives is a matter of public health.

11. The Consultants encountered only rare cases of economic development being frustrated by non-mains supply of electricity and water. Economic development is certainly frustrated by the non-availability of 3-phase electricity since this is necessary for the running of electric motors and is normally costly to install. Unfortunately, absence of information about 3-phase makes estimation of the extent to which economic development is frustrated on this account very difficult.

12. By far the most important adverse influence on rural economic development arising from non-mains supply is the absence of treatment capacity for sewerage. Many frustrated developments are for housing but the Consultants did find widespread evidence that industrial development was being frustrated by high charges quoted by the Water Authorities for developers' contributions.

13. Moreover, the scale of these contributions is often revealed only at the final stages of the planning process after much preparatory work for new development has been done. Developments have been frustrated by the size of these contributions. There is scope for better co-ordination of Planning activities in rural areas involving the Water Authorities and more accurate estimating of the actual costs by Water Authorities of increasing capacity for sewerage.

14. Existing policy recognises the difficulties of the rural areas with respect to non-supply of basic utilities from the mains. Water Acts enable local authorities with Central Government help to grant aid connections. The scale of resources available for this programme of works is inadequate relative to the scale of the tasks. The Rural Development Commission also has its own programme of grant assistance to rural projects covering redundant buildings and site servicing. This programme can be fine-tuned on a case-by-case basis to meet the varying needs of rural areas. The Consultants recommend a focus on the provision of mains electricity and water, including 3-phase electricity given that the scale of the problems for sewerage is so great. A new source of funding to overcome sewerage problems of restraint seems to be required on economic development grounds.

15. Privatisation of the electricity and water industries is currently underway with both Bills at Committee Stage in Parliamentary proceedings. The approach which will be adopted by Parliament to first time supply provisions of the privatised utilities remains uncertain but the following conclusions may be drawn at this time:
Electricity Privatisation:

The Bill puts the onus for controlling the privatised industry firmly on the regulatory body to set limits to the overall level and also to assess the structure of charges. It is unlikely that under privatisation there will be extra provision of resources to overcome the high costs of connection for isolated areas, or provide three-phase supply.

Water Privatisation:

The Bill provides for certain costs to be recovered from occupiers of properties for supplying new mains and connections to existing mains and for a right of appeal to an independent technical expert if there is disagreement over those costs. This right of appeal is valuable and an improvement over the present position, but in general the legislation is designed to confirm rather than improve on the status quo which is not to the advantage of the rural areas. The Bill provides no basis for assuming that Government will recognise the need for additional resources for sewerage and drainage for economic development.

16. Within a context of no significant increase in resources the Rural Development Commission may have wished to see improvements to the status quo for first time supply particularly for water and sewerage. There are four possible options:

(i) to go for a standard charge as in telecommunications. This would remove uncertainty and put everyone on the same footing. However, the Government is unlikely, as in electricity, to support the general position that new users should not bear the burden of higher costs if costs are in fact higher. Indeed, the Government has already rejected the suggestion that charges should be standardised for that reason. However, there is scope for pressing for standard charges within defined areas or for requiring the companies to set out in advance what average contributions are going to be;

(ii) to get nearer to the OFGAS model, and involve the Director General in the process of determining what is reasonable. That would allow a "case-law" to be developed and general principles promulgated. The DG could be advised by independent technical assessors;

(iii) to endeavour to ensure that the new companies may charge only a limited range of costs, such as the direct costs of connection or supply, excluding basic infrastructure such as reservoirs or treatment works;

(iv) to scrap the existing clauses in the Water Bill entirely and go for the drafting used in the Electricity Bill. That would leave the onus on the Director General.

The prospects of making amendments to the proposed legislation are not now great, however.
1. INTRODUCTION

The Rural Development Commission is concerned about non-provision of basic utilities in rural England, particularly in the more isolated rural areas. The Commission's concerns are twofold. First, there are problems which arise directly from non-supply for the existing population. Second, there is the impact that non-supply has, or may have, on the economic development of the area, and in particular on activities which are inhibited from locating in the remote areas because service availability is better elsewhere.

Awareness of these problems has come from a number of different sources. The Commission has been made aware of non-supply from statistics which have been assembled by some of the utilities. The Commission has also been asked from time to time to help finance the provision of basic services where the costs are particularly high, where the utilities have not been prepared to incur those costs and the local population have been unable to afford them. Some local authorities, most noticeably Northumberland County and Calderdale District Councils have also carried out surveys of non-supply in their areas which have drawn attention to the problems.

The basic services with which we are concerned are electricity and water and sewerage. Mains electricity is generally provided to remote areas but there is a distinction to be made between single-phase and three-phase supply; the three-phase supply is not always available in the remoter areas, which inhibits the use of certain kinds of machinery. More extensive is the lack of supply of water and sewerage, particularly sewerage.

Both face problems of the high cost of connection of such services in remote locations, where distance and often geographical features account for the high costs. In the case of sewerage, there are sometimes capacity constraints in treatment which inhibit connections.

Although it is known that there is non-supply of these basic services, the evidence regarding the extent and type of deficiency is patchy and anecdotal. Moreover, the extent to which there are regional or local variations in non-supply is not known. Added to this is the absence of detailed information about the problems which have arisen from non-supply of basic services, and in particular the extent to which economic development has been frustrated.

At this time, both electricity and water industries are being privatised. The Commission has been concerned to assess the impact that this privatisation process might have on the rural areas. One of the influences which it is feared the privatised utilities might have in rural areas is to increase the charges for first-time connection, unless safeguards are incorporated in legislation. Accordingly, the Commission has been keen to understand the content of the proposed legislation and the ways in which it might intervene to secure a better outcome for the rural areas.
The Rural Development Commission therefore have commissioned this study to look at the provision of basic services to the rural areas. The Consultants were asked to review the range of possible options which are available to overcome problems of non-supply and to suggest how the problems may be ameliorated and economic development promoted.

Objectives of the Research

The objectives were:

1. To provide a comprehensive review of the types and locations of deficiency and of difficulties in the provision of basic services in rural England, and to quantify the scale of deficiency.

2. To assess the extent to which such deficiencies have inhibited or are likely to inhibit social and economic development in rural settlements. This should include, for example, the effect on small firms.

3. To review why deficiency problems have arisen, including consideration of the effects of existing installation procedures and charges, for example, on small communities and small businesses.

4. To assess, against the background of the existing legislative framework and the proposals for the privatisation of the water and electricity industries, the likelihood of deficiencies being made good in the next five to ten years.

5. If deficiencies are still likely to persist, to review the range of options available to overcome them and to suggest how they could be taken forward. This should include consideration of the role of different agencies and the likely scale of costs.

The Consultants have approached the assignment by undertaking a number of separate but linked studies. First, the legislation and institutional arrangements for the supply of basic services have been reviewed. The Consultants have considered alternatives to non-supply from the mains for the three basic services and have considered the costs of each of these options and the geographical circumstances where each option might best be considered.

The main part of the Consultants work, however, has been to undertake two surveys. The first was a national survey of all utilities and all the local authorities covering rural areas, in order to discover the extent to which information about non-supply of basic services is known and to collect and collate such information. The second survey consisted of four detailed case studies in rural areas, the objectives of which were to establish the scale of non-supply in those areas and the problems arising from it. The case studies were selected to be widely dispersed geographically, and to represent different physical and geological circumstances. The case studies were in North Norfolk, South Devon, parts of Shropshire, and the North York Moors.
Finally, the Consultants have followed the progress of the privatisation Bills through Parliament and at the time of writing both the Electricity and Water Privatisation Bills are in Committee. The basic frameworks for dealing with first-time supply have been included in the Bills. These are discussed in this report.

The structure of the report follows the individual studies outlined above and concludes with two sections dealing with the summary of the findings both as regards extent and location of non-supply and the consequences arising from it. A number of issues for the Rural Development Commission to consider are raised and to take action on as appropriate.
2. METHODS OF SUPPLY AND INSTITUTIONAL FRAMEWORK

2.1 Electricity

The National Grid is the main network of electricity supply lines serving England, Scotland and Wales. It was set up in the 1930s and today consists of 400KV and 275KV three-phase transmission lines. The Central Electricity Generating Board (CEGB) is responsible for supplying electricity to the National Grid and for maintaining this system. The regional Electricity Boards, of which there are fourteen (including the North of Scotland Hydroelectric Board) serving mainland Britain, with eleven in England, distribute the electricity from the National Grid via their own transmission lines. These transmission lines normally operate at a voltage lower than that of the National Grid system.

Electricity Consultative Councils have been established as independent statutory bodies to safeguard and promote the interests of customers in each of the boards areas.

For economic and technical reasons the higher voltage transmission lines within the regional Electricity Boards' supply systems are three-phase; however, lower voltage lines towards the ends of the network may well be only single-phase.

In general, a single-phase supply system is used for light loads; it requires only two wires and all loads are connected between them (in an over-simplified sense, there is a "supply" wire and a "return" wire). The three-phase system is used for electric motors. A note on three-phase is included in Annex 3.

For normal domestic use a single-phase supply is sufficient and most households in this country operate on this system. Three-phase electricity may be required for industries and farms which operate more powerful electrical equipment, such as larger motors or pumps. This type of equipment is more economically designed to operate on a three-phase supply.

There are, therefore, two aspects to non-supply. The first is the complete absence of mains supply where a consumer must rely on some other source of power. The second is the absence of three-phase supply for consumers with a need to use equipment which requires it.

Electricity Boards are under a statutory duty under the Electric Lighting (Clauses) Act 1899 (incorporated in the Electricity Act, 1947) to provide supply to any owner or occupier of premises within 50 yards of the distributor main. The Act also specifies that a requisition may be made to six or more premises. The Boards may charge for work done to lay power lines for a distance in excess of 20 yards from the distributor main under the provisions of the 1947 Electricity Act. Clearly, where distances are significantly greater than this the cost of supply can be a serious deterrent to occupiers of premises. Moreover, owners and occupiers of premises which are served must agree to receive a supply of electricity which in value is not less than 20 percent annually of the cost of providing the supply. Thus a remote consumer has to pay not only for the connection, but for high usage as well.
It is not normally the case with electricity that there is inadequate capacity in the system to supply remote areas; the main problem is with the costs of connection.

The main problems are also a consequence of distance from the distributor main rather than physical or geological circumstances since the lines, typically, are taken over land. Remoteness may mean a greater susceptibility to interruptions in supply due to line breakages in severe weather. There are also problems associated with taking the lines overland in areas which are of high landscape value.

No consents are required from the Electricity Boards for an occupier of property to provide an alternative power source.

Annex 3 provides a review of alternative sources of electric power supply. Engine-driven generators are the only viable alternative at the present time for domestic purposes, and these can be used in any location. Petrol (for smaller generators) and diesel fuel are used, which present problems of storage and frequent delivery. Generators tend to be noisy and require frequent maintenance. For larger communities or industrial requirements, a generator driven by a gas turbine may prove more economical than an engine-driven unit, although hydroelectric generation and wind power would be appropriate if site conditions permit. Both require a back-up source.

2.2 Water and Sewerage

Water and sewerage are services which are the primary responsibilities of the nine regional Water Authorities in England. In some areas local authorities may act on an agency basis to provide certain sewerage and drainage functions on behalf of the Water Authorities. In some areas there are also private water companies, 28 in all, which supply water but many of the water companies in England are in semi-urban areas, especially in southern and south-east England. Each Water Authority is required to establish arrangements to represent consumer interests and this is achieved through Consumer Consultative Committees.

Of the two basic services, mains sewerage is the less common in rural areas. Under section 14 of the Water Act, 1973 Water Authorities only have to provide "such public sewers as may be necessary for effectually draining their area and to make such provision ...... by means of sewage disposal works or otherwise as may be necessary for effectually dealing with their contents". Thus where there is a public sewer the Water Authority accepts responsibility. Where there is no sewer a local authority can requisition provision through section 16 of the 1973 Act. Under requisitioning the local authority undertakes to pay the "relevant deficit" which is dependent on the costs of provision of sewers and the rateable value of the properties connected.
Alternative disposal systems are widespread in rural areas and include septic tanks and cesspits for individual properties and package treatment works serving larger isolated rural communities. These alternatives are reviewed in detail in Annex 3.

A typical domestic water consumption figure for this country is in the order of 180 L/hd/day. Water required for industry is equivalent to 130 L/hd/day. Factors affecting water use are availability, climate, economic status of consumer, whether sewers serve the area and water cost to the consumer. Currently, most domestic water supplies in this country are unmetered and charges for water are levied via the water rates. The proportion of the water rate which covers water supply is typically £44 per annum. Most industrial and commercial establishments are metered.

There are now five European Community Directives dealing with water quality standards. These concern water for human consumption, for abstraction to public supply; bathing; the support of freshwater fish and shellfish. All water supplied to houses is treated to a potable standard.

All these Directives define water quality standards and monitoring programmes. In addition there is a sixth Directive covering the principles of control of discharges of dangerous substances (lists I and II) considered potentially damaging to the aquatic environment. Consequently there are now numerous standards for more than 60 physical, chemical and microbiological parameters covering many different uses of water.

These Directives are now legally binding to all water supplies. The Environmental Health officers are responsible for testing the quality of water supplies. However, the Water Authorities have applied for and obtained derogations on certain non-toxic parameters, presumably to allow them time to implement works to comply.

There are various statutory powers and duties regarding the provision of water services. In particular there are requisitioning powers in relation to water supply under section 37 of the Water Act 1945 and section 29 of the 3rd Schedule of that Act which goes with Section 36 of the Act. Under these provisions, owners and occupiers of properties can "requisition" the relevant water authority or water company to provide mains water supply provided that the annual water rates which are payable in respect of those particular premises are not less than 1/8th of the cost incurred by the undertaker. Local Authorities can act as Guarantors for such schemes and make up any deficits incurred. In these current times of severe restraints in the finances of local authorities this is not now very common.

The problems of supply to isolated rural areas arise mainly from their distance to the mains but, in addition, can arise from shortages of capacity in the supply systems, or from the need for costly pumping to overcome physical barriers.
There are several alternatives to mains water supply and these are reviewed in Annex 3.

Where a local aquifer exists at an accessible depth, good quality water can usually be obtained relatively cheaply via a well or borehole and may require only disinfection to make it potable. This is the most common alternative source in lowland England.

Water abstracted from a river or stream will generally require a greater degree of treatment to obtain a potable standard and the cost of the necessary additional equipment will normally make it viable only for larger communities. Tanker supplies and rainwater collection are rarely used.

Water used by industry, other than for potable supply, may have to meet specific quality criteria dependent on its use. Individual water quality parameter requirements may be higher or lower than those for potable water and the degree of treatment required will vary accordingly.

Recognising the mains supply difficulties that rural areas face, grants have been made available on condition that a rural locality is served, pre-existing properties (those constructed at the time of the legislation) are served for the first time and that the supply of services is adequate for the purposes. Local authorities can claim 35% of the net costs of the acquisition scheme or 35% of specified cost limits per property, whichever is the lower. These grants play a small but significant part in the provision of services to remote areas and in 1987/8 the total grant was about £4 million (Hansard, 4 April 1989).

Unlike electricity, where consents are not needed, alternative supplies are often controlled by the water utilities. Abstraction of water for domestic purposes is possible without a licence, although (in theory at any rate) the water which is consumed must meet specified quality standards. Industrial and commercial users of water which is abstracted from bore-holes and other sources require a licence from the Water Authority.

Consent to discharge to a public sewer is, at present, given by the Water Authority or their agent. Charges for domestic sewage disposal are made via the Water Rates. The proportion of the water rates which covers sewerage is typically £45 per annum. Any industrial effluent will require a Consent to Discharge Licence and a charge may be made on the basis of the type of effluent.
3. SURVEYS

Two surveys were undertaken to assess the extent of non-supply and to obtain a better understanding of the consequences.

(i) A National Survey of all Water Authorities, Electricity Boards and rural local authorities in England. These entities were sent letters with requests for specific information on the extent of any problems arising from non-supply of basic services. Response rates were 100% from the utilities, 45% from Districts and 70 percent from the Counties. Some follow-up telephone interviews were carried out.

(ii) The four case studies of North Norfolk, South Devon, parts of Shropshire and North Yorkshire. In each study area the study team interviewed officials of the utilities, local authorities and consumer representatives and also a few major agents in the process of economic development, most noticeably the English Industrial Estates Corporation. However, no systematic interviewing of occupiers of property was carried out.

This section of the report presents the approach to the two surveys and gives details of the findings.

No accurate data exists regarding the extent of non-supply. It has been necessary to estimate this from a number of sources of information.

3.1 National Survey

Results are presented for each of the principle groups of entities approached.

3.1.1 District Councils

Letters were sent to 207 non-urban District Councils and those Metropolitan Boroughs which covered part of a Rural Development Area. Replies were received from 94 authorities (45%). The survey revealed a wide variety of responses both on the level of existing deficiencies and on whether infrastructure acts as a constraint on development.

Of the 94 Districts, 39 identified an existing deficiency in supply, 8 identified none and 47 were unaware of any problem. On the question of whether absence of mains supply for any of the basic services had acted as a constraint on development, 39 said that it had, 32 said that it had not and 23 were unsure.

Questions were also asked as to whether the Districts had undertaken any research into the effects of service deprivation in rural areas or were aware of such research. No useful replies were received on this particular topic.
The Districts were also asked if housing and social provision had been affected by the lack of investment in basic services infrastructure. Whilst most responses centred on the problems of providing low-cost housing in rural areas the main constraint was seen as the lack of funds rather than constraints arising out of infrastructure provision. One or two responses noted that the costs of infrastructure provision tended to increase the costs associated with social housing.

On existing deficiencies 47 (50%) of the responding Districts had not undertaken any comprehensive estimate of deficiencies in basic services.

Of the remainder, 39 Districts (41% of the total) had identified existing deficiencies in service provision. Only two of these related to electricity and these were in Tynedale in Northumbria and South Lakeland in Cumbria. The only other response on electricity came from Babergh Council (South Suffolk) which noted problems in voltage fluctuations in several areas. This had come from discussions with householders regarding the use of kidney machines.

Sewerage

The lack of mains sewerage was the primary concern of the Districts where deficiencies were mentioned. These included a number of Districts covered by the Anglian Water Authority. Mid-Suffolk, for example, noted that 18 villages were without mains drainage, about 15% of all villages in the District.

There was also a relatively large number of responses from the Midlands. In East Staffordshire District, for example, there were nine parishes where more than 95% of properties were not on mains drainage.

There was also a cluster of authorities in the South-West which identified a lack of provision in mains sewerage for parts of their area. These included North Cornwall, Kerrier, West Devon, East Dorset, Taunton, Deane and South Hams. All referred to sewerage deficiencies.

There were also, a number of urban fringe Districts and semi-urban Districts in the relatively affluent South-East which reported sewerage deficiencies, including Ashford, Hart, South Oxfordshire, Colchester, Braintree, Gravesham and Adur. Many of these Districts were pursuing or examining first-time sewerage schemes using their requisitioning powers. Ashford, for example, supplied details of a programme extending up to the year 2011 to requisition supplies for around 1300 dwellings. Similarly, South Oxfordshire had a programme covering nearly 600 properties. The cost to the District Councils of these requisitioning programmes can be very high. Ashford's programme is costed at nearly £6 million, and annual costs are expected to peak at around £450,000 early in the next century. South Oxfordshire estimates that the cost of requisitioning ranges from around £1500 per dwelling to as much as £18,000 per dwelling. This scheme is costed at around £7.7 million of which nearly £5 million will be borne by the District Council (about £8000 per dwelling). Hart in Hampshire has a rolling programme which is expected to reach £1 million per annum.
Holderness (Humberside) supplied details of a sewerage scheme which would connect around 500 properties. The cost of sewage treatment works for the 14 settlements involved was put at £1.7 million, or about £3400 per dwelling.

Water

A small number of Districts reported deficiencies in mains water supply. Information supplied resulted from the activities of Environmental Health Officers and this in turn usually reflected concern over the quality of private water supplies. In Braintree, Essex, at least 250 dwellings were identified in rural areas as being without a mains water supply and whose water supply was either unwholesome or insufficient. West Devon had also identified deficiencies in certain settlements. Langbaugh-on-Tees identified 36 private water supplies serving 134 properties, 80% of which were considered unsatisfactory from a chemical or bacteriological point of view.

Problems with water supply do appear to be localised. However, one particular area has more severe problems. The Metropolitan Borough of Calderdale reported nearly 2,000 properties connected to private supply (its particular problems are examined below). However, it does appear that Calderdale’s problems are very much the exception.

New Development

A total of 39 responding Districts (41%) noted that deficiencies in the provision of basic services had proved to be a constraint on development. Three types of constraints were identified:

(a) In some local authorities new development had been discouraged by the lack of infrastructure provision and this acted against the general policies of the Council to foster development. These included the more northern, urban fringe authorities, such as Bolsover, Tynedale and Langbaugh-on-Tees. In more rural East Lindsey and Boston in Lincolnshire there was a feeling that constraints on sewerage and the costs of overcoming them had influenced both the volume and pace of development. In Bassetlaw (Worksop, Nottinghamshire) the District noted that: "The current project to build six small workshops has highlighted a service problem common to rural areas which seriously restricts employment-creating development. The cost of providing a site with basic services (water, power, sewerage) in rural areas is such that the economic price which must be charged for the land is over twice the market value for industrial urban sites situated alongside existing services. It is just not economic for the private sector to develop such sites except for housing which makes more profit."
(b) In other districts local plans have been influenced by service provision and specific locations have been identified where there is a capacity in the system and development can proceed. This is the traditional plan-making approach which uses, for example, key settlement policies to exploit under-used capacity and avoiding crossing thresholds. This kind of approach was found in a variety of forms. Waveney (in Suffolk) operates a key settlement policy to concentrate development into settlements with adequate basic services. Adjacent Mid-Suffolk District, however, noted that many sites "allocated" in village and district plans are not developable because of foul and surface water disposal problems. The Chief Planning Officer produced a map indicating the parishes in which planning applications are subject to referral to Anglian Water because of the limited capacity of sewerage works and systems. The latter illustrates the breakdown in the traditional plan-making approach. As Bassettlaw District noted: "Consultation with the utilities in respect of local plans appears to be meaningless as utilities have insufficient staff (or commitment) to carry out the necessary surveys. Allocations tend to be made with relatively little information and if utilities cannot cope, subsequently either the development does not proceed or standards fall."

(c) Some authorities noted that the constraints on mains service provision has led to a system of developer's contribution to overcome deficiencies. Mid-Suffolk District Council has noted that for housing development Anglian Water Authority has, in the past few years, been demanding a plot premium for contribution to their works of between £2000 and £3000 per plot. This contributes to their policy of providing for local needs. However, many small villages lose out on small-scale provision. High infrastructure costs sometimes require economies of scale (i.e. larger developments) in villages, a situation which is often at odds with local planning policy. On the industrial front nearly 40 hectares in Mid-West Suffolk of allocated land are affected by infrastructure problems, which can only be overcome by the appropriate developer contribution.

Of the 32 District Councils which did not regard infrastructure as being a constraint, the majority were in South-East England and relatively few located in RDAs. The replies indicated at least three reasons why infrastructure may not be considered a problem:

(a) Mains services are fairly widely available. Examples included Wellingborough which is a compact district with no village more than seven miles from the town centre.

(b) The operation of other planning policies are more significant in constraining development in rural areas. Such policies include Green Belt and Areas of Outstanding Natural Beauty. As Congleton Borough Council noted: "The provision of basic services in the rural parts of the Borough is not seen as a constraint at present, primarily because current planning policies lay emphasis on restraining development within existing settlements in order to maintain the quality of the open countryside."
(c) There have in the past been constraints, or there are localised problems, but these have now been rectified by developers' contributions. In contrast to those authorities which see developers' contributions as a constraint, others perceive them as providing an opportunity. Examples include Mid-Bedfordshire and Guildford.

3.1.2 County Councils

Altogether 39 County Councils were contacted which had extensive rural areas. Replies were received from 27 of these (70%). Most of these replies came from the County Planning Officers, reflecting the pivotal role of strategic planning through the County Structure Plan.

Only one County Council had carried out any extensive and systematic investigation of the levels of provision of basic services and consequences. This was Northumberland, which had carried out a survey of electricity and water supply. This is dealt with in depth below.

Constraints on new development resulting from lack of infrastructure came from two distinct areas. First there was a group of the more peripheral counties in England such as Cornwall and Cumbria. In Cornwall, the County Planning Officer was aware of situations where the lack of basic services could adversely affect economic development. He states that:

"For example, in Penwith District there are problems both in terms of water supply and sewerage which would inhibit the development of fish processing - an industry which would be very well suited to this area as adding value locally to fish catches. In Truro, a company also engaged in fish processing had to pay a substantial sum of money to South-West Water so that they could reinforce the mains supply. Similarly, in Restormel and Caradon Districts there is an embargo on "wet" industry. At Roche in Mid-Cornwall, development on an industrial site was held up pending decisions on who should pay for the necessary pumping equipment to get a water supply to the site".

The solutions to these problems is seen in the practice of developers' contributions, and these are specifically mentioned in the Cornwall Structure Plan. It states that:

"The Water Authority consider that their current financial regime is now significantly better because developers' contributions can now be added to their capital programme. Such contributions will probably become an even more important factor in promoting improvements and the anticipated privatisation will lead to an even more commercial attitude being taken."

Cornwall make additional comments on rural housing. It is noted that the higher costs of drainage to cesspits and septic tanks is not allowed for in the Housing Corporation cost yardstick and that this has created difficulties for the Cornwall Rural Housing Association in some of its villages developments.
In Cumbria, electricity is considered to be a particular problem. The Cumbria Rural Development Programme Committee's document, *Developing Rural Cumbria*, notes that the English Estates programme of developing rural strategic sites is being affected by the high cost of providing services such as electricity. The need to reduce prohibitive "up front" servicing costs is an issue that was raised several times in this study.

The second area of significant constraints on development is to be found in some parts of East Anglia. This is an area where there are development pressures in rural areas due to the relative proximity of London and the South-East and processes of rural re-population. It is noted by Cambridgeshire County Council that:

"From time to time Anglian Water imposes conditions on development in villages where standards are seriously deficient. It is the policy of Anglian Water to concentrate on existing deficiencies rather than provide for future development in their financial plans. They expect developers to fund any necessary improvements to water infrastructure. Consequently, there may be difficulties in achieving a modest scale of growth in some rural settlements."

Such growth must be large enough to support infrastructure improvements yet not so large as to destroy the character of the original settlement. A similar situation was found in Suffolk and Norfolk.

In most of the other replies from the County Councils no particular problems were highlighted. For example, the Isle of Wight Joint Planning and Technical Unit noted that "industry, commerce and tourism are more constrained by environmental and financial factors than service deficiencies." As for Structure Plan policies, the reply from Leicestershire County Council was typical: "Planning policies have not been particularly influenced by a lack of investment in electricity and water service provision."

A number of replies noted that development was not always welcomed and that policies of restraint in rural areas were more important. For example, in framing alterations to the Structure Plan Hereford and Worcester County Council noted that "subject to the conditions of environmental acceptability, it is envisaged that arguments on the value of developments to the local community will be more telling than those of the quality of infrastructure provided." In other cases County Councils orientated Structure Plans so that growth was provided both where possible and acceptable. However, Somerset realised that such policies direct development towards "those areas best able to accept it and away from those areas where other policies may be seen as having a priority." More common among these other authorities was a view similar to that of Hampshire County Council, namely, "deficiency of services can strengthen the arguments for restraint on growth."
3.1.3 **The Electricity Boards**

The 11 Electricity Boards operating in England were contacted and replies were received from all of them. Similarly the respective area Electricity Consultative Committees were contacted and replies were received from eight of these. The survey also included umbrella organisations: the Electricity Council and the Electricity Consumers Council. Correspondence was also exchanged with the North of Scotland Hydroelectric Board to obtain information about Scottish practice of supply to remote rural areas.

**Level of Non-Connection**

Some Boards stated that there were no areas without electricity, but that there were a few scattered, isolated premises. It can be assumed that there are no more than 100 properties which are not connected per Board in this category.

The Midlands Electricity Board stated that in some isolated areas where, usually due to the nature of the surrounding countryside, it is very difficult to provide supply, potential customers have refused the terms offered by the Board. Such areas include remote parts of the Wye Valley, Forest of Dean, Vale of Evesham, Trimley and in the Cotswolds in areas of outstanding natural beauty or high amenity. However, the Board did not expect there to be more than 50-100 premises in this category.

The Yorkshire Electricity Board were aware of properties around Todmorden and in the Dales around Keighley. In addition they estimated a small flow of property upgrading schemes where former remotely located agricultural buildings are being converted for residential use, often as holiday homes. YEB’s estimate of unconnected properties is a maximum of 30. This is thought to be an underestimate and at least 100 were identified in the North Yorkshire case study.

The North-Eastern Electricity Board estimate there may be about 300-500 properties without electricity supply. These properties are almost exclusively in the remote rural parts of North and West Northumberland, West Durham and in rural North Yorkshire.

The Board with the greatest level of non-connection is the South West Electricity Board with around 1000 households without a public electricity supply. Most of these are in rural Devon and Cornwall.

Estimates of the levels of non-connection based on the responses of the Electricity Boards are as follows:
<table>
<thead>
<tr>
<th>ELECTRICITY BOARD</th>
<th>Total Properties/ Households not connected</th>
<th>Total Number of Customers (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGLIA</td>
<td>200</td>
<td>2.86</td>
</tr>
<tr>
<td>EAST MIDLANDS</td>
<td>100(e)</td>
<td>2.08</td>
</tr>
<tr>
<td>LONDON</td>
<td>0</td>
<td>1.89</td>
</tr>
<tr>
<td>MERSEYSIDE &amp; NORTH WALES</td>
<td>100(e)</td>
<td>1.28</td>
</tr>
<tr>
<td>MIDLAND</td>
<td>50-100</td>
<td>2.00</td>
</tr>
<tr>
<td>NORTH-EASTERN</td>
<td>300-500</td>
<td>1.38</td>
</tr>
<tr>
<td>NORTH-WESTERN</td>
<td>100(e)</td>
<td>2.06</td>
</tr>
<tr>
<td>SOUTH-EASTERN</td>
<td>100(e)</td>
<td>1.82</td>
</tr>
<tr>
<td>SOUTHERN</td>
<td>100(e)</td>
<td>2.39</td>
</tr>
<tr>
<td>SOUTH-WESTERN</td>
<td>1000</td>
<td>1.20</td>
</tr>
<tr>
<td>YORKSHIRE</td>
<td>30 - 130</td>
<td>1.93</td>
</tr>
<tr>
<td>TOTAL</td>
<td>max 2430</td>
<td>18.96</td>
</tr>
</tbody>
</table>

For England as a whole the maximum number of unconnected properties is in the order of 2,430. There are around 19 million connections to mains electricity, suggesting that the rate of non-connection is around 0.01%. Only in two areas, the North-Eastern and the South-Western Electricity Boards, does the level of non-connection exceed 0.03%.

The Cost of Connection

The formula for determining a contribution towards connection is the same for all the Electricity Boards. The cost of new supplies is common to all customers within each defined group irrespective of location. This means that in urban areas new domestic customers pay a relatively small connection charge, normally £160 subject to the Board’s expenditure not exceeding £480. Where costs exceed the latter figure, the full difference is passed onto the customer. The reason for this arrangement is that Electricity Board tariffs are designed to support new business expenditure of up to £320. As the Principal Engineer of North-Eastern Electricity Board noted in his reply to the survey:

"In rural situations, costs can be very much higher and [say] £10,000 is not untypical in the more remote areas. This would lead to a connection charge of £9,680 which I acknowledge is often unacceptably high for most domestic users."

It is noted by a number of Boards that costs are kept low by using overhead electricity supply lines where possible. However, in areas with a high landscape value or in conservation areas or on high land the visual impact of overhead lines is such that planning authorities press for routes where the lines are screened. Indeed sometimes (in sensitive villages) undergrounding is required and the cost of cabling and termination (the transfer from overhead lines and vice versa) can greatly add to the costs.
Costs can also be measured by the time taken to provide new connections. Typical delays in providing rural supplies are 9-12 months. Most of this delay is due to the time needed to obtain permission to erect overhead lines. Wayleaves are required from the owners of land and approval from Planning Authorities is also required.

**Quality of Supply**

Supplies in rural areas fall within the same statutory limitations as urban areas. Supply voltage must be maintained within ±6%. The East Midlands Consultative Council noted that some modern equipment, such as computers, is susceptible to voltage "spikes" on the system which cannot be prevented. These are more likely to occur on overhead line networks and therefore commercial and industrial consumers using this type of equipment are faced with the choice of installing suitable protective devices, which can be expensive, or running the risk of incurring damage and loss of production. There was a feeling that such considerations may well become a deterrent to locating companies in areas where there is an overhead supply, but there is no evidence of this at present.

The interruptions to supply for each of the Area Boards in 1987/8 are as follows:

<table>
<thead>
<tr>
<th>ELECTRICITY BOARD</th>
<th>MINUTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGLIA</td>
<td>95(^1)</td>
</tr>
<tr>
<td>EAST MIDLANDS</td>
<td>85</td>
</tr>
<tr>
<td>LONDON</td>
<td>47</td>
</tr>
<tr>
<td>MERSEYSIDE AND NORTH WALES</td>
<td>100</td>
</tr>
<tr>
<td>MIDLAND</td>
<td>70</td>
</tr>
<tr>
<td>NORTH EASTERN</td>
<td>69</td>
</tr>
<tr>
<td>NORTH WESTERN</td>
<td>68</td>
</tr>
<tr>
<td>SOUTH EASTERN</td>
<td>102(^2)</td>
</tr>
<tr>
<td>SOUTHERN</td>
<td>105(^3)</td>
</tr>
</tbody>
</table>

**Notes**

1 Excludes 748 minutes lost to customers because of October 1987 storms.

2 Time lost as a result of the October 1987 hurricane estimated at 1164 minutes per connected customer has been excluded from the figures.

3 1986/7 figure. Figure for 1987/8 is 546 and includes the effect of the hurricane in October 1987.
It is noticeable that the more urban Electricity Boards (London, Yorkshire and North-West) have far fewer interruptions than those which have larger expanses of rural areas (Anglia and South Western). Urban areas tend to have higher proportions of underground cabling and are less susceptible to interruption. A number of consultative councils noted that a problem faced by consumers in rural areas is that supply overhead lines are vulnerable to damage from high winds, ice and birds. Thus rural supplies tend to be less reliable. The South-Eastern Consultative Council noted that the South-East is relatively heavily wooded and consequently experiences more problems with windborne material than do many other boards. The area was particularly badly hit by the October storms of 1987 and reconnection of supplies to many rural areas took weeks and occasionally months to complete. Vandalism to overhead lines was mentioned as a problem by the East Midlands Consultative Council.

North of Scotland Hydroelectric Board

The North of Scotland Hydroelectric Board was contacted because of their commitment to the promotion of remote rural areas. The Board was set up by the Hydroelectric Development (Scotland) Act 1943 before the electricity industry was nationalised and followed closely the recommendation of the Cooper Committee. This committee envisaged that hydroelectric power would attract electro-chemical and electric-metallurgical industries and that the Board would cooperate in schemes for the regeneration of the Highlands. This was the origin of the "social clause" which, in the words of Section 2(3) of the 1943 Act, requires the Board "so far as their powers and duties permit [to] collaborate in the carrying out of any measures for the economic development and social improvement of the North of Scotland District or any part thereof".

Prior to December 1975, rural electrification was carried out by the Board on the basis of the cost-effectiveness of the schemes. Priority was given to those schemes that would connect the largest number of potential consumers at the lowest cost. By this means very large numbers of consumers were connected annually, but by the 1970s the number of new connections had fallen to some 4-5000 per year due to the higher costs associated with increasing remoteness.

In 1975 reappraisal of the rural development arrangements was made and the Board decided to introduce a formal Uneconomic Rural Development Programme which would take supplies to communities of five or more properties where fixed limits of costs were not to be exceeded. This formal programme was started in 1977 and the initial phase was set to last five years.

The ceiling limit of cost, which is reviewed annually, was set on the basis of what it would otherwise cost to provide a consumer with the same quality of supply by means of private small scale generation. It is currently set at £10,970.
With the exception of the first year, all of the Board’s formal URD programme has qualified for grant aid from the European Regional Development Fund (ERDF) at 30% of qualifying costs where the schemes have been within the designated areas; the grant being given for specified schemes.

By mid-1984, almost all known communities of five or more properties for which the cost of connection was within the Board’s ceiling limit of cost had been connected. There were, however, a number of communities which were so remote (generally islands), or where the level of acceptance of scheme terms was so low, that the cost of connecting each consumer exceeded the appropriate ceiling limit of cost, and accordingly a mains supply was not provided. In addition, there were a substantial number of properties, either single dwelling or groups of two to four, which had not been offered terms because they did not lie within the definition of a community, i.e. five or more properties. Altogether about 1000 occupied premises remained unconnected.

In 1983 it was decided that for the final phase of the programme, covering the five years from March 1984, the principles should be extended to all existing rural properties whether located singly or in groups. The ceiling limit of cost would remain and an ERDF grant obtained for properties eligible for such grants.

Prior to the final phase of the programme the average cost of supplying properties within a scheme had not been allowed to exceed the appropriate ceiling limit of cost and schemes had been abandoned in those cases where it was not possible to reduce the costs below this limit. In the final phase a similar cost limit has been applied to any new programme, but where the cost limit has been exceeded, provision is made for the consumer to buy himself in by paying the excess costs.

The final phase of the programme is expected to be completed in the summer of 1989 when 99.8% of the potential consumers in the Company’s District will have been connected.

Expenditure under the Uneconomic Rural Development Programme has averaged £1.8 million per annum over the five year period 1980-1984, and is expected to be £5 million between 1985-1989 to complete the programme.

It is recognised by consumers that the development programme is uneconomic and consequently the Board ask for a nominal contribution towards the cost of providing a supply and a guarantee of revenue, expressed in kilowatt hours, from consumers taking up the scheme. The level of contribution asked is based on an assessment of what a crofter could afford to pay without seriously harming that person’s livelihood.
The Monopolies and Mergers Commission Report on the Efficiency and Costs of the Board was published in 1985. This considered that the annual budget for the URD Programme was reasonable, but that the Board over-estimated the resource cost savings associated with providing a mains rather than a domestically generated supply of electricity by disregarding the higher than average maintenance costs associated with remote connections and the costs of future replacement.

3.1.4 The Water Boards and Water Companies

All nine English Water Authorities were contacted and responses were received from all of them. Welsh Water were not contacted directly although there are small areas within Gloucestershire and Herefordshire which are within their area. Additionally, 27 private water companies in England were contacted and replies were received from 15 of them (56%). Finally, the Water Consultative Committees and the Water Authorities Association were also contacted.

Level of Non-Connection

No detailed responses on the scope of non-connection were received, but nearly all the Water Authorities supplied an estimate of the proportion of connected properties in their respective regions. Their detailed responses are listed as follows:

Anglian Water stated that while they have detailed information on their system and about their customers they naturally had less information about those who were not connected. However they estimated that nearly 99% of the residential properties in their region were connected to the water supply system. Those not connected are isolated units in the less densely populated areas of Lincolnshire, Norfolk and Suffolk. Some 9% of residential properties are not connected to mains drainage and these are either isolated properties or small hamlets. Anglian Water note that many of these have a public sewer near by but have chosen not to connect, and that for farms and areas of low housing density, septic tanks provide an adequate mains of disposal.

North-West Water note that 99.1% of the population in the region is served by mains water supply. The number of households using a private water supply is put at 2000. The proportion of population connected to a public sewer is put at 96.9%. The Authority also supplied copies of its four County Reviews covering rural areas in their region. The review for Cumbria notes that small local sources in a number of areas are proving to be inadequate and are to be improved or replaced. Water supply problems have been identified at Arnside, Sedburgh, Dentdale and Haweswater and action is currently under way to correct this. Particular villages with deficiencies are having their supplies boosted by new boreholes. Finally, the water supply resources to cope with the large influx of tourists in the summer and a scheme and remedial investment is being progressed, including the construction of a new reservoir.
The County Review for Cheshire notes that in the rural parts there are acute water supply needs affecting small numbers of people spread over large areas.

Northumbrian Water supplied no additional information on water supply other than that noted in their annual report. Many of the rural areas are covered by the Gateshead and Newcastle Water Company. Northumbrian Water’s annual report notes that 99.1% of its supply area is connected to mains water. Similarly the annual report states that 98.4% of the regional population is connected to the sewerage system.

Severn Trent Water note that 99.6% of the population in its region is connected to water mains and 97.6% to public sewers. Severn Trent also provided extracts from the Authority’s sewerage manual which gives statistics on the populations connected to sewer for each District Council area which lies wholly or partly within Severn Trent. These extracts indicate that in all four divisions of Severn Trent there are around 338,000 people not connected to mains sewerage. The distribution of non-connection within the Authority’s area is very much concentrated in the more rural western districts compared with an average level of non-connection of 4.2% for the whole Authority. Bridgenorth District has a level of non-connection at 28.1%, Montgomery has 38.1%, North Shropshire has 40.1%, Forest of Dean has 23.4% and Malvern Hills has 16.5%. Only a small proportion of Leominster’s population is included, but nearly 60% are without mains sewerage. Similarly, for the 1200 households covered in South Hereford 91.8% are without mains sewerage. These statistics indicate the degree to which particular rural locations are deprived of mains sewerage.

Southern Water state that the general take-up for water supply is 99% and for sewerage 95%. These figures include supply by six water companies operating within its area. Most of the properties not on mains supply are in Hampshire.

On sewerage, the Authority estimate that there are 84,800 properties on cesspool and septic tanks. These are broken down into divisional areas as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kent</td>
<td>33000</td>
</tr>
<tr>
<td>Sussex</td>
<td>24500</td>
</tr>
<tr>
<td>Hampshire</td>
<td>24000</td>
</tr>
<tr>
<td>Isle of Wight</td>
<td>3300</td>
</tr>
</tbody>
</table>

South-West Water declined to answer our questions in the light of preparation for privatisation. The Authority did, however, enclose a copy of their annual report and this showed that 95% of the population is connected to water supply and 85% to mains sewerage. For both services this was the lowest level of connection of any of the Water Authorities.
In Thames Water’s area the proportion of persons without mains water supply is low at 0.04%. The proportion without sewerage is put at 2.2%. The total population not on supply, and breakdown in each Thames Water division, is given as follows for 1987/8:

<table>
<thead>
<tr>
<th>Division</th>
<th>Water Supply</th>
<th>Sewerage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western</td>
<td>2,000</td>
<td>65,000</td>
</tr>
<tr>
<td>Southern</td>
<td>1,000</td>
<td>55,000</td>
</tr>
<tr>
<td>Northern</td>
<td>-</td>
<td>59,000</td>
</tr>
<tr>
<td>Eastern</td>
<td>-</td>
<td>51,000</td>
</tr>
<tr>
<td>North London</td>
<td>-</td>
<td>8,000</td>
</tr>
<tr>
<td>South London</td>
<td>1,000</td>
<td>13,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,000</strong></td>
<td><strong>251,000</strong></td>
</tr>
</tbody>
</table>

The level of non-connection is obviously very much lower in the London area. Outside the London area there is a tendency for the level of non-connection to be greater in the west of the region, which includes North Wiltshire and Gloucestershire.

**Yorkshire Water**

Yorkshire Water’s annual report notes that 99% of the population is connected to mains water and 96.3% to sewerage.

**Wessex Water**

Wessex Water estimate that 97.4% of the resident population is connected to mains water. The remainder is served by private sources which are typically in upland rural areas such as Exmoor and the fringes of Salisbury Plain. Of the estimated 2.4 million people living in the Wessex sewerage area about 93% are connected to the public sewer network. Where infrastructure needs uprating or new facilities are required, Wessex seeks contribution from developers to pay for these works. These are normally negotiated before or at the planning application stage. Contribution sought may relate to mains and sewers, balancing reservoirs, pumping stations, service reservoirs, water and sewage treatment works and source works. Contributions are calculated on the basis of requirements in each area but typically range from £500 to £2,500 per property.

Unlike the Water Authorities, the Water Companies do not provide information on the level of non-supply as part of their annual reports. However, some water companies did supply information on non-supply and these are listed as follows:
<table>
<thead>
<tr>
<th>Properties</th>
<th>As a percentage of connected properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>not connected</td>
<td></td>
</tr>
<tr>
<td>Bournemouth &amp; District</td>
<td>1,000</td>
</tr>
<tr>
<td>East Surrey</td>
<td>20</td>
</tr>
<tr>
<td>Hartlepool</td>
<td>0</td>
</tr>
<tr>
<td>Lee Valley</td>
<td>1,480</td>
</tr>
<tr>
<td>Newcastle &amp; Gateshead</td>
<td>3,600</td>
</tr>
<tr>
<td>North Surrey</td>
<td>Very few</td>
</tr>
<tr>
<td>Rickmansworth</td>
<td>10</td>
</tr>
<tr>
<td>South Staffordshire</td>
<td>4,700</td>
</tr>
<tr>
<td>Sutton District</td>
<td>0</td>
</tr>
<tr>
<td>Tendring Hundred</td>
<td>Very few</td>
</tr>
<tr>
<td>Sunderland &amp; South Shields</td>
<td>Very few</td>
</tr>
<tr>
<td>West Kent</td>
<td>200</td>
</tr>
<tr>
<td>York Waterworks</td>
<td>30</td>
</tr>
</tbody>
</table>

Of these companies only one, South Staffordshire, provided an analysis of the properties involved. This allowed an identification of the number of properties without supply in each parish or ward throughout the area served. On a District basis the number of properties not served are: Tamworth, 1987; East Staffordshire, 610; Birmingham, zero; South Staffordshire, 1574; Dudley, zero; Cannock, 237; West Bromwich, zero; Lichfield, 657; South Derbyshire 223.

Most of the Water Companies are located in South-East and Southern England, and generally the level of non-connection is relatively small.

**Estimates of Non-Supply**

Using the information supplied in the Water Authorities’ annual reports it has been possible to make some national estimates for the level of non-connection; these are shown in table 3.1. The information for each Authority is based on the concept of equivalent population, which is the total resident population who receive the service, plus an allowance for holiday visitors to the Region and for the service provided to industry and commerce. The equivalent populations have not been made available and the calculation of the number of persons affected has been undertaken by using mid-year estimates for the Water Authorities which have been supplied by the OPCS. Estimates of the total number of households affected have been calculated by assuming the average household size derived from the 1981 census.

For England as a whole it is estimated that there are around 146,000 households not connected to mains water and more than 700,000 households not connected to mains sewerage. On this basis 0.8% of all households in England are not served by public water supplies and 4.0% are not served by public sewer. This corresponds broadly with independent information supplied to us by the Water Authorities Association.

It should be noted, however, that most of the households identified above are in rural England. The OPCS has identified only 1,500,000 households as being under this definition - in non-urban (i.e. rural) areas. Consequently, the proportions of households not connected in rural areas are much higher than indicated above.
Cost of Connection

The North-West Water Authority set out the charges for first time connection to mains water. It is understood that these charges approximate to those for all Water Authorities.

<table>
<thead>
<tr>
<th></th>
<th>Property on nearside to mains pipe</th>
<th>Property on longside of mains pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfaced</td>
<td>£170</td>
<td>£400</td>
</tr>
<tr>
<td>Non-surfaced highway</td>
<td>£120</td>
<td>£240</td>
</tr>
</tbody>
</table>

Where properties are more than 15 metres from the mains supply the actual cost of making the connection is charged.

First-time sewerage of rural areas for existing properties is usually undertaken by a District Council using the requisitioning procedure under Section 16 of the 1974 Water Act. It is necessary for these authorities to guarantee the deficit between the cost of the scheme and the income to be received. The formula for doing so is laid down in the Act.

Only Southern Water and Thames Water indicated the extent of this programme. The programme for Southern Water amounts to around 370 dwellings per annum. Given that nearly 85,000 properties were identified as being deficient it can be seen that the programme is relatively limited. Southern Water estimate that the average cost of requisitioning schemes for each property connected is in the order of £4250. The programme for Thames Water covers between 750 to 1,000 properties per year and the cost is put at around £2,000 per property.

Anglian Water note in their Annual Plan for 1988 that the potential demand for first-time rural sewerage schemes remains high but such schemes are "extremely expensive and usually uneconomic". Anglian Water believe that where they are carried out the contributions which have to be paid should cover the full cost, which can be over £5000 per property.

Severn Trent note that grants are available under the Water Acts and that the benefit of these grants is passed on to the person requisitioning supplies. First-time connection grants are made available by Severn Trent to owners of existing properties being connected to new sewers, the objective being to ensure maximum use of a new public sewer. Although the grants are made available to first-time connections in rural or urban locations, in practice, rural localities benefit most.

On the basis of an average connection cost of between £2000 to £4000 the cost of providing first-time sewerage in England to those properties not connected at present is put at well over £2000 million.
Quality of Supply

The Water Authorities and Companies measure the quality of mains water by pressure, bacteriological content, chemical content, potability and coloration. All Water Authorities are making efforts to meet the stricter interpretations of the EEC directive on drinking water. Nitrates are identified as being a problem throughout the Anglian Water area. South-West Water note that 15% of water supplies fail to satisfy bacteriological standards of the directive, 1.5% of the chemical standards and 10% of the standards for appearance. Similar problems are no doubt identified for other Water Authorities and companies. However, these quality deficiencies affect urban and rural areas alike. As Anglian Water note in their reply, there are several areas which, from time to time, suffer from lack of pressure or coloration of the water supplied. These problems, however, are caused by increase in water use and the nature of the distribution network not the isolation of the properties affected. There was an indication by some respondents, that it was the age of the mains system that was the most important factor on quality of supply.

On sewerage the Water Authorities measure the quality of service by flooding both within and outside properties. Again there is no differentiation between urban and rural areas. Wessex Water in their annual report note that all but four of the twenty-six District Councils in the region operate the sewerage system within their areas as agents for the Water Authority. In the remaining four Council areas - Mendip, Purbeck, Salisbury and West Wiltshire - the service is directly operated by Wessex. Experience of direct operation shows substantial cost reductions.

New Development

The case studies highlighted the levels of developer contributions to both on and off-site works required by the Water Authorities in respect of new development. These contributions extend to such works as drainage systems, mains pumping and extensions to sewerage treatment works. They appear to be influenced by the level of previous capital investment in an area and current development pressure.

None of the Water Authorities responded directly to any questions about new development and in particular the question of developers' contributions to infrastructure provision which are highlighted in the case studies. Only one company has mentioned developers' contributions and this was Tendring Hundred Water. The company noted that supplies in remote areas or those areas where existing demand has reduced the full capacity of the water distribution system, the company's general policy is to seek a contribution from any developer towards the cost of provision or enhancement of the water supply infrastructure. These works may include long lengths of pipelines, perhaps the addition of a reservoir storage and booster pump facilities, all of which may take one to two years to construct.
Severn Trent supplied a detailed annex to the Severn Trent Plan as part of the case study material. This indicated that the authority takes full account of industrial and housing allocations given in Strategic Guidance for metropolitan areas, Structures Plans and local plans in preparing their own capital expenditure programme. They also take account of any new major developments and movements in the local economy. It is thought that most Water Authorities adopt similar procedures, but no detailed information from the Water Authorities Corporate Plans was made available to us due to privatisation.
3.1 : POPULATION NOT CONNECTED TO MAINS WATER AND SEWERAGE

<table>
<thead>
<tr>
<th>WATER AUTHORITY</th>
<th>TOTAL POPULATION</th>
<th>POPULATION NOT CONNECTED</th>
<th>% POPULATION NOT CONNECTED</th>
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<tr>
<td><strong>WATER SUPPLY</strong></td>
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<tr>
<td>ANGLIAN WATER</td>
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<tr>
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<td>1.00</td>
</tr>
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<td><strong>ALL AUTHORITIES</strong></td>
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<td><strong>SEWERAGE</strong></td>
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<tr>
<td>SEVEN TRENT WATER</td>
<td>8,320,700</td>
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<tr>
<td>SOUTH-WEST WATER</td>
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<td>SOUTHERN WATER</td>
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<td>THAMES WATER</td>
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<td><strong>ALL AUTHORITIES</strong></td>
<td>47,161,600</td>
<td>1,905,800</td>
<td>(4.04)</td>
</tr>
</tbody>
</table>

Source: Water Authorities and OPCS.
3.2 **Case Study Surveys**

Four rural areas were surveyed in greater detail in order to provide the study team with a validation of the national survey estimates of the extent of non-supply and to elucidate the problems associated with non-supply, especially the extent and nature of any frustration of economic development.

The four areas were chosen to be widely divergent in their geographical features and include both lowland and upland areas in different regions of England.

The case studies involved face-to-face discussions and interviews with officials of utilities, local authorities, consultative committees and others involved in rural development. Wherever possible, maps and other documentation relating to the supply of the basic services were collected in the field and independent estimates were then made by the study team of the extent of non-supply.

3.2.1 **North Norfolk Case Study Area**

The case study area is centred on the Rural Development Area of three North Norfolk District Councils: Kings Lynn and West Norfolk, North Norfolk and Breckland Districts. A small part of the Norfolk RDA is in Broadland and Great Yarmouth Districts but these have been excluded from the case study area. The study area also excludes Kings Lynn and its immediate hinterland. The case study area is shown in Figure 3.1.

The Norfolk RDA has been characterised in the past by rural depopulation and all the attendant problems this brings. In the past ten years Norfolk has been the subject of some considerable growth. This has been partly due to improved rail communications brought about by electrification of the Norwich to London line and partly due to the boom in London and the South-East. Commuting is increasing with consequent affects on the housing market. There has been a tendency for this growth to filter through to the RDA and there are now signs of what has been described as rural repopulation.

Unemployment has been declining, from 9.1% in April 1986 to 6.4% in April 1988. This figure is slightly below the RDA average. However, within the RDA there remain pockets of relative severity, for example around Hunstanton. Seasonal unemployment is acute in the coastal towns of North Norfolk District.

Agriculture is still important in the area, but employment in this sector is in decline. Many farms are diversifying their businesses to boost farm incomes. Industrial Development is pursued by English Estates who have developed 11 schemes since 1978. Most of this development has been concentrated in growth centres designated by the Norfolk Structure Plan, particularly at East Dereham and North Walsham.
Transport is a major problem in the North Norfolk RDA. Due to the small size of settlements and sparsity of the population public transport is seen as a particular problem. Roads are also seen by many in the area as being a constraint on economic development and that links to other regions should be upgraded.

The provision of housing to meet the needs of local people has become an issue of particular concern in Norfolk as house price increases have been among the highest in the country. Whilst Structure Plan policies provide housing allocations in all villages, relating these to the needs and demands of local people is fraught with problems. This housing problem has been exacerbated by the decline in housing stock held by the local housing authorities.

The organisations interviewed in this case study are listed as follows:

Anglian Water Authority
Eastern Electricity Board
Norfolk County Council
Kings Lynn and West Norfolk District Council
Breckland District Council
North Norfolk District Council
English Estates
RDC Business Service
Rural Community Council
Water Consultative Committee
West Norfolk Enterprise Agency Trust
Ove Arup - Cambridge Office

Electricity Supply

There are no specific areas without mains supply, and non connection did not seem to be an issue of particular concern to the local authorities. In the whole of Norfolk there were fewer than 50 inhabited households without mains supply. Most of these, particularly farms, have their own generators. Customers have a right to supply on request. Eastern Electricity make charges which are calculated so that the total return of the capital programme did not exceed 25 years (discounted over 25 years at 9% required by the Treasury). The Board could not show undue preference and the first-comer must be charged the direct cost of supply. There is no provision under current legislation to charge late-comers a proportion of the capital expense and reimburse the first-comer.

Contributions are required from developers in respect of on-site infrastructure. The Board felt that there was a risk of future income not compensating for capital investment so that they frequently demanded the full capital cost and gave reimbursements to users at a later date.
English Estates have an arrangement with Eastern Electricity that its schemes are not deemed speculative. They were concerned that such an arrangement might not continue after privatisation. However, despite such arrangements problems with electricity supply were expressed. At Docking, English Estates had purchased buildings to provide workshop facilities in the village as part of the RDC village revival scheme. Electricity supply was only obtained after difficult negotiations. At Cromer, the Board wanted £30,000 to lay a cable to serviced land. English Estates thought that the heavy electricity users who would occupy the site would justify lowering this charge. A more general complaint was that the Board would not service a site until it was occupied and frequently occupiers faced a delay in taking a site due to waiting for electricity connections.

Overhead lines in rural areas are more susceptible to damage by wind and lightning. The annual interruption for a rural line of some 120 minutes was twice as frequent as for an urban underground system. Some parts of Norfolk are renowned for high lightning strikes and as a protection EEB are fitting plants with an auto-reclosing facility. This shuts down and re-starts the supply as a way of minimising the disruption caused by a lightning strike.

Reliability is a function of distance from the main network, but overhead lines are much quicker to repair than underground cables. Some users like farms and companies relying on computers were vulnerable to service interruption, however most would have a back-up supply.

To convert the whole of the Board’s rural network to three-phase transmission would cost £20 million. The Board did market three-phase use, mostly to farmers, and tied this effort into refurbishment work on lines to hold down the cost of putting in the new supply. Where possible, multiple applications for three-phase were encouraged as this also reduced the cost. If customers were converting from another fuel source then they were not charged for this change. The penetration of three-phase is greater than 90% of agricultural customers, leaving about 400 farms on single phase.

The Eastern Electricity Board is actively trying to develop alternative sources of energy generation, including wind power and landfill gas. Because these would be connected to the grid they do not have a particular rural focus. However, the Board is also investigating a link with British Gas to burn gas at local power stations for electricity generation. Gas from the fields off the Norfolk coast comes ashore at Becton. Although this power would be fed into the grid, the relative cheapness of this source would be passed onto the consumer and in this way energy users in rural areas would obtain some of the benefits of natural gas, which they are unlikely to obtain at present.
Water and Sewerage

With regards to water supply, Anglian Water estimate that in excess of 99% of households were mains supplied. Single households can sink a bore hole, but other users need the Authority's consent to extract water and this would depend on the likely volume of use. Generally water quality was not regarded as a problem, though some individual households in rural areas serviced by long pipes suffer from inferior quality due to deterioration of the pipes.

Additionally, the Water Consultative Committee noted that low water pressure was relevant in many areas and towards the Fens, water quality was an issue with some complaints about chlorination. However, representatives from North Norfolk had received only one complaint in four years.

Non-supply of mains sewerage affects at least 16% of properties in the Anglian Water area. Anglian Water stated that rural coverage was not a priority and would not occur without some explicit subsidy. Anglian Water considered septic tanks as being acceptable so long as they were properly maintained.

The Water Consultative Committee, however, noted that because of the high water table there were problems with both surface water drainage and septic tanks, with the latter needing more frequent emptying than normal. The alternative of sealed tanks (i.e. cesspits) is more expensive.

Anglian Water undertake a cost-benefit analysis on the comparison between installing a local treatment plant or pumping to a more distant works. It is unlikely that the current or future charging structure could lead to these costs being recovered directly and so they have to be met by the capital programme. The typical cost per dwelling varied between £1,000 and £12,000. Anglian Water regarded costs of above £5000 as uneconomic. For groups of dwellings or industrial users, local treatment systems can cost as much as £250,000.

Norfolk County Council did not feel that Section 16 schemes generally offered good value for money because of the high per household cost. Additionally, it was considered that work commissioned under Section 16 may detract from other schemes of a more strategic nature.

With regards to new development three issues emerged in the case study: the relationship with town planning, the existence of embargo, and the developers' contributions.
Town Planning

Anglian Water stated that it could only give advice on planning applications but this was generally accepted. With regard to forward planning it was much easier for Anglian Water to allow small incremental development in those towns which had adequate capacity. The mains water and sewerage networks in East Anglia were planned against a background of rural depopulation. Now there was significant population growth caused by in-migration.

Norfolk County Council’s view was that it was clear that strategic planning was influenced by infrastructure provision. Co-ordination with Anglian Water was difficult. An example is the town of Swaffham in Breckland District, which was originally to be identified as one of 12 growth centres in the Structure Plan, but had to be lowered to a local centre because Anglian Water maintained that it could not cope with the proposed 6000 housing units. The town was constrained in terms of sewage treatment and surface water drainage and there could not be any discharges into the River Wissey without major investment. There was local opposition to the downgrading of the town, but Anglian Water maintained that it could not fund the necessary investment. Total planning applications in Swaffham had now exceeded 1000 houses and new developers seem to be prepared to meet Anglian Water’s estimate of the investment needed. There was clearly a mismatch between Anglian Water’s stated intentions when commenting on the Structure Plan and subsequent decisions on investment. A similar example was mentioned by Breckland District Council in respect of sewerage constraints at Attleborough.

Embargoes

Anglian Water claimed that there were no embargoes on new development. However, Kings Lynn and West Norfolk District Council noted that in practice an embargo was to be found in the Downham Market area for new schemes needing substantial drainage. A similar problem occurred at Swaffham in Breckland District and this had resulted in a virtual embargo on new development. Currently, surface water run-off goes to the Northwell Pool which is over capacity. English Estates have four factories and five small units draining into the Pool, but Anglian Water is objecting to an application to develop a site close to one of the factories for a further four units.

The District Council also had a 10-acre site that is undeveloped because of similar objections on grounds of treatment capacity limitations. English Estates have since taken on this land and have also attempted to obtain approval from Anglian Water. English Estates maintain that there must be a water course near Swaffham and that Anglian Water have both the responsibility and powers to overcome a surface water drainage problem which has existed for at least 15 years.
Developers’ Contributions

The final issue to emerge was the developers’ contributions. Anglian Water identified three types of new development. First, small developments in villages in non-sewered areas where a private plant may be the appropriate solution. Consent to discharge to water courses would be required from the Water Authority at present and the National Rivers Authority after privatisation.

Secondly, large developments in non-sewered areas were generally resisted by passing on the full cost of sewerage to the developer.

Finally, there was the case where development took place in settlements which, although sewered, were at capacity at the local treatment works. Anglian Water noted that treatment works and sewerage systems come in large units and are a lumpy investment. These constraints arise from the limited nature of the network which was laid out mostly in the 1950s. The system was close to full capacity in most areas and required fresh investment before it could be expanded. For this reason Anglian Water recouped the cost of local infrastructure from developers and, because of past under-investment, did it to a greater extent than other utilities.

Developers’ contributions have become a problem for both local authorities and English Estates. At Hunstanton, an area of high unemployment, English Estates have been trying to build advance units for some time. They now have planning permission for eight units on a 3/4 acre site, but Anglian Water are insisting on a positive piped surface water disposal system to the river. The cost would run into several hundreds of thousands of pounds so making the scheme uneconomic.

Also at Hunstanton, a substantial part of the £1 million development cost of a 10 acre business park was for the provision of a sewerage treatment plant as the existing system was at full capacity. All sites to the south of Hunstanton face a problem with drainage to the Heacham River. One developer was asked for £700,000 for work to upgrade a sluice and river-course to cope with run-off on a housing development.

Elsewhere, the Downham Market area is adversely affected by a number of water and drainage problems. The town is close to the relief channel and the existing drainage facilities are at full capacity. Water pressure is very low in the locality. In one recent project a developer was asked to meet the costs of constructing a water tower. The project has been abandoned and the District Council believe that the developers’ contribution demanded by Anglian Water tipped the balance.
At Upwell the conversion of a former school into workshops units requires a new sewage treatment plant because the village has no mains sewerage. The District is currently considering the planning application and feels that the cost of supplying this infrastructure is making the conversion marginal. Also, at a barn conversion on the Sandringham Estate at Mitcham, £40,000 out of a total building cost of £180,000 was for a sewage treatment plant.

English Estates has also had problems with drainage in North Norfolk. At Fakenham, it serviced a site by putting in a road and a surface water drain. Anglian Water agreed that soakaways would be suitable. One of the new site-users was subsequently informed by Anglian Water that it could not use the soakaways and would have to pipe surface run-off to a nearby river at considerable cost.

Additionally, problems were found at East Harling in South Breckland. The County Structure Plan allowed for a development of up to 25 houses. Anglian Water stated that they had capacity problems at the local sewage treatment works, pumping station and pumping mains.

Anglian Water offered to extend the plant to provide for a scheme of 50 units as this level of development would be economic. This modification was agreed with the District Council and an allocation of 50 units would be made in the local plan. Investigations by Anglian Water revealed that the works would cost £290,000 or £5,800 per dwelling. Infrastructure costs for a development of 100 houses were not significantly higher but a scheme of such a size would be totally unacceptable to the Parish Council and Breckland Planning Committee resolved not to allocate further growth to East Harling.

This case illustrates the threshold in practice. Only a small number of houses can be allowed by the local planning authority, but a large development is required to finance the contributions required by the Water Authorities.

Other cases were noted by Breckland District Council.

Two main concerns emerged in connection with developers' contributions:

(i) The level of contributions. It was not possible to verify whether contributions asked for were reasonable. Breckland District stated a standard charge of around £1000 is emerging for improving capacity at local treatment works. Furthermore, since 1986 additional contributions were being sought for the upgraded water supply.

(ii) Forward Planning. Anglian Water have objected to the implementation of proposals which had been previously agreed when the Structure Plan was drawn up.
3.2.2 South Devon Case Study Area

This case study area is centred on the Rural Development Area of three South Devon District Councils: South Hams, Teignbridge and West Devon. The case study area therefore excludes the Exeter and Plymouth hinterlands and the areas around Newton Abbot and Tavistock. However, some of the information collected extends to the last two areas, especially Tavistock. The case study area is shown in Figure 3.2.

All three Districts have experienced a population growth since the 1970s, generally at a faster rate than the county as a whole. Between 1981 and 1986 South Hams grew by 6.1%, Teignbridge by 7.8% and West Devon by 3.2%. South Hams and Teignbridge had the highest rates of growth of all seven Districts in the Devon RDA and together accounted for more than 50% of the growth experienced. However, the growth in the case study area was far from uniform. While some parishes in the case study area showed a population decrease, others showed an increase of more than 15%. Those parishes experiencing losses tended to be the more remote upland areas, while the highest rates of growth tended to be experienced in the lower settlements. The overall rate of growth in communities with a population above 3,000 was 7.4% compared with only 1.4% in villages and hamlets of less than 500 persons. Areas of highest growth included Totnes (South Hams) with 16% and Chudleigh (Teignbridge) with 21.1%.

Agriculture is important in all three Districts. In South Hams and Teignbridge agriculture accounts for around 10% of all employment while in West Devon it accounts for nearly 24%. The average for the Devon RDA is 17%. In addition to the direct employment related to agriculture, indirect employment arises in allied manufacturing and service industries. Farm diversification has been considered, but it is generally seen as marginal compared with mainstream farming activity.

Tourism tends to be concentrated in the south of the case study area in coastal locations such as Dartmouth and Salcombe.

In common with the whole of Devon, unemployment has been declining in each of the three Districts, and falls in the range of 9 to 10%. Seasonal fluctuations are particularly important in coastal locations where tourism is important and pockets of high unemployment are found in Totnes, Salcombe and Dartmouth in South Hams, and Buckfastleigh in Teignbridge.
Figure 3.2
SOUTH DEVON CASE STUDY AREA
The organisations interviewed in the case study were:

South-West Water
South-West Electricity Board
Devon County Council
South Hams District Council
Teignbridge District Council
West Devon District Council
English Estates
Rural Development Commission - Business Advisor
Devon Rural Community Council
South Hams Agency for Rural Enterprise
Ms Emma Nicholson, MP for West Devon

Electricity Supply

The South-Western Electricity Board estimated that within the study area there were fewer than 200 premises which were without electricity supply and not all these were inhabited. Some areas are still being put on the network and the exceptions were usually uneconomic to supply. The South-West Electricity Consultative Council estimate that for the whole of the SWEB area there are fewer than 1000 homes not connected. Some of these may well be second homes.

None of the local authorities interviewed identified any significant problems associated with lack of mains electricity supply.

About 95% of mains lines are three-phase, but the individual spurs to customers are not. It was thought that around 15% of customers in rural areas were served by single-phase. For most of these users single-phase was adequate and if they needed to convert to three-phase all that would be required in most cases would be a new transformer.

Refurbishment of lines automatically leads to a three-phase line being installed. There was little pressure for three-phase, except from farmers, and there were no marketing initiatives such as those being pursued by Boards elsewhere in England.

SWEB noted that the cost of connecting remote customers could be very high. For example, the cost of mains connection to Teignhead Farm in the middle of Dartmoor would cost up to £30,000. The South Hams Agency for Rural Enterprise (SHARE) noted that the cost of installing services to barn conversions could add £20,000 to the total. The Consultative Council knew of one isolated property where the cost of connection was as much as £50,000. SWEB supplied a scale of charges together with the Rural Development contribution.
<table>
<thead>
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<th>Connection Costs</th>
<th>Rural Development Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>£700</td>
<td>Basic Rural Development Contribution of £160</td>
</tr>
<tr>
<td>£700–£1400</td>
<td>Basic Rural Development Contribution of £160, plus Supplementary Charge equal to the whole of the connection costs over £700.</td>
</tr>
<tr>
<td>£1400+</td>
<td>Basic Rural Development Contribution of £160, plus Supplementary Charge equal to the whole of the connection costs over £700, plus Maintenance Surcharge equal to 28% of the connection costs over £1400.</td>
</tr>
</tbody>
</table>

The RDC Business Advisor noted that cost was the central issue as far as first-time electricity supply was concerned. Under the Redundant Building Grants scheme the RDC will give a grant of 25% up to a limit of £50,000 and some of this could be used to cover the cost of three phase provision. Funding is also available for site servicing under the Partnership Scheme with local authorities with up to 50% of cost being provided by the RDC.

Because of the difficulty in negotiating wayleaves, the typical connection delay in rural areas was 9-12 months compared to 3-6 months in urban areas. An Electricity Board can seek compulsory wayleaves if negotiations fail, but an inquiry can lead to even longer delays. (There had been only two or three inquiries in the last 15 years.)

English Estates have had a number of problems with electricity supply to new developments. At South Brent in South Hams District they were trying to develop a three-acre field with no on-site services. The Electricity Board had quoted a figure of £17,000 for a transformer, but had indicated that this sum would be lower if English Estates guaranteed a fixed timescale for the development of the site and guaranteed future consumption. Otherwise, such a development is termed speculative and a large down payment is required, which can be clawed back if usage reaches a given amount.

English Estates were not generally convinced that the size of connection charges for new developments were a true reflection of actual costs. On a development site at Kingsbridge (South Hams District) the Electricity Board initially asked for £22,000 for electricity supply that required high voltage underground cabling. After negotiation this was reduced to £17,000. English Estates noted that the economics of developing industrial land were certainly marginal enough for sums of this size to make the difference between viability and non-viability.
Water and Sewerage

South West Water has the lowest density of resident population of all the water authorities in England and Wales. SWW has 132 persons per sq km compared with the average of 328 per sq km in England and Wales. Consequently, the Authority has the longest length of water mains and the second longest length of sewers per head. It notes that the essentially rural nature of the region together with its settlement pattern and topography severely limits opportunities to benefit from economies of scale and results in high unit costs. This is particularly evident in the case of sewage treatment.

The area has also experienced the second highest population growth and the future projection for both population and service demand is considerably higher than the national average. The region experiences a very high influx of holiday-makers with an additional 500,000 visitors in the peak holiday weeks.

SWW has increased its annual level of capital investment by nearly 40% since 1980/81 in order to rectify identified service deficiencies and to meet the region’s growth. The Authority’s policy is to give priority to improving the inadequate levels of service to existing customers rather than supporting growth. However, in practice some 40% of the Authority’s capital investment is required to support growth.

On water supply the Corporate Plan for 1987/88 notes that 196,000 of the Authority’s customers received water which failed to meet the EEC Directive on drinking water. Similarly 129,000 received water failing the standards for aesthetic acceptability and 20,000 received water containing excessive unstable chemicals. Work to ensure compliance to the EEC Directive must be completed by 1990.

Fifty out of the 75 main sea outfalls were considered to be unsatisfactory as were 129 out of the 134 main estuary outfalls. Pollution of the marine environment is recognised as the largest single problem facing South-West Water. The Authority’s sewage treatment works are failing to meet their current consent conditions. In 1986 the discharges from 193 works (there are 644 altogether serving populations of 250 or over) were compliance tested. Of these, 55 discharges (28%) failed to meet consent conditions and many of these were from smaller works.

South-West Water stated that there are mains water supplies to all villages, though a number of people prefer to remain on private supplies, predominantly from wells and boreholes. South-West Water had an excellent population and household data base using parishes and wards and gave a summary of the level of connection. For the case study area 92.9% of dwellings were estimated to be on mains supply in 1986. Properties without mains water approximated to around 3,900 dwellings (10,200 people). By 2001 it is projected that between 93.2% and 93.9% of the population will be connected.
Many areas, particularly near the edge of Dartmoor are without mains sewerage. In the case study area around 12,200 dwellings are without mains connection, or 77.9% of the total.

West Devon District Council has undertaken agency work for SWW on sewerage. It was noted that within their area there was a large number of households on septic tanks, but generally these worked quite well. About a quarter of settlements were seweraged by the old Rural District Councils, but much of this had been done with 6-inch pipes and did not provide much room for population growth in these settlements. In the past 10 years there had been only five requisitioning schemes.

South-West Water provide a booklet for customers of the charges scheme, 1988/9. This sets down the Authority's policy in fixing charges which is to ensure that they make a proper contribution to the cost of carrying out their functions. The booklet notes that in accordance with their duty under the Water Act 1973 they have taken steps to ensure that the charges do not discriminate unduly against, or show undue preference to any class of persons.

New Development

In the south of the case study area, new development for a large water user is theoretically possible as the area is crossed by trunk mains. Outside this area, fresh development might cause some difficulty with water supply. However, there was little pressure on capacity from industrial development in the case study area because the pace and overall level of this type of development was low. Generally repopulation in rural areas had caused some problems in water supply, as with other services.

SWW stated that there are many applications for private treatment works because this is the way developers can accelerate a project. This is not particularly satisfactory from SWW’s point of view as they generally wish to contain discharges from these facilities into local rivers and water courses.

South-West Water have introduced a policy over the past six to seven years whereby the development industry pays for all infrastructure outside the capital programme. This was thought to be the only realistic way of overcoming serious infrastructure deficiencies in the region. For example, the average size of sewage treatment works in the Devon area is 1,600 people (whereas the size of works in the Thames Water area caters for 35,000 people).

In West Devon, the District Council noted that villages were often small with populations in the range of 100 to 200 people. Development is very small scale and is usually linked to agriculture or local services. The small scale of development meant that high servicing costs could not be met by the Local Authority or private developers. For example, at Lifton six acres had been allocated for industrial development. However, a new water mains was required and this would make the site marginal to a private developer. At North Tawton there was a good site with outline planning permission for industrial development. The development could not go ahead because of land drainage problems.
The Council stated that they could impose a Section 52 Agreement on the planning permission requiring the developer to carry out the works but as the site would yield only three to four units this was below the threshold necessary to provide such a contribution.

In South Hams the District Council knew of five locations where embargoes or restrictions on development occurred because of deficiencies in water supply. However, these were generally small settlements and it was unclear whether development had in fact been held back. On sewerage, about 60 locations in sewered areas were subject to restrictions due to capacity at sewage treatment works and other sewerage problems.

Policy statements in the various District Plans for South Hams note that SWW have a priority rating system allocating points out of a maximum of 100 to schemes. Priority is given to new development at Ivybridge and Kingsbridge (30 points) Totnes and South Brent (25 points) and Dartmouth and the remaining selected local centres (20 points) on the strength of the Structure Plan. Assisted Area status also gives a higher priority rating. However, the maximum allocation of 30 points for new development compares with a maximum allocation of 60 points to resolve existing deficiencies.

In contrast to South Hams, the only area constrained by service provision in Teignbridge was at Ashburton where there was a sewerage embargo. Here the Council did in the end come to an agreement with the Water Authority and a private development went ahead after the developer had made a substantial contribution.

English Estates' view was that infrastructure problems were a significant constraint on developing new sites. There were embargoes imposed by South-West Water in some areas and frequently sewage treatment works could not deal with the proposed development. For example, at Witheridge, South-West Water imposed an embargo on development because the pipework on the site could not cope with the likely sewage flow. English Estates would have to pay £16,000 to upgrade a 500-metre pipe to allow further development. It was noted that other users would benefit from this improvement but would make no contribution.

At an English Estates development in South Brent the total servicing charge on the 3.3-acre site (for both electricity and water) was £100,000 and this compared with a total value of £350,000.

At South Molton (which is in the RDA, but outside the case study area) the County Council asked English Estates to consider developing a 20-acre site near the North Devon link road. There was an embargo at this location because the sewerage system was at full capacity and other services were absent.
The total servicing cost was £700,000 and included the following items:

- Culverting: £30,000
- Road Drainage (to upgrade capacity): £100,000
- Road Works (including sewer): £180,000
- Surface Water: £108,000
- Electricity Supply: £60,000
- Gas: £100,000
- Water Supply: £20,000

Despite the high costs it is an attractive site and English Estates want to proceed. However, it will take three years to progress the necessary sewerage work.

The Devon Structure Plan was approved in 1979 and followed a key settlement approach for rural areas. However, new development in the selected key settlements has been held back until new infrastructure is put in place. At Barton 900 dwellings have been held up and at Roundswell 1000 dwellings and 80 acres of industrial land were similarly constrained. Honiton and Tiverton both have water supply problems and the sewerage systems are at capacity. Crediton also has an embargo on the sewerage system. At Bideford there are drainage problems resulting in the pollution of local rivers. Again, at Meldon, development has been held back for 10 to 15 years. There is also an embargo on development near the coast due to the high level of offshore discharges.

South-West Water noted that some large users had considered private supplies in case the drought problems of 1976 were ever repeated. Tourism caused problems and in the summer months the system was stretched to capacity. The RDC Local Business Advisor noted that some rural businesses had complained about water pressure and discoloration. Occasionally, some food manufacturers had to abandon production.

In contrast to English Estates, the RDC Small Business Advisor did not see water or sewerage provision as a constraint on overall economic development. However, there were problems with existing businesses. For example, a pine-stripping company had been asked by the Water Authority to transport effluent to a distant treatment works and this cost factor will make this kind of operation less viable in rural areas. A confectionary company based in Ivybridge was not allowed to pump effluent straight into the drains. Transporting the effluent added £10,000 a year to the company’s overheads and it was actively looking for an alternative solution. Another food processing company was required by the Water Authority to build its own treatment plant.

Generally, although inadequate sewerage might inhibit some companies from moving to rural Devon it was felt that the lack of suitable industrial land and transport links were actually much more important constraints.
3.2.3 *South Shropshire Case Study Area*

This case study area is centred on South Shropshire District and that part of Bridgnorth District within the Rural Development Area. Additional information relates to areas outside the case study area in North Shropshire and the northern parts of Hereford and Worcester. The extent of the case study area is shown in Figure 3.3.

Development measures are being experienced in Shropshire, but the presence of Telford New Town to the north-west of the study area has catered for much of this.

The rural area is experiencing population growth through in-migration and this is expected to continue. Housing demand however, is projected to grow twice as fast as population. There are generally no problems with housing land availability, although if the planning authorities released further agricultural land for housebuilding, this would be taken up by substantially increased levels of in-migration.

Agricultural employment accounts for 10% of rural jobs. Farm incomes and agricultural land values have declined in real terms over recent years. Farm diversification can bring some economic benefit but at present it is quite limited. Another 20% of rural jobs are in manufacturing, the largest sector being metal and engineering industries. Over half the employment in rural Shropshire is in the service sector. It is recognised that if agriculture and industry continue to decline as they have in the past, then attention to tourism and leisure developments will be needed alongside help for agricultural diversification and continuing provision of industrial workspace.

The unemployment rate for rural Shropshire was 8.4% in July 1987 which was slightly less than for the counties as a whole. Within the rural area the highest unemployment rates are found generally in the market towns and in settlements where local mining and quarrying have been abandoned.

English Estates is pursuing a programme of workshop developments to relieve unemployment in rural areas. There is currently a high demand for workshop space, but the main problem is that private developers do not find the return high enough so concentrate on house building instead. There is a great difficulty in finding suitable sites, although the situation is better in South Shropshire than Bridgnorth. Land availability, and also road access, are seen as the principle constraints on development in Shropshire.
The organisations interviewed in this case study are listed as follows:

Severn Trent Water
Midland Electricity Board
Shropshire County Council
Bridgnorth District Council
South Shropshire District Council
English Estates
Rural Development Commission - Small Business Advisor
Rural Community Council
Midlands Electricity Consultative Committee

Electricity Supply

There are no significant settlements without mains electricity and less than 0.5% of properties in the case study area were without mains supply. In the case study area there are around 25,000 customers and so no more than a handful of occupied properties were not connected.

The cost of connection was related to necessary work and likely future use. In rural areas the revenue generated is generally not sufficient to offset connection costs and a contribution is usually required. MEB is currently revising its contribution policy, but there is little leeway for negotiation over costs unless the customer could undertake some of the work such as digging trenches. It was known that some potential users in the area had not proceeded with connection because of the cost. However, it was noted that, especially on the Welsh Borders, by servicing cottages this could double their existing market value.

The MEB seek in their investment programmes to anticipate local authority plans, especially for Telford New Town. Meetings take place annually before the budget planning meeting. Shropshire County Council noted good liaison over the preparation of the Structure Plan. No development has had to be relocated or held up because of MEB constraints.

The MEB stated that it had to maintain voltage within ±6% and that this was achieved 98.5% of the time. There was a voltage drop in overhead lines which were less reliable than underground lines. About 95% of rural lines are overhead and only villages have cables. MEB stated that they receive around 20 complaints a year on voltage reductions.

However, the Midlands Electricity Consultative Committee stated that they did receive a lot of complaints from the case study area about voltage reduction. The design of the network meant that capacity did run out at the fringes of the area. South Shropshire District Council complained about interruptions to supply in rural areas and this affected computer users.
The Rural Community Council also stated that there were complaints of voltage reductions, particularly at peak times, and this affected businesses like farms which ran milking equipment.

**Water and Sewage**

Severn Trent stated that there were no villages without mains water but around 3000 properties in the case study area are not connected. There are about 39,000 households in the study area connected to the mains and therefore the proportion not on mains supply is high, perhaps 15%. Some estates have their own source and distribution systems, but over time these are slowly coming into the mains. Severn Trent have an obligation over time including taking over estate systems when bore holes fail. The local authorities use their powers under Section 36 of the Water Act to requisition mains supply so the trend is to increase supply. Enquiries are currently being made to connect Rattingham, Horderley, Richards Castle, Calloughton and Colton Hall.

Shropshire County Council believe that there are about 10,000 people in the whole of Shropshire without mains water supply (2.6%).

On sewerage, Severn Trent Water Authority claim that all villages with more than 20 houses are severed. There are more than 1000 sewage treatment works in the Severn Trent area. Many of the smaller units were built prior to 1974 by the old Rural District Council and were often inadequate for the job they were expected to do. Shropshire County Council noted that septic tanks worked well in this area. However, Bridgnorth District Council expressed the view that Severn Trent Water had little interest in extending rural sewerage.

Similarly South Shropshire District Council noted that Severn Trent Water had no programme for new mains sewerage in South Shropshire. The District Council estimated that there were 40-50 villages not on mains drainage and where septic tanks were causing problems.

**New Development**

On water supply, Severn Trent was not aware of any development held back by capacity problems. However, some areas are close to capacity and significant levels of new development might run up against constraints.

Severn Trent stated that there were no embargoes resulting from the lack of mains sewers or full capacity at sewage treatment works. It was, however, Severn Trent's policy to ask for developers' contributions. Severn Trent did not think that there were any differences between the Water Authorities as to charging developers' contributions; there were, however, differences in development pressure.

English Estates stated that they endeavour to avoid sites with service problems. Most Shropshire sites were located close to 'A' class roads and services could be provided without much difficulty at these locations. Severn Trent had never objected to any English Estates development.
South Shropshire District Council stated that several housing schemes in its area had not gone ahead because of the lack of mains drainage. Knowbury was one example. In this village the Council wanted to install mains drainage. However, until it was in place the Council was refusing schemes as they were premature.

Bridgnorth District Council wanted an industrial estate at Brosely in order to relocate small firms away from residential areas. On the 12-acre site which had been identified, off-site drainage problems were adding substantially to the cost of development. Development in some villages would be resisted because the local sewage treatment works were at capacity.

There were several examples in the Shropshire case study of how lack of infrastructure impinged upon economic development. South Shropshire District Council noted that in Clidbury Morton the largest employer almost left the area because its expansion was constrained by work needed on the local sewage treatment works. The local authorities met some of the cost and the remainder will be divided between the company and future users. It was thought unlikely that any dairy products companies could be sited in the area because no sewage treatment works could cope with the effluent.

The local Business Advisor to the Rural Development Commission also noted that food processing firms had problems because of their need for water supply and effluent disposal.

3.2.4 North Yorkshire Case Study Area

This case study area covers the Rural Development Area in Hambleton, Ryedale and Scarborough Districts. The areas excluded therefore cover Scarborough urban area and the hinterland north of York. The extent of the case study area is shown in Figure 3.4.

The Rural Development Programme identifies four sub areas covered by the case study. To the north of the case study area, the Cleveland fringe has experienced a large population growth, although this has slowed a result of the decline in job opportunities in the Teeside area. The area depends mainly on agricultural and service sector employment with little manufacturing.

The coastal area lies mostly within the North York Moors National Park. There is a heavy reliance on seasonal tourism and high rates of winter unemployment are experienced. Much of the area around Whitby is dependent on Teesside for employment, an area which has itself suffered an economic down-turn. Within the more isolated upland areas near the coast there remains a heavy dependence on agricultural employment. There is a consensus among the various authorities involved that there is a need to promote farm diversification in this particular area.
Figure 3.4
NORTH YORKSHIRE CASE STUDY AREA
The Central Moors is an area of population decline, primarily of young people. The whole area is very sparsely populated with a density of only 0.21 persons per hectare. There is a heavy dependence on agriculture. Access to employment service centres is a problem in this area, particularly in the northern part. Tourism is becoming an important contributor to the maintenance of the local economy, especially around Pickering.

To the south of the case study area lies the Vale of Pickering, Malton and the Wolds. The area is experiencing a small increase in population. The area has a low density population of 0.36 persons per hectare. An agricultural dependence exists within the Wolds area, and employment in this sector is declining. Employment also tends to be seasonal in nature. Access to services is difficult as there are few village shops and public transport into the main service centres is poor.

The organisations interviewed in this case study are as follows:

Yorkshire Water Authority
North-Eastern Electricity Board
North Yorkshire County Council
Scarborough Borough Council
Ryedale District Council
Hambleton District Council
English Estates
Rural Development Commission - Business Advisor
North Yorkshire National Park
North-Eastern Electricity Consultative Committee

Electricity Supply

The North-Eastern Electricity Board supplied maps covering nearly 100% of the case study area showing all 11kv lines. It is estimated that fewer than 100 properties in the District are not on mains supply and most of these would have their own generators. In the past two years the Board had 76 enquiries for connection, of which 20 had taken mains supply. For these the average cost of connection was around £5,000. The stated reasons for not taking up supply were invariably cost related.

All the District Councils confirmed the virtually universal coverage of mains electricity supply.

New Development

The North-Eastern Electricity Board noted that they could deliver required voltage anywhere. Any large factory or town development off the main network would need reinforcement. The NEEB had indeed met challenges such as at Leaming where the RAF were building 360 houses near a small village.

Scarborough Borough Council noted that the Board did not want to introduce supply in advance of development and treated industrial sites as being speculative. This resulted in delays, often up to nine months, before development could proceed.
English Estates stated that they were often asked to make contributions to sub stations such as that at Reeth where £13,000 was asked for. The costs were generally similar regardless of the size of the site in question, but the Corporation accepted this as standard practice.

The Districts covering the case study area together had fewer than 200 complaints p.a. on voltage variation and some of these were eventually attributed to unauthorised loads.

The North Eastern Electricity Consultative Committee noted voltage fluctuations exceeded the standard variation in rural areas and NEEB were not always quick to reinforce supply. Generally, however, the Consultative Committee thought that the Board's record was very good, while NEEB itself noted that complaints were below the national Electricity Board average.

The RDC Business Advisor commented on insufficient capacity in some parts of the region, noticeably near Eskdale.

The Consultative Committee stated that three-phase was a contentious issue for the area. In rural areas only the main line feeders are three-phase and consumers wanting it would find the connection and the cost of conversion very expensive. The contribution NEEB required was geared to usage and so frequently a 100% contribution was required.

**Water and Sewerage**

Yorkshire Water stated that the summer population of the case study area is approximately 200,000 of which 97.7% is connected to a mains water supply. This implies that around 4,600 people are without mains supply. Ryedale District Council noted that no village was without mains water, but that a number of individual properties were not connected. In Hambleton District the Vale of Mowbury Local Plan notes that in certain parishes there are private or individual water supplies.

Yorkshire Water stated that generally hamlets and smaller settlements were not sewered. In Ryedale around 90% of resident households were on mains sewerage and in Hambleton around 75%. Scarborough Borough Council estimated that about 90% of establishments were not sewered. The resident population not connected to mains sewerage has been estimated as follows:

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Unconnected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hambleton</td>
<td>75,800</td>
<td>18,900</td>
</tr>
<tr>
<td>Ryedale</td>
<td>90,300</td>
<td>9,030</td>
</tr>
<tr>
<td>Scarborough</td>
<td>104,400</td>
<td>10,440</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>270,500</td>
<td>38,420</td>
</tr>
<tr>
<td><strong>RDA</strong></td>
<td>153,045</td>
<td>-</td>
</tr>
</tbody>
</table>

50
In Ryedale District the Chief Technical Officer had prepared a report listing 13 parishes with priority for first-time provision and for improvements to sewerage. Ten of the parishes, covering 70% of the affected dwellings, were in the RDA. No estimates of the costs of the schemes were indicated as it is difficult in advance to calculate how many people they would connect. There was also no indication as to when these schemes would be put in hand.

New Development

Yorkshire Water noted that most sewerage works in the case study area were at or near capacity. The capital programme was arranged according to a ranking system allocated to projects:

I Statutory or Requisitioned Work
II Cost-Saving Investment
III Safe and Adequate Water Supply
IV Sewerage Flooding
V River Flooding

Yorkshire Water applied cost-benefit analysis to all new projects. It was noted that rural projects may come out relatively poorly on this basis because costs were generally greater and because fewer people benefited. It should not be assumed that problems in rural areas are proportional to the size of development and small schemes, such as dairies and food processing industries, can cause difficulties with their discharges.

Development limits have been introduced in the Hambleton District Stokely Local Plan, in those settlements where sewers and sewage disposal facilities are inadequate. In the Vale of York Local Plan, land has been allocated although sewerage is at capacity. The Local Plan notes that Yorkshire Water has raised no objections to the allocations made but "it may be a requirement that developers make a financial contribution to increase the limited capacity in some cases."

Hambleton District Council had also prepared a report to consider the impact of drainage on development control. The Council noted deficiency in the drainage system should not in itself mean an automatic refusal of planning permission. Where the necessary infrastructure is not available it considered that the problem should be solved by an agreement with the developer under Section 52 of the 1971 Town and County Planning Act. However, these "negative conditions" can only be applied where there is a reasonable prospect of action being undertaken.

Scarborough Borough Council noted that given the restrictions in rural areas in the North Yorkshire Structure Plan there was a need to allocate only a small amount of land for development. Given the generally small scale nature of industrial, commercial and tourism provision in rural areas no particular problems have been identified.
Despite being one of the fastest growing Districts in England, Ryedale’s development was mostly concentrated in local growth centres and market towns which are fully serviced.

English Estates stated that the main problem with rural development was its small scale which is less able to bear high servicing costs. In the past English Estates had concentrated on market town sites where the infrastructure was in place. The policy had recently changed and now more rural sites were sought where infrastructure problems were obviously greater. However, no more than half a dozen schemes had been stopped because of service costs. Since their funding was relatively small (£1.25 million per annum for the whole county) English Estates could pick and choose from a variety of sites.

English Estates were attracted to the concept of mixing housing and commercial development in order to increase the overall size of development with the aim that, because of the high returns on housing development, this would help cover on-site costs. They were exploring a joint scheme with a private developer who will build the housing.

English Estates quoted problems with a number of specific sites. At Slinby where they were trying to build a workshop scheme on a 1.5 acre site, Yorkshire Water wanted them to undertake works which raised the total site development costs to £113,000. It was estimated that the total value of the site was no more than £40,000 so that English Estates faced an immediate loss in excess of £60,000.

At Whitby, English Estates had a scheme on a 14-acre site donated by Scarborough Borough Council. The site was worth £28,000 per acre. The land cost £40,000 per acre to service which had included the need to build an off-site sewer.

3.3 Technical Issues Raised by the Case Studies

Sewerage

The existing sewerage systems in the case study areas were generally found to be operating at or close to capacity. The age and condition of the systems, together with the lack of maintenance in the past, mean that a large capital investment will be required in the future to maintain and operate them.

The extent of areas not served by a sewerage system is larger than that for any other service. Whilst it is usually technically possible to provide a sewerage system to any area, the cost is often prohibitive. Topographical constraints may exist which will require pumping stations to be used giving rise to additional operation and maintenance costs.

Septic tank and soakaway systems were the most commonly used alternatives in rural areas; this was found to be the case in Shropshire, Devon and Yorkshire. The local high water tables in Norfolk restricted the use of soakaways and in these locations cesspits were used, which are more expensive to install and empty. The cesspits often have to be set in concrete to prevent floatation.
No examples of composting were found during the case studies. However, packaged treatment works were used for larger rural developments. In Devon, the South-West Water Authority stated that in some areas the number of individual applications for Consent to Discharge from private package treatment works was causing planning difficulties for overall sewerage schemes.

In Shropshire, Severn Trent Water Authority had operational problems with the number of septic tank systems installed by the Local Authorities in the past. These normally consisted of a number of properties connected to a septic tank soakaway system. The Authority expressed the view that as there were no records for most of these systems, it was unclear who would be responsible for them following privatisation. In Devon, the South-West Water Authority stated that there were problems with the quality of discharges in rivers and coastal areas causing EEC Water Quality Directives to be exceeded. In some areas crude discharges occurred. The way in which the EEC Regulations are imposed after privatisation may have a cost implication for rural users who discharge to the sea or watercourses as additional treatment may be required. However, the Directives seem to allow septic tank soakaways to be used in ‘remote’ areas.

Water Supply

All the case study areas contained small local aquifers and parts of the Norfolk case study area had access to a major aquifer. Most alternative supplies were either wells or boreholes, although springs were used in North Yorkshire. No examples were found of river intakes being used for domestic purposes although they are used by industrial water users. Similarly, no examples of tanker supplies were found.

Most Water Authorities interviewed reported problems complying with the EEC Potable Water Quality Directives and most had applied for derogations for one or more parameters. Of prime concern were nitrate levels in Norfolk and, to a lesser extent, in Shropshire. If the EEC limits are imposed on private supplies in the future more stringently than they are at present, then there will be cost implications for some rural areas. Anglian Water Authority estimated in 1985 that the cost of upgrading their water treatment facilities to meet the EEC nitrate limit would be approximately £30 million with annual operating costs of £3 million.

Both in the Devon case study area and part of the North Yorkshire case study area the public supply system had difficulties coping with high peak demands in the summer months due to the tourist trade. In Norfolk the systems were generally operating close to capacity. However, elsewhere there was generally sufficient spare capacity in the mains to accommodate development.

Some technical difficulties in serving rural areas with a reticulation system were noted in flat regions, such as the Vale of York and Norfolk, where mains require additional pumping or water towers to boost the water pressure. In Shropshire the topography undulates and a distribution system requires numerous service reservoirs and air release valves. These solutions to topographical problems impose additional capital and running costs on schemes serving such areas.
Electricity

The diesel or petrol generator was by far the most widely used alternative system of supply, although there were isolated cases of dwellings or farms using small-scale windpower or hydroelectric schemes. In the case studies no examples were found of the use of solar power to generate electricity, as was to be expected.

Most dwellings without a supply tended to be isolated individual properties and only one large area without a distribution system was found during the case studies. This was Dartmoor which has only a small population.

The availability of a three-phase electricity supply was found to be generally restricted in rural areas. Many farms with an existing single-phase supply had applied for a three-phase supply in order to operate certain types of farm equipment. The cost of providing a three-phase supply is dependent on the distance from the higher voltage transmission lines. In rural areas this distance can be large and hence the costs are usually prohibitive. This was seen by Northumberland County Council as being a constraint to farm diversification.

Conversion of single-phase lines to three-phase is only undertaken at the Electricity Board's expense on a load-driven basis, i.e. when the usage on a line makes it more economical to distribute on a three-phase system.

The capabilities of the existing supply networks were generally adequate to deal with both existing loads and a small amount of new domestic development. The Electricity Boards reported receiving very few complaints concerning voltage drop in the systems. The reliability of rural networks was generally stated as being lower than that of urban networks, but they still functioned adequately for 99.98% of the time. Reliability is dependent on line length which is greater in rural areas, where additionally, the problem is compounded by the use of overhead lines.
4. SUMMARY OF FINDINGS

4.1 Extent and Location of Non-Supply from the Mains

From the evidence both of the National Surveys and the four Case Studies, accurate information relating to the extent and location of non-supply is simply not available for any of the basic services. Accurate information could only be established by very detailed research looking at the circumstances of occupiers of individual properties in an area. Nevertheless, the research has enabled estimates of non-supply in England to be prepared which are robust. These estimates are summarised in the paragraphs which follow.

Electricity

As regards electricity, at least 2300 properties in the country are unconnected to the mains. Our evidence suggests that these are virtually exclusively rural in location. They represent less than 0.01% of the total number of connections in the country. Unconnected properties are to be found in all regions, but they are highest in the North-East and South-West regions where the proportion of properties unconnected to total connections rises to 0.03%.

Unconnected properties are isolated but not necessarily remote. The explanation for lack of connection to the mains is mainly to be found in their distance from the nearest distributor main.

It has not been possible to estimate the number of connections which are single phase, rather than three-phase. This is unfortunate, since the impact of non-supply for economic development is probably slight, but non-availability of three-phase electricity certainly does restrict the use of machinery and must act as a restraint on economic development in rural areas.

The most frequent alternative supply is provided by petrol or diesel generators.

Water

About 150,000 properties in England are without mains supply of water. Again, as with electricity, these are almost exclusively to be found in rural or fringe urban areas. These properties represent about 0.8% of all properties which are connected to mains water supply.

All regions have properties which are not connected to the water mains, but the largest concentrations of non-mains supply are to be found in the South-West where as many as 5% of all properties lack mains water supply.
The most common forms of alternative water supply are boreholes and abstraction from streams. For domestic consumers the problems associated with alternative supplies depend on the source, but normally boreholes meet directives with relatively modest degrees of local treatment. Other sources have greater difficulty in meeting directives without more substantial treatment and also suffer from other difficulties such as variability in the flows and discoloration.

**Sewerage**

Estimates of the number of properties in England without mains sewerage is around 750,000. Although predominantly rural in their location, areas which are not served by mains sewerage include those which are expanding as a result of urban development. The number of unconnected properties represents about 4.0% of properties which have access to mains sewerage.

As with water, the highest concentration of non-mains supply is to be found in the South-West where as many as 15% of all properties are not connected to the mains sewerage system.

The most common alternative disposal systems for those properties without a mains sewer connection are cesspits, septic tanks and, for slightly larger developments or communities, local package treatment works.

4.2 **Consequences Arising from Non-Supply from the Mains**

The basic services of electricity and water supply may be distinguished from sewerage by their consequences of non-mains connection.

As regards electricity and water the principal problems are to do with isolation, and real resource costs of overcoming distance to the mains distributor in the case of electricity. Only in very local circumstances did the research uncover examples of capacity constraints in the mains water-supply system which inhibited rural development.

On the other hand, non-connection to mains sewers arises from absence of capacity in the treatment works as well as the distance to the mains from the property concerned. Indeed, it would be fair to say that the principal reason for the comparatively high levels of non-connection to sewers is as a result of these treatment capacity constraints.

The consequences which arise from non-supply from the mains depend upon the costs of providing that supply, and the requirements of the property occupiers. There are alternatives to mains supply for all three services and in many instances the alternatives are perfectly satisfactory to the occupiers, given that there are heavy costs to them of connection to the mains.
The consequences may be divided into two basic types:

(i) Rural deprivation, where non-mains supply is just one of a number of factors which contribute to the comparatively low standards of living of rural dwellers in isolated areas;

(ii) Lack of economic development arising from non-supply in the remoter rural areas.

As far as rural deprivation is concerned, the issues are far from being clear cut. Many instances were found of domestic consumers having to rely on alternative supplies of water and of sewerage services, but these were satisfactory for their needs and were available at a cost far less than the costs of connection to the mains. Indeed, other sources are sometimes free. Absence of mains supply for water and sewerage does not in itself imply a deprivation.

Nevertheless, there were many other cases where occupiers of properties were clearly disadvantaged by not having mains supply, particularly of water. Wherever alternative supplies of water fail to meet required standards there is clearly a public issue to be resolved. This may perhaps be regarded as first and foremost a public health matter, rather than one of deprivation, but the fact that the domestic consumers suffer from deprivation in other respects complicates the consideration of what is to be done.

**Economic Development**

The research uncovered only exceptional and isolated examples of economic development being frustrated by the non-availability of water. Such cases typically required relatively large volumes of water supply and abstraction licenses from the Water Authorities were not forthcoming in such cases if depletion of the aquifer or the other sources would result.

Cases of frustration of economic development by complete absence of mains electricity are rare. However, the question of three-phase supply is more uncertain in this regard since the extent of non-supply of three-phase is impossible to determine. Impact is likely to fall on relatively small users since large users of electricity could install their own generating capacity, if necessary. Rural diversification probably is frustrated as a result of the non-availability of three-phase in certain areas, but this has been impossible to quantify.

By far the most significant of the three basic services for frustration of economic development is the non-availability of mains drainage and sewerage. This is true both of the scale of development which is prevented from occurring and its wide geographical spread. Non-availability of mains sewerage can occur in all locations and not simply in the isolated and remote areas. Economic development is frustrated as alternative solutions to mains supply are unacceptable to the Water Authorities because of the consequences for discharges to the water-courses or the heavy costs associated with collecting and treating the waste.
Economic development is frustrated in many different ways, most noticeably for housing developments but also major and minor industrial developments. Water Authorities rarely embargo areas because of lack of treatment capacity, but the effect of the high charges that are quoted for mains treatment is the same and marginal schemes become uneconomic.

We are convinced that the frustration of rural development by absence of mains sewerage is both considerable as to its scale and wide-ranging as to its extent, and to overcome the difficulties would require an investment programme estimated at £2.7 billion.

The Impact of Policy Instruments

From time to time the Rural Development Commission is asked for grant aid toward the provision of basic services. The resources that can be devoted to this kind of activity are strictly limited. In the circumstances the Commission needs to consider each case on its merits, rather than having a generalised programme of basic service provision.

The magnitude of the economic development task, given the scale of underinvestment in sewerage and drainage facilities, is such that the Commission will make only the slightest of impacts on the problem. It may be best therefore to focus on cases of isolation that lead to non-mains provision of electricity and water where there are significant problems associated with alternative supplies, either in terms of costs or of meeting standards.

Provisions in various Water Acts to overcome the difficulties of remote rural areas are satisfactory in principal, but the scale of resources which is available for use in these programmes is small in relation to the nature of the problem. The mere existence of a programme of support for the rural areas is not enough, the real need is for resources on a significant scale to overcome the resource costs associated with isolation.

The overall conclusion, therefore, with respect to the attempts by policy makers to overcome these difficulties is that the instruments are in place, but the resources are inadequate.
5. **ISSUES**

The previous section has identified the principal explanation for the non-supply of mains services in rural areas to be the very high resource costs associated with providing those supplies. In the case of electricity and water these high costs are for connections to distributor mains but for sewerage and drainage are additionally for treatment capacity.

**High Resource Costs**

There is little doubt that the principal issue associated with the lack of mains supply of basic services in rural areas is high resource costs. There is a separate and unrelated issue of whether the utilities fairly charge consumers for these costs and we deal with this below. But whether the utilities get their charging procedures right or not, the issue remains that the isolated areas are disadvantaged in relation to urban areas because of the high connection costs, and rural areas more generally are disadvantaged because of lack of capacity in sewerage treatment facilities.

The consequences are two-fold; first, the fact that lack of basic services is only one of a number of disadvantages suffered by the remoter rural areas, adding a dimension to the concept of rural deprivation for the population - the absence of economic development because of the difficulties of attracting or sustaining economic growth.

Because the costs are resource costs, if they are to be overcome then someone in society has to pay for them. The consumers themselves are reluctant to do so, either through inability or because the alternatives are cheaper, else there would be no problem since requisitioning powers are in place. The utilities could cross-subsidise to rural areas by adopting charging policies which are either uniform or which are limited to a pre-determined range of costs of first-time supply, which are less than the true marginal costs, but the implication of this is that one group of consumers bear the costs of another group.

The alternative to cross-subsidisation within the utilities, is for Government at either Central or local level to provide some grant or other subsidy assistance to the rural consumers. This has been accepted in principal for water and sewerage supply for many years, and the Rural Development Commission's own grant programme is able to finance the provision of basic services on a project-by-project basis.

This research has demonstrated that with respect to electricity and water the problems of non-mains supply are predominantly in scattered and isolated communities and premises. There would seem to be no justification for having a programme of subsidy to these areas since the individual circumstances of these communities varies considerably, and alternative supplies, particularly in the case of water, may be more appropriate than bringing in the mains. Any programme of assistance to the investment into rural services is best dealt with by a selective programme of grant-aid on a project-by-project basis, with the applicants making the bid for the grants dependent on the strength of their needs.

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With respect to sewerage however, the situation is quite different. The research finding is that economic development is being held back on a significant scale in rural areas because of the shortage of treatment capacity, but the scale of the deficiency in capital equipment is such that no individual programme could hope to overcome all the disadvantages which are being faced. In short, the programme that would be necessary to bring rural areas to comparable standards of sewerage supply to the urban areas is prohibitive either for the utilities to undertake themselves, or for any independent programme of Government support.

It would be appropriate for Government to consider bending the allocation of Water Authority resources in the direction of sewerage provision in rural areas in order to achieve economic development objectives but such a policy would have to recognise the fact that there will continue to be a deficiency which hinders development lasting well into the next century.

Developers' Contributions

One manifestation of the high costs, particularly for sewerage connections, is the contribution that developers are asked to make for the servicing of their developments in rural areas. This issue has the added dimension that developers' contributions appear to be arbitrary in their application and that there are doubts in the minds of developers and final consumers that the utilities, who are monopoly suppliers in these cases, are fair in their estimates of the costs when they make charges. Some rationalisation of the procedures for making developers contributions seems to be in order.

In an economic sense developers contributions should be seen as a charge on the land rather than final consumers. However, to the extent that ownership of the land is with rural interests there is an effect on rural areas.

Co-ordination

Linked to the above issue of developers' contributions is the co-ordination of the planning of local authorities and investment planning of the utilities, particularly the Water Authorities. Several examples were found during the course of the research where Authorities had agreed to allocations of development in rural areas at the structure plan stage of the planning process, only for them to subsequently object when individual developments consistent with the structure plan came forward for planning application. There are several possible explanations for this divergence, but it is clear that the result is a waste of energies and a frustration of the objectives of both local authorities and the potential occupiers of the properties themselves.

Water Authorities may claim that they do not have the resources to participate fully in the structure plan process and that information required for structure planning is beyond their abilities to deliver. Nevertheless the consequence is that the authorities in making their day-to-day investment decisions are in effect major town planning policy makers, albeit of a negative kind.
In future, under privatisation, this whole issue may take on a new turn. Many water authorities are major land-owners in rural areas and it is conceivable that they could advance their own financial position by servicing their own sites but not those of others. It seems unreasonable for the Water Authorities to have such an important say in the processes of planning the developments of rural areas.

**Thresholds**

The planning of developments in rural areas have to take account of capacity thresholds particularly for sewerage. One way for the Water Authorities to make more effective contributions to strategic planning decisions would be to work out the geographical implications of their capacity limitations so that local authorities have a better idea of where the thresholds are and what the costs are likely to be of breaching them.

It is always cheaper per unit of new development for a larger development to breach a threshold than a smaller one, and several occasions were identified where linking housing schemes with industrial development in some co-ordinated fashion would provide a financial solution for the Water Authorities and may even result in better planning.

This approach conflicts to some extent with the Rural Development Commission’s policy concerns which are to try and encourage development in the more isolated and remoter areas and not to promote key settlements. But the issue of cost thresholds has to be confronted and there is indeed a conflict between dispersal policy and the high costs, which are often prohibitive, of development in dispersed locations.

**Quality of Supply**

In rural areas the quality of mains electricity and water supply is variable and generally inferior to the services provided in urban areas. For example, electricity supply often has voltage variations in rural areas which are not experienced in urban areas, and there is a greater potential for disruption to supply particularly in severe weather. These difficulties are acknowledged by the Electricity Boards, but on grounds of equity perhaps more could be done to overcome these difficulties by increasing the reliability of supply.

Similarly with water, the rural areas are more likely to suffer reduced pressure and interruptions to supply from the mains than are the urban areas. Again, on grounds of equity alone there seems to be a good case for the Water Authorities to devote greater resources to improving the quality of supply to existing consumers in the remoter areas.
Health

Non-supply of mains water also raises an issue in relation to public health. With private water supply there is a greater possibility of inferior quality. A large proportion of Calderdale’s private water supplies failed to meet the EEC Directive on drinking water. Securing compliance with the Directive will require considerable financial resources. At present there is inadequate incentive for households not connected to mains supply to become connected. Apart from the cost of connection, private water supplies are often free. Similarly there is little incentive for individual householders to install private treatment plants. It has been suggested that compliance of private supplies should be treated as a public health issue, but one which has a particular rural focus. Realistically the only way compliance with the Directive will be achieved for private water supplies will be by enforcement and/or financial incentive. Such action will require a commitment from Government both in terms of finance and legislation.

Implications

All of the issues outlined above, in one way or another involve the use of resources, either additional resources or the diversion of existing resources to the rural areas if they are to be dealt with. This is an inescapable reflection of the high-cost locations of the isolated and remoter areas. Resources can be diverted from within the utilities themselves, and we have outlined some scope for achieving this for the Water Authorities in particular. But the rural areas will not have their circumstances improved on any significant scale if reliance is placed wholly on the Water Authorities.

A fundamental change will only come from some external diversion of resources to the rural areas. In the case of electricity and water the existing Rural Development Commission grant programmes, supplemented by the local authority programmes for water supply, are appropriate instruments since they can consider cases on their own merits. As alternative supplies to the mains may be adequate and cost-effective, the case-by-case approach is suitable for this purpose.

With respect to the frustration of economic development in rural areas due to inadequate sewerage treatment capacity, the scale of the problem is too great to be overcome by Rural Development Commission grant programme. An external push is required. Government would need to determine whether the benefits of economic development was sufficient to outweigh the costs associated with providing the infrastructure which would facilitate that development. This might form the basis for further study and investigation.
6. PRIVATISATION

At the time of writing the two utility Privatisation Bills are at committee stage in Parliament. Privatisation will change the institutional context for the provision of mains services.

Other things being equal, the privatised utilities will be less interested in provision of basic services to the rural areas than the current nationalised industries. This is because the problem of mains provision is essentially high cost without a prospect of commensurate increases in revenues to offset those high costs.

However, the precise manner in which the privatised utilities will choose to deal with the problems of the remoter and isolated rural areas depends very critically on the regulatory framework for those utilities. If the legislation imposes duties on the private utilities, it could actually improve on the situation which exists under the nationalised industries.

Each privatised utility will have a regulatory agency somewhat along the lines of the regulatory agencies for gas and telecoms. The precise form for these regulatory agencies has yet to be determined and if past experience is a guide the nature of regulation will be influenced very much by the approach adopted by the Director General concerned.

Accordingly it by no means follows that privatisation will make the situation of the remote rural areas worse. The matter depends very much on what Parliament chooses to include in the two Acts, the licensing procedures for the privatised utilities, and the powers given to and approach adopted by the Director General.

Time-Table

Like previous privatisation bills, the Water and Electricity Bills are enabling instruments which set the general framework leaving much of the detail to be filled in later. An important element of that framework are the operating licences which will be awarded to the private companies. These will set out in more precise terms what duties will be placed on them.

The Government has asked the Water Authorities to work on the basis that the privatisation will take place of all authorities simultaneously, towards the end of 1989.

On current plans the sale of the distribution element of the electricity industry will take place in the first quarter of the following year. Again the intention is to sell all the Area Electricity Boards simultaneously, but the generating side will take longer because of its massive scale.

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Rural Concerns

Most rural privatisation concerns are part of the more general public concern over how social and commercial interests can be reconciled. The Government’s original proposals, which would have made the private water companies largely self-regulating had to be abandoned in favour of a system of external regulation, in the form of the National Rivers Authority. In the case of electricity, most discussion up to now has focused on the degree of competition which can be created particularly in generation.

Rural interests lie mainly in the area of pricing, where the regulatory regime will be highly influential. Unfortunately, the Government has said very little so far about the way in which regulation is to work. Little has yet emerged on the precise role of the Director General of Water Services, whose job it will be to regulate price, services and related matters beyond the little that was said in the 1986 White Paper.

The industries’ obligations to supply services will continue after transfer to the private sector but the way in which those obligations are discharged and the conditions of supply will of course be different as the financial framework and motivation of the industries will alter.

On the evidence available from the industries already privatised, we can expect that the Government will attempt to go for a ‘light’ system of regulation, meaning that the Government directly or through the regulator will attempt to rely on general rules rather than many specific interventions.

For example, it is likely that the key question of how to control prices will be answered by imposing a general rule on the lines of the "RPI minus x" formulae used for British Gas and British Telecom. That approach leaves open the question of how individual charges should be set, either for particular services, or for particular groups of people.

The Energy Select Committee considered the question of rural users and concluded that "rural users should (not) be charged more per kilowatt hour consumed than people living in towns. However, we recognise there is a potential problem regarding would-be consumers in isolated areas where the cost of connection to the distribution system would be high". The Committee’s solution was that the Government should compensate the distribution Boards where social considerations suggest that rural consumers should not be charged the full cost of connection. However the White Paper did not consider this option.

In the case of gas, OFGAS told the Energy Select Committee that it had to take up on behalf of some consumers the question of connection charges but that so far they had not been a major issue. In such cases, its aim is to agree with British Gas appropriate policies for general classes of cases.
In the case of telecommunications, OFTEL has had a much more important role to play. As the Director General told the Committee: "a regulator cannot be indifferent to decisions about the prices for individual services". He went on to say that as a result of complaints, he had "pursued a number of detailed inquiries into the basis for BT's prices for particular services, in all cases looking for prices to bear reasonable relationship to BT's costs". However, because many costs are joint to several services, that cannot be a precise matter. Accordingly, even when the regulator takes a close interest, there may be a large grey area of opinion or judgement.

Similar approaches will apply to water and electricity.

In the case of water, important issues arise round the question of opening up new land for development. How developers should pay for new infrastructure in a privatised industry was considered in the March 1988 consultation paper. That proposed that developers should pay all the relevant costs.

More significant, however, is the possibility that the water companies could themselves become developers. It has been a feature of all the privatisations that have taken place so far that the privatised companies have been allowed to enter into activities which their previous statutes had prevented them from doing. (Typically, UK public corporations have only been allowed to conduct their core activity).

This possibility is particularly important for the water industry, in part because of the scale of the industry's existing land holdings and in part because of possible alliances which could be formed with development interests or even that the water companies could act as developers themselves. If so, then awkward conflicts could arise between the companies obligations to other developers and their own commercial interests.

**Provision in the Bills for Connection Charges**

Following on from Section 5 of this report one of the key issues in the proposed legislation is the charge for first time supply.

The position for Electricity is as follows:

Clause 15 imposes a general duty to supply 'upon being required to do so' by owner or occupier.

Clause 17 (see Annex 2) disallows undue discrimination in charges as between different classes of person but that leaves open the possibility of 'due' discrimination. Drawing on OFTEL experience, 'due' discrimination can be based on differences in costs of supply, and as these are generally higher in rural areas this opens up the way to discrimination against such areas. It may be desirable therefore to allow English ministers to create uniform price areas (as seems to be permitted in Scotland in Clause 3 of the Bill).
Clause 18 states that 'the supplier may require any expenses reasonably incurred in providing (an electricity line) to be defrayed by the person requiring the supply of electricity to such an extent as is reasonable in all the circumstances'. The Bill does not attempt to define the costs to be taken into account. However it does contain a kind of clawback provision which allows those making a high initial charge to get a supply to be reimbursed in some circumstances.

The position for water (see Annex 2) is as follows:

Clause 37 imposes a duty to supply water for domestic purposes (which includes commercial users providing they are not using water for commercial purposes) within a three month period. Where a main is requisitioned, charges are to be calculated on the basis of the deficit if any resulting from its operation over a 12 year period. The cost calculation may include other mains, tanks, service reservoirs and pumping stations, where extra capacity may be required. Any disputes are to be referred to an arbiter agreed between the supplying undertakings and the person(s) making the requisition. Clause 39 imposes a duty to connect to a main and allows the undertaker to recoup the cost.

For sewerage, the position is as follows:

Clause 67 provides for owners and occupiers of premises and local authorities to requisition sewers for domestic purposes, and for the undertakers to be liable to penalty if they have not done so within 6 months.

Clause 58 sets out the principle by which charges can be calculated. The basic idea is that for water is that charges should be payable if there is a deficit on the provision of a particular sewer over the 12 years after installation. In calculating that deficit, the undertaking can include not only the cost of the immediate link but also additional capacity downstream including pumping stations which can be attributed to the need to cope with the sewage using that link. Following the water model, the Bill provides, if there is any dispute between the sewerage undertaking and anyone requisitioning capacity, that a single arbitrator shall be asked to decide the issue.

Both Bills, in different ways, assume that connection charges are the responsibility of the would-be user. There are obvious equity and economic arguments for the Government's approach: equity, if one assumes the principle that users should bear those costs which can be uniquely attributed to them and economic, on the ground that charges related to costs serve to discourage development of high cost locations and vice versa.

However, equity could be interpreted differently in terms of a standard charge. The argument for the standard charge would be, as it is for other national charges such as postal services, that no-one should be disadvantaged by virtue of their location.
The economic arguments can lead in another direction to that taken by the Government. The notion of allowing water undertakings to make up deficits for up to 12 years means that users do not know what their charges are likely to be in that period. Put differently, the draft clauses put the risk of investment away from the undertakings on to the users. There is no provision for surpluses being used to offset deficits nor even the type of clawback provision proposed for electricity. There is no reason why this should be so in a privatised world.

The provision in the Water Bill for arbitration is likely to lead to discrepancies. Different charges could result from different conventions on asset depreciation. All the assets will have lives much longer than 12 years, but just how long is a matter of convention, as is the discount rate used to derive an annual charge. A better way would appear to be that suggested by the gas industry where OFGAS has developed a standard costing form for British Gas to use, which can be the basis of resolving any dispute.

The Water Bill as it now stands does not seem desirable from the viewpoint of rural development. Whilst it will be hard to resist the principle that privatised water and sewage undertakings should be allowed to recover connection costs from specific users, there were options for how it is to be done. One option therefore would be to press for a standard charge. This approach can be supported by the practical difficulties of determining just how the connection costs should be calculated. Another option is to press for a clear and more dependable system for deriving charges. Probably the best route would be a simple clause like that for electricity with the onus placed on the Director of Water Services to work out a system. The system should be such as to allow the level of costs to be controlled otherwise users can be forced to pay for the water undertaking's mistaken investment decisions. One route to that is to insist from the start that the connection charge is put in the basket of goods used for purposes of price control.

If the Water Authorities are to be allowed also to be property developers, or to be owned by developers, then it is important that charges are seen to be the same for all users in the same situation. The proposals as they stand would allow water undertakings to cross-subsidise if they wished to do so.

**Summary of Privatisation Issues for Rural Areas**

In general the Electricity Bill does not give any serious grounds for concern regarding first time supply. Indeed the fact that the Bill makes it easier for new suppliers to enter the industry may well help rural areas to develop small-scale generation schemes as the technology becomes more cost-effective. The problem with this may be that the principal supplier may be relieved of the duty to supply. As far as electricity charges are concerned, the Bill puts the onus for controlling the privatised industry firmly on the regulatory body to set limits to the overall level and also to assess the structure of charges.
It is possible, of course, that the circumstances in which the public may appeal to the Director will be too narrowly drawn although indications from Committee are that this will not be the case.

The main issue for rural areas in the Water Bill is first time connection charges. The Bill provides for certain costs to be recovered for supplying new mains and connections to mains and for a right of appeal to an independent technical expert if there is disagreement over those costs. This right of appeal is valuable and an improvement over the present position, but in general the legislation is designed to confirm rather than improve on the status quo which, on the basis of the findings of this research, is unsatisfactory for rural areas.

An undesirable feature is that the charges authorities now impose appear arbitrary and unpredictable. The right of appeal puts some check on this but it may not be effective because developers may not want to tangle with the new companies nor to take action which delays or otherwise complicates the development process. Furthermore, at present, Water Authorities have only a limited incentive to seek contribution: the privatised companies will have much stronger incentives to do so, so the need for a check on their behaviour is all the stronger.

There are at least four options for improving on the status quo for water and sewerage which could have been introduced:

First, to go for a standard charge as in telecommunications. This would remove uncertainty and put everyone on the same footing. However, the Government is unlikely, as in electricity, to support the general position that new users should bear the burden of higher costs if costs are in fact higher. Indeed, the Government have already rejected the suggestion that charges should be standardised for that reason. However, there may be room for pressing for standard charges within defined areas or for requiring the companies to set out in advance what average contributions are going to be.

Second, to get nearer to the OFGAS model, and involve the Director General in the process of determining what is reasonable. That would allow a 'case-law' to be developed and general principles promulgated. The DG could be advised by independent technical assessors.

Third, to develop the existing clauses (38 and 67) so to ensure that the new companies may charge only a limited range of costs, such as the direct costs of connection or supply, excluding basic infrastructure such as treatment works.

Fourth, to scrap the existing clauses entirely and go for the drafting used in the Electricity Bill. That would leave the onus on the Director General entirely; which would be a calculated risk.
In drawing the Rural Development Commission's attention to these possibilities we are drawing on the experience of the case studies carried out on the project. These confirm that even now, the Water Authorities tend to have a major influence in determining just where development goes and when it occurs. After privatisation, they may be able to develop themselves or enter into joint ventures. There is a general risk that they will use their effective powers over water and sewerage supply to further their wider interests. They may do this by failing to charge their own developments in full or by making it easier for them to have new capacity installed. Although the Bill requires them to respond rapidly to any requisition request, that in itself is likely to be an ineffective check.

The four options mentioned would have helped to limit the new PLC's freedom and promote accountability but they do contain some risks to rural interests. For example, if the Director is given greater powers, he is bound to lean on cost concepts to determine what is reasonable.
NATIONAL SURVEY CONTACTS

(a) Electricity Boards in England

London Electricity Board
South Eastern Electricity Board
Southern Electricity Board
South Western Electricity Board
Eastern Electricity Board
East Midlands Electricity Board
Midlands Electricity Board
Merseyside and North Wales Electricity Board
Yorkshire Electricity Board
North Eastern Electricity Board
North Western Electricity Board

(b) Water Authorities

Anglian Water
Northumbrian Water
North West Water
Severn Trent Water
Southern Water
South West Water
Thames Water
Wessex Water
Yorkshire Water

(c) Water Companies

The Bournemouth & District Water Company
Bristol Waterworks Company
Cambridge Water Company
Chester Waterworks Company
The Colne Valley Water Company
East Anglian Water Company
The East Surrey Water Company
East Worcestershire Waterworks Company
The Eastbourne Waterworks Company
Essex Water Company
Folkestone & District Water Company
Hartlepool Water Company
Lee Valley Water Company
The Mid Kent Water Company
Mid Southern Water Company
Mid-Sussex Water Company
Newcastle & Gateshead Water Company
North Surrey Water Company
Portsmouth Water Company
Rickmansworth Water Company
The South Staffordshire Waterworks Company
Sunderland & South Shields Water Company
The Sutton District Water Company
Tendring Hundred Waterworks Company
West Hampshire Water Company
West Kent Water Company
The York Waterworks Company

(d) County Councils

Cumbria County Council
Derbyshire County Council
Devon County Council
Dorset County Council
Durham County Council
East Sussex County Council
Essex County Council
Gloucestershire County Council
Hampshire County Council
Hereford and Worcester County Council
Hertfordshire County Council
Humberside County Council
Isle of Wight County Council
Kent County Council
Lancashire County Council
Leicestershire County Council
Lincolnshire County Council
Norfolk County Council
Northamptonshire County Council
Northumberland County Council
North Yorkshire County Council
Nottinghamshire County Council
Oxfordshire County Council
Shropshire County Council
Somerset County Council
Staffordshire County Council
Suffolk County Council
Surrey County Council
Warwickshire County Council
West Sussex County Council
Wiltshire County Council

(e) District Councils

Metropolitan Borough of Burnsley
Metropolitan Borough of Calderdale
Metropolitan Borough of Kirklees
Adur District Council
Allerdale District Council
Alnwick District Council
Amber Valley District Council
Arun District Council
Ashford Borough Council
Aylesbury Vale District Council
Barrow District Council
Basingstoke & Dean Borough Council
Bassetlaw District Council
Berwick-upon-Tweed Borough Council
Beverley Borough Council
Blaby District Council
Blyth Borough Council
Bolsover District Council
Boothferry District Council
Boston Borough Council
Braintree District Council
Breckland District Council
Brentwood District Council
Bridgnorth District Council
Broadland District Council
Bromsgrove District Council
Broxbourne Borough Council
Burnley Borough Council
Canterbury City Council
Caradon District Council
Carlisle City Council
Carrick District Council
Castle Morpeth Borough Council
Charnwood Borough Council
Chelmsford District Council
Cherwell District Council
Chester City Council
Chichester District Council
Chiltern District Council
Chorley Borough Council
Christchurch Borough Council
Cleethorpes Borough Council
Colchester Borough Council
Congleton Borough Council
Copeland Borough Council
Cotswold District Council
Craven District Council
Crewe & Nantwich Borough Council
Darlington Borough Council
East Devon District Council
East Dorset District Council
East Hampshire District Council
East Hertfordshire District Council
Lindsey District Council
East Northamptonshire District Council
East Staffordshire District Council
Eden District Council
Epping Forest District Council
Erewash Borough Council
Fenland District Council
Forest Heath District Council
Forest of Dean District Council
Fylde Borough Council
Gedling Borough Council
Glanford Borough Council
Graveshams Borough Council
Ct. Yarmouth Borough Council
Guildford Borough Council
Hambleton District Council
Harborough District Council
Harrogate Borough Council
Hart District Council
Hertsmere Borough Council
High Peak Borough Council
Hinckley & Bosworth Borough Council
Holderness District Council
Horsham District Council
Huntingdon District Council
Hyndburn Borough Council
Isles of Scilly Council
Kennet District Council
Kerrier District Council
Kettering District Council
Kings Lynn & West Norfolk District Council
Lancaster City Council
Langbaugh Borough Council
Leominster District Council
Lewes District Council
Lichfield District Council
Macclesfield Borough Council
Maidstone Borough Council
Maldon District Council
Malvern Hills District Council
Melton Borough Council
Mendip District Council
Mid Bedfordshire District Council
Mid Devon District Council
Mid Suffolk District Council
Mid Sussex District Council
Mole Valley District Council
Newbury District Council
New Forest District Council
Northavon District Council
North Bedfordshire Borough Council
North Cornwall District Council
North Devon District Council
North Dorset District Council
North East Derbyshire District Council
North Herefordshire District Council
North Kesteven District Council
North Norfolk District Council
North Shropshire District Council
North Warwickshire Borough Council
North West Leicestershire District Council
North Wiltshire District Council
Oswestry Borough Council
Pendle District Council
Pembright District Council
Peterborough City Council
Poole Borough Council
Preston Borough Council
Purbeck Borough Council
Ryedale Borough Council
Ribble Valley Borough Council
Richmondshire District Council
Rochford District Council
Rossendale Borough Council
Rother District Council
Rushcliffe Borough Council
Runnymede Borough Council
Rushcliffe Borough Council
Kushmoor Borough Council
Rutland District Council
Ryedale District Council
Salisbury District Council
Scarborough Borough Council
Sedgefield District Council
Selby District Council
Sevenoaks District Council
Shepway District Council
Shrewsbury & Atcham Borough Council
South Bedfordshire District Council
South Cambridgeshire District Council
South Derbyshire District Council
South Hams District Council
South Herefordshire District Council
South Holland District Council
South Kesteven District Council
South Lakeland District Council
South Norfolk District Council
South Northamptonshire District Council
South Oxfordshire District Council
South Ribble Borough Council
South Shropshire District Council
South Somerset District Council
South Staffordshire District Council
South Wight Borough Council
Stafford Borough Council
Staffordshire Moorlands Borough Council
Stockton-on-Tees Borough Council
Stratford-on-Avon District Council
Stroud District Council
Suffolk Coastal District Council
Surrey Heath Borough Council
Swale Borough Council
Tandridge District Council
Taunton Deane District Council
Teesdale District Council
Teignbridge District Council
Tendering District Council
Test Valley District Council
Tewkesbury Borough Council
Thamesdown Borough Council
Thanet District Council
Three Rivers District Council
Thurrock Borough Council
Tonbridge & Malling District Council
Torridge District Council
Tunbridge Wells Borough Council
Tynedale District Council
Uttlesford District Council
Vale of White Horse District Council
Vale Royal District Council
Wansbeck District Council
Wansdyke District Council
Warwick District Council
Waveney District Council
Waverley Borough Council
Wealden District Council
Wear Valley District Council
Wellingborough Borough Council
West Devon Borough Council
West Dorset District Council
West Lancashire District Council
West Lindsey District Council
West Oxfordshire District Council
West Somerset District Council
West Wiltshire District Council
Weymouth & Portland Borough Council
Winchester City Council
Windsor & Maidenhead Borough Council
Wokingham District Council
Worcspring District Council
Wrekin District Council
Wychevon District Council
Wycombe District Council
Wyre Borough Council
Wyre Forest District Council

(f) Rural Community Councils

Avon Community Council
Bedfordshire Rural Community Council
Berkshire Community Council
Buckinghamshire Council for Voluntary Service
Cambridgeshire Community Council
Cheshire Community Council
Cleveland Council for Voluntary Service
Cornwall Rural Community Council
Cumbria Council for Voluntary Action
Derbyshire Rural Community Council
Community Council of Devon
Dorest Community Council
Durham Rural Community Council
Rural Community Council of Essex
Gloucestershire Rural Community Council
Hampshire Council of Community Service
Rural Community Council of Hereford and Worcester
Community Council for Hertfordshire
Community Council of Humberside
Isle of Wight Community Service Council
Kent Rural Community Council
Community Council of Lancashire
Leicestershire Rural Community Council
Community Council of Lincolnshire
Norfolk Rural Community Council
Northamptonshire Rural Community Council
Community Council of Northumberland
Nottinghamshire Rural Community Council
Oxfordshire Rural Community Council
Community Council for Shropshire
Community Council for Somerset
Community Council of Staffordshire
Community Council for Suffolk
Surrey Voluntary Service Council
Sussex Rural Community Council
Warwickshire Rural Community Council
Community Council for Wiltshire
Yorkshire Rural Community Council

(h)  Other Organisations

Association of County Councils
Association of District Councils
Country Landowners Association
Council for the Protection of Rural England
Electricity Council
Electricity Consumers Council
English Estates
Highlands and Islands Development Board
Lake District Special Planning Board
National Joint Utilities Group
National Farmers Union
North of Scotland Hydro-Electric Board
Office of Population Censuses and Surveys
Trades Union Congress
Water Authorities Association
Water Companies Association
Welsh Development Agency

North Norfolk Case Study

Eastern Electricity Board : Philip Hardy (Chief Design Engineer)
                         Richard Harpley (Planning Engineer, Norfolk)

Anglian Water Authority  : Brian Perry (Engineering & Standards Officer)
                         Mike Morrod (Regional Engineer)

Norfolk County Council   : Michael Terry (Team Leader Economic Development and Tourism)

North Norfolk District Council : Terry Nolan (Chief Executive)
                                Brenda Langslow (Planning Officer)

Kings Lynn and West Norfolk District Council : Graham Turner (Economic Development Officer)

Breckland District Council : Ken Dickinson (Chief Planning Officer)
                          Paul Redkin (Planning Officer)

English Estates           : Mark Taylor (Projects Officer)

Rural Development Commission : Geoff Morgan (Senior Business Advisor)

Water Consultative Committee : Mrs Capps (Chairman)
                              Mrs Abbs (Breckland District Council)
                              Mr Springer (North Norfolk District Council)
Norfolk Rural Community Council: Tim Cawkwell (Director)

Arup Cambridge Office : Norman Beaton

West Norfolk Enterprise Agency : Andrew Ramsey (Executive Manager)
Trust

South Devon Case Study

South Western Electricity Board: Bob Scanton (Deputy Manager, Devon Area)

South West Water Authority : Peter Fordham (Regional Planning Officer)
                            Terry Smith (Water Operation Controller)
                            Brian Newman (Planning Liaison Officer, South)
                            D. Mosedale (Senior Engineer in Dart District)

Devon County Council : Philip Watts (Chief Planner)
                        Keith Thorley (Research and Information)

South Hams District Council : Councillor GP Haywood (Chairman of Devon Rural
                                Development Programme Committee)
                             Mr T Smale (Assistant Director of Planning)
                             Mr J Robinson (Principal Engineer, Drainage)

Teignbridge District Council : Roger Courtiour (Economic Development Officer)

West Devon District Council : Tim Darsley (Economic Development Officer)

Rural Development Commission : David Rees (Senior Business Advisor)
                               Hilary Winter (Business Advisor)

English Estates : Andrew Evans (Property Surveyor)
                Ed Birch (Projects Officer)

Community Council of Devon : John Leaver (Director)

South Hams Agency for Rural Enterprise : Mr Temple (Business Advisor)

South Shropshire Case Study

Midlands Electricity Board : Andy Potter (Divisional Manager)
                            Tony Denton (Planning Manager)
                            David Mawhinney (New Business Manager)

Severn Trent Water Authority : John Hall (Planning Manager)
                              Eric Ashcroft (District Manager)

Shropshire County Council : David Pearce (Planning Officer)

Bridgnorth District Council : Malcolm Crocker (Development Officer)
                             Eric Shaw (Technical Officer)
South Shropshire District Council: J B Caird (Planning and Development Officer)  
Mr Sutton (Deputy Planning Officer)
Rural Development Commission: Ray Kessler (Business Advisor)
English Estates: Andrew Anderson (Property Surveyor)
Midlands Electricity Consultative Council: K Shaw (Representative)
Rural Community Council: Malcolm Kimber (Director)
Arup Birmingham: John Harvey (Engineer)

North Yorkshire Case Study

North Eastern Electricity Board: Alan Edwards (Principal Engineer)  
Dennis Kelly (Supplies Engineer)  
Bob Binns (Planning Engineer)
Yorkshire Water Authority: John Taylor (Divisional General Manager)  
Barry Truman (Area Manager)  
Jim Sanderson (Sewerage Liaison Officer)  
Peter Garsling (Engineer)  
Eric Allett (Engineer)
York Waterworks Company: Mr Wilford (General Manager)
North Yorkshire County Council: Ken Williamson (Planning Department, Group Leader, Policy and Local Plans)
Hambleton District Council: Bruce Adams (Planning Officer)
Ryedale District Council: Mr Cudworth (Chief Executive)
Scarborough Borough Council: Mr Williamson (Planning Officer)  
Ron Hall (Technical Services Officer)
North York Moors National Park: Mike Welbourne (Planning Officer)
Rural Development Commission: Jim McKinney (Business Advisor)  
Ian Maskell (Building Officer)
English Estates: Paul Barber (Property Surveyor)
North Eastern Electricity Council: Sir Joseph Barnard (Chairman)  
Dr Michael Nichols (Secretary)
EXTRACTS FROM PRIVATISATION BILLS
(b) a charge in respect of the availability of a supply of electricity; and

c) a rent or other charge in respect of any electricity meter or electrical plant provided by the supplier;

and such a charge as is mentioned in paragraph (b) above may vary according to the extent to which the supply is taken up.

(4) In fixing tariffs under subsection (1) above, a public electricity supplier shall not show undue preference to any person or class of persons, and shall not exercise any undue discrimination against any person or class of persons.

18.—(1) Where any electric line or electrical plant is provided by a public electricity supplier in pursuance of section 15(1) above, the supplier may require any expenses reasonably incurred in providing it to be defrayed by the person requiring the supply of electricity to such extent as is reasonable in all the circumstances if—

(a) the supply is required within the prescribed period after the provision of the line or plant; and

(b) a person for the purpose of supplying whom the line or plant was provided ("the initial contributor") has made a payment to the supplier in respect of those expenses.

(2) The Secretary of State may, after consultation with the Director, make provision by regulations for entitling a public electricity supplier to require a person requiring a supply of electricity in pursuance of section 15(1) above to pay to the supplier, in respect of any expenses reasonably incurred in providing any electric line or electrical plant used for the purpose of giving that supply, such amount as may be reasonable in all the circumstances if—

(a) the supply is required within the prescribed period after the provision of the line or plant; and

(b) a person for the purpose of supplying whom the line or plant was provided ("the initial contributor") has made a payment to the supplier in respect of those expenses.

(3) Regulations under subsection (2) above may require a public electricity supplier who, in pursuance of this section or the regulations, has recovered any amount in respect of expenses reasonably incurred in providing any electric line or electrical plant—

(a) to exercise his rights under the regulations in respect of those expenses; and

(b) to apply any payments received by him in the exercise of those rights in making such payments as may be appropriate towards reimbursing the initial contributor and any persons previously required to make payments under the regulations.

(4) Any reference in this section to any expenses reasonably incurred in providing an electric line or electrical plant includes a reference to the capitalised value of any expenses likely to be so incurred in maintaining it, in so far as they will not be recoverable by the supplier as part of the charges made by him for the supply.

19.—(1) Subject to the following provisions of this section, a public electricity supplier may require any person who requires a supply of electricity in pursuance of subsection (1) of section 15 above to give him reasonable security for the payment to him of all money which may become due to him—

(a) in respect of the supply; or
“relevant day”, in relation to a requirement to provide a water main for any locality, means the day after whichever is the later of the following, that is to say—

(a) the day on which the conditions specified in section 38 below are satisfied in relation to the requirement; and

(b) the day on which the places where service pipes to premises in that locality will connect with the main are determined under subsection (4) above.

38.—(1) The conditions mentioned in section 37(1)(c) above are satisfied in relation to a requirement for the provision of a water main by a water undertaker if—

(a) such undertakings as the undertaker may have reasonably required in accordance with subsection (2) below have been given by the person or persons who have required the provision of the main; and

(b) such security as the undertaker may have reasonably required has been provided for the discharge of any obligations imposed by those undertakings on any person who—

(i) by virtue of section 37(2)(a) or (b) above required, or joined in requiring, the provision of the main; and

(ii) is not a public authority.

(2) The undertakings which a water undertaker may require for the purposes of subsection (1) above in respect of any water main are undertakings which bind the person or persons mentioned in that subsection (in the case of two or more persons, either jointly and severally or with liability to pay apportioned in such manner as those persons may agree) to pay to the undertaker, in respect of each of the twelve years following the provision of the main, an amount not exceeding the relevant deficit (if any) for that year on that main.

(3) For the purposes of this section the relevant deficit for any year on a water main is the amount (if any) by which the water charges payable for the use during that year of that main are exceeded by the prescribed percentage of so much of the costs reasonably incurred in providing that main as were not incurred in the provision of additional capacity in that main.

(4) The costs reasonably incurred in providing a water main (“the new main”) shall include—

(a) the costs reasonably incurred in providing such other water mains and such tanks, service reservoirs and pumping stations as it is necessary to provide in consequence of the provision of the new main; and
(b) such proportion (if any) as is reasonable of the costs reasonably incurred in providing any such additional capacity in an earlier water main as falls to be used in consequence of the provision of the new main;

and in this subsection "earlier water main", in relation to the new main, means any water main which has been provided in the period of twelve years immediately before the provision of the new main and was so provided in pursuance of a requirement under section 37 above, under the provisions of section 36 or 37 of the 1945 Act or of section 29 of Schedule 3 to that Act (water main requisitions) or under any local statutory provision corresponding to section 37 above or to any of those provisions of the 1945 Act.

(5) Any reference in this section to the provision of additional capacity in a water main provided in pursuance of a requirement under any enactment is a reference to such works carried out or other things done in connection with the provision of that main as are carried out or done for the purpose of enabling that main to be used for purposes in addition to those for which it is necessary to provide the main in order to comply with the requirement.

(6) For the purposes of this section references to the water charges payable for the use during any year of any main provided by a water undertaker are references to so much of the aggregate of any charges payable to the water undertaker in respect of services provided in the course of that year as represents charges which—

(a) have been imposed by the undertaker in relation to premises which are connected with that main; and

(b) are reasonably attributable to the provision of a supply of water (whether or not for domestic purposes) to those premises by means of that main.

(7) The Secretary of State may by regulations make provision for the payment of interest at the prescribed rate on any sums which for the purposes of subsection (1)(b) above have been deposited with a water undertaker by way of security for the discharge of any obligation.

(8) Any dispute between a water undertaker and any other person as to—

(a) the undertakings or security required by the undertaker for the purposes of this section; or

(b) the amount required to be paid in pursuance of any such undertaking,

shall be referred to the arbitration of a single arbitrator appointed by agreement between the undertaker and that person or, in default of agreement, by the President of the Institution of Civil Engineers.

(9) Except in the case of regulations made before the transfer date, the Secretary of State shall not make any regulations under this section unless he has first consulted the Director.

39.—(1) This section applies where the owner or occupier of any premises which are situated in the area of a water undertaker and are premises which consist in the whole or any part of a building or premises on which any person is proposing to erect any building or part of a building serves a notice on the undertaker which—
Alternative Sources of Electricity Supply

Three Phase Electricity

A three-phase system, in its most basic form, requires four wires, of which only one is a "return" wire. A voltage exists between this "return" wire and each of the other three, so that a single-phase load can be connected between any one of the three "supply" wires and the common "return" wire. Because the three supply voltages are alternating - constantly varying and reversing, many times a second - they are given a time phase displacement so that no two of them reach a maximum value at the same instant. The effect of this is that, when the three "supply" wires are equally loaded, the algebraic sums of the three load currents is zero, and no current flows in the "return" wire. This then can be, and usually is, omitted on systems where the three-phase currents can be expected to be more or less equal. Consequently, the majority of three-phase transmission and distribution systems have only three wires, not four. Three-phase systems predominate because, for a given wire size, a three-phase system can supply three times as much power as a single-phase system and, is essential for most motor-driven machinery.

When three-phase equipment is required to be operated and only a single-phase supply is available, it is possible to install equipment to convert the single-phase supply into a crude kind of three-phase.

The most straightforward means of effecting the conversion is to use a single-phase motor to drive a three-phase alternator, mounting the two machines on a common bedplate. The resulting three-phase output will have a frequency some 3 to 5 per cent less than the (single-phase) mains frequency. The cost of such equipment is likely to exceed £2,000 for an output of 5 Kva.

When the requirement is only to run one or two three-phase motors from a single-phase supply a combination of transformer and capacitor can provide a cheap solution, with a cost ranging from £230 for a 3 HP motor to £790 for 20 HP. This type of equipment, however, is only suitable for supplying a single motor.

A third means of converting single to three-phase system is to use a single-phase rectifier to produce a DC output which can then be used as input to a static inverter to give a three-phase output. Although there is no limit in theory, to the load capacity of such an arrangement, it seems that only small sizes (i.e., up to 1½ kw) are likely to be available ready-made. The cost of 1½ kw equipment is likely to be around £360.

Engine-driven Generators

When there is an absence of an electricity supply from the public network the most common method of providing electricity is by the use of an electrical generator driven by a petrol or diesel engine. Plants of this kind might be installed to serve only one consumer or, in larger sizes, to serve a whole community. Engine-driven generators are available in a variety of sizes, upwards from a few hundred watts to several megawatts.

Note: all costs in 1988 prices unless otherwise stated.
The smallest sizes, such as might be suitable for single dwelling applications tend to be petrol driven, otherwise the diesel engine is the most popular prime mover on account of its lower fuel and maintenance costs.

Engine-driven generating sets can be purchased complete with weatherproof acoustic housings, thus obviating the need for a building structure, but they are seldom likely to produce electricity as cheaply as that available from the public network, except in the case of very large installations.

In most applications, a generator set will be expected to run continuously for 24 hours a day, but it will need to be shut down at regular intervals for maintenance. Thus it is desirable that a second set is provided to cover for maintenance or breakdown.

Delivery and storage of fuel may present problems, especially in remote locations.

The cost of an engine driven generator set will naturally vary according to its size. Manufacturers literature has been used to estimate these costs which can range from around £700 per KW of capacity for small sizes down to less than half that for the larger sets. The cost of fuel to run engine driven generators has been estimated from manufacturers information. For a diesel unit rated at 80Kw unit of 3.9 Kw this cost was estimated at 3.8p per unit. For a petrol driven generator rated at 0.75 Kw the fuel costs were estimated at 32p per unit.

By way of comparison the cost of domestic electricity varies from area to area and according to the amount of energy used. For example, a quarterly consumption of around 1,000 Kwh (‘units’) in the South of England would currently cost about 6.5 pence per unit; twice this consumption would cost around 6 pence per unit, while 500 units per quarter would cost around 7.5 pence/unit and 250 units/quarter more than 9 pence per unit.

Gas Turbines

Electrical generators can also be driven by industrial gas turbines, but these are generally only available in larger sizes such as might be suitable for a community generating plant. Gas turbines can be designed to run on a variety of fuels, but are only about half as efficient as diesel engines, and may require a higher degree of operator skill. However, they are able to run for longer periods with less maintenance.

Wind Power

Electrical power can be produced by using the wind’s energy to turn rotor blades which are connected to an electrical generator. The energy of the wind is proportional to the cube of its velocity. Therefore, a successful scheme requires a site with a high mean wind velocity.

Typical wind generators start to produce modest power at a wind velocity of about four metres per second (9 mph) and reach a maximum output at around twelve metres per second (26 mph), though a higher range might be applicable in windy locations.
Wind power technology is approaching the point where it could become a viable proposition in areas of high average windspeed. Due to the variable nature of the wind, however, a wind generator must be used in conjunction with either storage batteries and/or some additional source of electricity supply.

Problems associated with this method are the environmental impact of the mast required for a windmill and the noise produced by the motion of the blades through the air. Maintenance is liable to be an additional problem in remote areas.

The cost of electricity produced by wind turbines will depend on the scale of production as well as the average wind speed at the site and type and number of machines used. Figures published by the British Wind Energy Association indicate that large scale reliable grid-connected wind turbines on the best sites in the UK would produce electricity for about 2.1 pence per unit.
Hydroelectricity

Electricity is generated by causing water to flow through a turbine driving a generator. In order to cause the water to flow a head difference is required between the inlet and the outlet of the turbine, this is usually provided by a small dam in the watercourse. The main requirements are a suitable site for the dam and a significant minimum flow component to the watercourse, which will depend on the hydrogeology and size of the contributing catchment. Some form of back-up power supply would usually be required to cover periods of low flow. The set up costs for a hydroelectric scheme are usually large. The generator units are quoted by manufacturers to cost around £1,000 per kw installed but the cost of any dam structure required would be additional to this. Running costs, however, tend to be low.

A major restriction is the minimum head of water required to operate the units, which is normally required to be in excess of two metres.

In general, the high cost of the associated civil engineering works makes small-scale installations uneconomic.

Solar Power

Electricity can be generated by causing light to pass through thin pieces of silicon containing impurities such as boron, phosphorous or arsenic.

At present this is a relatively inefficient operation and is costly. Even large scale units have been quoted as costing around £3,000 per Kw of output installed.

As peak demand for electricity would not correlate with peak production using this method, a storage battery or alternative backup supply would be required.

While solar generation may be suitable for supplies to specific items of high cost equipment, it is at present quite unsuitable for general domestic or commercial purposes. Solar power, where it can be exploited, is better directed to the heating of water for domestic use or for space heating.

Other Methods

Other methods of alternative electricity production are only really applicable on a large scale, such as an Electricity Board might consider. These could include electricity generation from:

- Tidal Power
- Geothermal Plant
- Biomass - i.e. using straw, etc., as a fuel for a power station.
Alternative Methods of Water Supply

Well or Borehole

Major aquifers such as chalk, limestone and sandstone of the sedimentary rocks of Lowland Britain have been sources of water for many years. Such groundwater sources have provided supplies for many large centres of population. Groundwater is generally of a high standard and at present often only requires minimal treatment (i.e. disinfection) before it can be used in a supply. Clearly the success of this source of supply depends on the qualities of the geological strata.

A typical borehole consists of a lined hole drilled into the aquifer. A pump is then used to extract the water. This can either be placed at the surface or more commonly is a submersible pump which can be inserted down the hole and used to pump water up from it. The water is then stored in a tank and treated prior to distribution.

Aquifers in areas adjacent to coastal regions may be subject to saline conditions and consequently a borehole supply may not be feasible. Excessive abstraction from aquifers previously containing potable water in similar areas may cause saline intrusion rendering the water unfit for human consumption.

Smaller borehole sources can be designed to operate automatically with drip feed chlorination but water quality would still require checking regularly.

A typical borehole 10m deep with a well screen, casing and surface mounted electrically driven pump has been estimated from contractors and manufacturers information, to cost in the order of £4,000 and would normally be sufficient to serve a population of between 10 and 40 people. A metering pump to dose the water with chlorine could be linked up via the electrical system of the borehole pump to operate automatically and would probably cost in the region of £400.

River or Stream

For large water supply schemes run by a Local Authority, a dam may be constructed on a watercourse in order to procure water. The reservoir so formed acts as storage and gives the water supply rate required a greater reliability. For smaller schemes it is more common to use river intake works with a series of screens to remove course debris. These can take the form of either a direct intake on the river bank, a floating pontoon intake, a piled structure in the river or abstraction from behind a weir. For smaller schemes a simple pipe intake fitted with a strainer may be sufficient. Prevention of silting and blockage at the intake and abstraction water quality have to be considered when designing intakes.

After abstraction the water is stored in some form of tank which provides the storage for a required reliability. Water obtained from a river will generally be of a lower quality than that of groundwater and the degree and cost of treatment required is therefore greater. Typically this can consist of sedimentation, coagulation, filtration and some form bacterial purification.

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Sedimentation tanks are designed to reduce the velocity of flow of water so as to permit suspended solids to settle out by gravity. Coagulation is the addition of chemicals to aid the process of sedimentation. Filtration takes place through sand and gravel filters and bacterial purification is typically chlorination.

The cost of water treatment can be high and there is also a requirement for ongoing maintenance by skilled workers who understand the process. Products produced by the processes have to be disposed of. Water quality also has to be checked on a regular basis.

This type of plant is generally only practical for treating water for larger communities. A typical package water treatment plant serving a population of about 450 has been estimated by manufacturers to cost £70,000.

Tanker Supply

The area to be supplied has its own storage tank installed, which is then topped up at regular intervals by tanker loads of water which have already been treated. The dwellings are served from the tank via a localised pipe network system.

Rainwater Collection

Rainwater run-off from roof areas may be collected for use. In this country it is generally only used for non-potable applications, in areas of high annual average rainfall. It is usually used in conjunction with another source of water as the reliability of such a supply is generally low.

Water falling as rain in rural areas will normally be of a relatively high quality. However, contamination may occur from pollutants picked up from the collection surfaces or deposited directly into uncovered storage tanks, e.g. guano.

Springs

Springs by their nature tend to be at about water table level and hence are less reliable if variation in the water table take place. Usually if a spring exists a borehole will be successful in the same location.

Alternative Methods of Sewage Disposal

Waste water normally disposed of to the public foul water sewers will consist of faecal matter, bath and sink water and industrial effluents. In older systems combined sewers additionally take rainwater flows.

Sewage breakdown takes place by two types of bacteriological action:

Aerobic: Where the micro organisms involved function in the presence of oxygen. Most sewage treatment in sewage works is achieved in this condition.

Anaerobic: Where a different type of micro-organism breakdown the sewage in the absence of oxygen.
There are four basic alternative methods of sewage disposal.

**Cesspits**

These consist of a waterproof tank which basically collects the sewage. Typically they provide enough storage for 45 days use and serve a maximum of 8 people. The tank is emptied by a tanker at regular intervals for disposal at a sewage treatment works. The system requires a local tanker service and vehicle access to the tank. The tanker services are usually operated by private companies who arrange to collect the waste and transport it to a sewage treatment works.

The costs of installing a cesspit have been estimated using manufacturers cost information and typical emptying costs have been obtained from local waste disposal contractors. To serve a typical household of four people the installation cost would be approximately £4,300 with annual emptying costs in the order of £1,475. For a similar unit serving eight people the estimated costs would be £7,200 and £2,900 respectively.

**Septic Tanks**

A septic tank is basically a settling tank with a high level outlet and a scum removal facility. They provide a high degree of partial anaerobic treatment and require less frequent emptying than cesspits, typically once a year. The effluent can be disposed of to a soakaway, depending on ground conditions, a subsoil drainage system or alternatively be passed to some form of secondary treatment package treatment plant.

The emptying service is operated in a similar manner to that described above for cesspits. The treatment of cesspit and septic tank waste at a sewage works can create problems due to the anaerobic condition of the waste applying a high load on the aerobic treatment processes. Sewage treatment works may contain sludge treatment facilities which operate under anaerobic conditions and can be used to dispose of this type of waste.

Care needs to be taken to prevent cross contamination when using a septic tank soakaway system in conjunction with a private borehole or river intake. The Local Authority may impose a minimum distance constraint between a septic tank and any borehole, this would be dependent on the transmissivity of the underlying aquifer.

The costs of a septic tank and soakaway system have been estimated using current rates from civil engineering projects together with manufacturers quotations. For a unit serving four people these would be approximately £1,000 and serving a small community of approx 30 people, around £2,000. Annual costs for emptying, obtained from waste disposal contractors, would be approximately £31 and £66 respectively.

**Composting**

This is undertaken on the faecal content of the sewage only, bath and sink water have to be disposed of by an alternative method.
The system works on an aerobic basis and takes place in a compartment beneath the latrine. The method requires a fibrous material such as sawdust or straw to be placed in alternate layers with faecal matter to keep it aerobic. After composting the waste can be put back to the land returning the natural nutrients and humus to the soil.

Two compartments are usually required. The use of the compartments alternated, one being used for a latrine and the other supplying compost.

To prevent the spread of disease it is important that the waste is not handled before composting is complete. This method of disposal is rarely used nowadays.

**Package Treatment Works**

Small package treatment works come in a variety of sizes serving populations from 5 to 200. The more common types of plant consist of either a biological filter or an activated sludge process such as a rotating bio-filter. These are used to treat the effluent produced from a normal septic tank installation. Both these types of system work on an aerobic principle whereby a surface is provided on which a bacteriological layer builds up.

Typical costs for supply and installation of rotating bio-filters have been obtained from manufacturers and current rates from civil engineering projects. For a unit serving four people these are estimated to be in the order of £3,000 rising to £11,000 for small community of 50. Electrical running costs, based on a 240v 1-phase mains supply, have been estimated at £26 and £85 per annum respectively.

Larger package treatment works are available which do not require pre-treatment using septic tanks. For populations of about 250, manufacturers estimated costs are approximately £40,000 and £110,000 if the population is increased to 1,000.

**Summary of Sewage Disposal Alternatives**

For small domestic purposes a septic tank and soakaway system is usually employed as it requires less frequent emptying than a cesspit. A soakaway only operates successfully where the ground is relatively permeable and water table is at least 2.5m below ground level. When these hydrogeological constraints preclude the use of soakaways, cesspits are normally employed. These are larger than septic tanks and require more frequent emptying and are therefore more expensive to install and maintain. Composting is rarely used nowadays.

For larger communities a package treatment works becomes economically viable although a power source will be required to operate it. These may also be used to treat industrial effluents, some effluents may require specific forms of treatment requiring additional plant.
The Northumberland Rural Development Programme Committee received a report in July 1987 on the Supply of Basic Services to Remote Rural Areas in Northumberland. The report concluded that a significant number of individuals and communities were without mains services but that the social and economic implications could only be properly assessed through direct approaches to affected households on a systematic basis.

Consequently, a household postal survey was undertaken in November 1987 to establish the adequacy of present arrangements and the action which might be taken to overcome any difficulties. It covered the four districts of Alnwick, Berwick upon Tweed, Castle Morpeth and Tynedale.

A list of 189 households thought to be without mains electricity was compiled, with the assistance of the North East Electricity Board (NEEB), from a comparison of transmission network plans with O.S. maps and the Electoral Register. This was supplemented by information provided by the National Farmers Union, the Ministry of Defence, the Forestry Commission, local politicians and individual householders. All of the households identified received questionnaires.

A list of 3,600 properties thought not to be on the public mains water supply system was compiled from information provided by the Newcastle and Gateshead Water Company, Castle Morpeth Borough Council and the Country Landowners Association. A sample of around 1 in 8 was selected, based on those for which a name and address could be clearly identified, and questionnaires were sent to 452 households.

On electricity 138 responses were received, representing a rate of 73%. 83 of the households responding lacked mains electricity; 68 respondents said they were not satisfied with their present arrangements. About half the respondents were farmers. Most respondents use diesel generators, including 2 who also use wind generators to supplement their supplies. Another uses a wind generator supplemented by a petrol generator. Only two had no supply at all. All of those requiring electricity for business purposes use diesel generators although one business also uses a steam generator. The output of generators used generally ranges from 1Kw to 11.5Kw, but the majority are in the 3-5Kw range.

The main reason why respondents were not satisfied with their present arrangements was inadequate capacity to run all the equipment they wished to use.

A second reason was interrupted supply including both generator breakdown and maintenance problems.

A third reason quoted was high running costs with an average for fuel and maintenance of £950 p.a. Estimates ranged from £250 p.a. for operating a generator for 4-5 hours each day to £2,000 p.a. for a generator serving a farm.
About half of the respondents not satisfied had received or were seeking Electricity Board quotations for the installation of a mains supply. Quotations received in the past 10 years ranged from £3,000 to £38,000 for individual properties, with an average of £12,500.

On this basis, to connect the 68 respondents not satisfied with current arrangements would cost £850,000.

16 respondents had at some time considered the purchase of new diesel generators - the average cost being around £3,000. 14 respondents had considered using wind and/or hydro generators with costs for installation of between £1,200-£8,000 for wind and £3,000-£23,000 for hydro systems.

On water 252 replies were received of which 209 were without mains supply. Of these 158 (76%) were satisfied with their present arrangements. Most of the 209 respondents without mains supply (197) use a ground water source. Of these, 161 come from springs and only 20 from bore holes. 138 households share their supply with others.

Of the 51 respondents not satisfied, 32 share their supply with others and 1 has no supply at all. 12 are farmers and require a water supply for both domestic and agricultural purposes.

Most of the respondents not satisfied were concerned about unreliability - 27 suffered from variable or low pressure and 22 from interrupted supply. Respondents were also concerned about poor quality including odour, colour and taste.

Of the respondents not satisfied, 18 had taken steps to make improvements. 10 had sought Water Company quotations for the installation of mains supply but only 6 had been given specific estimates - ranging from a connection charge of £65 to £9,000 (with an average of £2300). Of the others, 2 were told only that connections would be very expensive and 2 were told that mains supplies were not available. (If correct, this would be illegal).

Because of the concern expressed by Northumberland County Council interviews were carried out as part of this study in Northumberland with the County Council, the North Eastern Electricity Board and the Newcastle and Gateshead Water Company. The North Eastern Electricity Consultative Council were also interviewed and were very helpful in supplying information and copies of correspondence.

The North Eastern Electricity Board estimated that between 300 and 500 isolated rural properties in its area are without electricity of which 200 to 300 are in Northumberland.

There are geographical concentrations in non-supply. About half of the properties not connected are in two clusters: Upper Coquetdale (in Alnwick District) and in the Tyne Valley (Tynedale). Particular mention was made of the area around the Army Camp at Otterburn. The remaining un-connected households were on scattered isolated farms.
The main concern of the local authorities in Northumberland is that existing businesses have been constrained by the lack of electricity. For example, in Tynedale a red deer farm is unable to expand into a fully fledged visitor attraction and a cabinet maker cannot run sufficient power equipment to increase his production. The County Council regard first time electrification as a pre-requisite for farm diversification such as into tourism. There was a general feeling that EEC agricultural policies had made upland farming marginal and that diversification was a way of maintaining living standards.

Although not covered in the survey, or indeed mentioned by the County Council, was a concern expressed by others on the subject of 3-phase. The North East Electricity Consultative Council said that the National Farmers Union was concerned about the absence of 3-phase electricity from large parts of Northumberland, especially in the Wooler area. Although NEEB do not automatically replace single phase with 3 phase there may be a possibility of offsetting the costs of putting in 3 phase to farmers if it was co-ordinated with ongoing refurbishment.

Northumberland County Council is particularly concerned about the high costs of connection and is actively engaged in seeking methods of obtaining grant aid. It was noted that the NEEB was not able to make special financial provisions for rural areas. For farms, under the Agricultural Improvement Scheme MAFF will contribute a 30% grant in Less Favoured Areas and 15% in Lowland Areas. Eligibility for grant depends on the demonstration of increased productivity. For non-agricultural, non-domestic users two methods of financial assistance have been used. Firstly, the RDC is able to make grants available as part of its 25% grant scheme for the conversion of redundant buildings. Secondly, EEC funding through the European Regional Development Fund is available for industry in Assisted Areas. However, Tynedale and much of Berwick on Tweed District have never had assisted area status and more recently it has been withdrawn from Alnwick and Berwick on Tweed. ERDF funding is therefore not a solution available to Northumberland. No grant aid has ever been made available for domestic users.

Northumberland County Council drew attention to the Uneconomic Rural Development Programme (URDP) as operated by the North of Scotland Hydro-Electric Board. It is noted that in those parts of the NOSHEEB areas with assisted area status grant aid has been secured by the ERDF but in Non-Assisted Areas the Board meets the full cost. Eligibility for ERDF funding has therefore not been a determining factor in the implementation of the programme. It is noted that there is no comparable provision in the legislation to any of the other regional electricity boards and there are no plans to incorporate any such provision in the Electricity Privatisation Bill.

The County Council noted that although regional electricity boards other than NOSHEEB are not able to subsidise the costs of connections in rural areas, it is possible (as outlined in Section 2 of this report) for communities of six or more households to requisition a ‘distributing main’ to enable connections to be made. However, the procedure is complicated and requires a considerable degree of commitment and agreement amongst individual householders.
This approach has been taken up by the National Farmers Union. Seventeen farms in the Upper Coquetdale Valley are without electricity and a scheme to connect them in 1983 was assessed at £250,000. More recently the North Eastern Electricity Consultative Council has tried to promote a similar scheme on the Otterburn Range Estate (Coquetdale Farms) owned by the Ministry of Defence. The cost of connection to the fourteen tenants would run to £290,000 (£21,000 each).

The County Council have stated that they are unable to raise any money themselves under Section 136 of the Local Government Act and that in any case they expect this power to be prescribed under future legislation. They therefore look to the Government, and the Rural Development Commission in particular, to provide the grant aid required.

On the subject of water supply, the County Council recognised that only 25% were dissatisfied with the current arrangements. The Council regard water "as of secondary importance" and the main request for its inclusion came from the District Councils. No geographical analysis was undertaken as a part of the survey. However, a previous survey undertaken in 1984 identified 21 small communities which were dependent on private supplies. These are concentrated in Alnwick and Berwick on Tweed Districts, but also includes two settlements in Tynedale and one in Castle Morpeth.

The County Council noted that Water Authorities are able to requisition mains supplies to rural communities under section 36 of the Water Act, 1945 but the costs of provision have to be met by a combination of central Government grants available from either the DoE or MAFF or both depending on the local circumstances, and guaranteed payments from the local authority and consumers.

As outlined in Section 2 of this report, the DoE provides grants of 35% for the supply of mains water to a community for the first time or to reinforce an existing supply subject to an upper limit on cost. MAFF will grant aid the provision of water supply from either a public main or a private source to farm holdings on the same basis as electricity. Recent examples of mains provision in Alnwick and Tynedale Districts suggest that local authorities and consumers need to guarantee payments - usually phased over 12 years - of between 50 and 70% of the capital cost of a scheme. The use of these powers varied between the Districts. Tynedale and Berwick-on-Tweed were generally regarded as being fairly active, the others less so reflecting a desire to restrain expenditure.
In 1988 the Metropolitan Borough of Calderdale undertook a study on behalf of the European Commission into the quality of private water supplies in the district. The purpose of the study was to estimate the degree of compliance with the EEC directive on water supply for human consumption. The study identified nearly 2000 properties using private water supplies with over 5000 people. This represented 2.7% of the Borough’s population. Altogether there were 650 different sources of private water supplies, about half of which supplied single domestic properties. These have evolved over many past decades and have not been replaced with public supplies.

The majority of private water supplies in Calderdale are found in the "upper valley" area. This area extends about 20 kilometres west to east from Todmorden Moor to Halifax and 23 kilometres north to south from Widdop Moor to Moss Moor. The area is largely upland and is deeply dissected by the River Calder and its tributaries. The peat moorlands form the catchment areas for all the water supplies in Calderdale, both public and private. Water issues from the ground where the porous peat meets the impervious rock or clay, some water passes through thepeat and is absorbed into the permeable strata. It water that issues from the moors forms small rivulets which flow down the valley sides into the streams below. The water that finds fissures in the rock or is absorbed into the permeable strata reappears lower down the hillside as a spring. It is usually from these issues, rivulets and springs that private water supplies are collected.

For some supplies, water is directed or channelled into drains through which it flows, sometimes for considerable distances, to the properties which it serves. In other supplies a collection tank may be constructed close to where the water issues; the water is then piped to the properties. In many cases however, a combination of many types of conveyance is employed for example: rivulet, stone drain, stone tank, earthenware pipe, iron pipe or lead pipe.

This century has seen a gradual decline in both agricultural and industrial activity in the area. Over the years land and property has been split into many ownerships. Many of the former farmhouses are now occupied solely as dwellings. The farmland has deteriorated, along with the drainage systems and watercourses. More importantly the knowledge of the source and direction of water courses has disappeared which in the past would have been known to local farmers and/or landowners.

The Borough estimate that 91% of the samples analyzed as part of the study failed to comply with the Directive for one or more parameters. The results are shown in the accompanying table and indicate that there may be some serious health problems associated with these supplies, especially microbiological contamination.
Results of Sampling in Calderdale

Properties using private water supplies 1971
Population (estimate) using private water supplies 5164
Percentage population " " " " 2.71%

Supplies regularly serving more than 500 persons 0
Supplies regularly serving between 50 and 500 persons 8
Supplies regularly serving less than 50 persons 293
Supplies serving one domestic property 349
Total number of Private Water Supplies 650

Degree of Non-Compliance for Individual Parameters*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Maximum Allowable Concentration</th>
<th>Number of Samples failing to comply with MAC</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physico-chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen Ion Concentration (pH)</td>
<td>5.5</td>
<td>241</td>
<td>37</td>
</tr>
<tr>
<td>Sulphates  SO4 mg/l</td>
<td>250</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Aluminium  Al mg/l</td>
<td>0.2</td>
<td>99</td>
<td>15.2</td>
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<tr>
<td>Nitrates  NO3 mg/l</td>
<td>50</td>
<td>8</td>
<td>1.2</td>
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<tr>
<td>Iron     Fe ug/l</td>
<td>200</td>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>Manganese Mr ug/l</td>
<td>50</td>
<td>25</td>
<td>3.8</td>
</tr>
<tr>
<td>Copper   Cu ug/l</td>
<td>3000</td>
<td>1</td>
<td>0.15</td>
</tr>
<tr>
<td>Toxic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead     Pb ug/l</td>
<td>50</td>
<td>154</td>
<td>23</td>
</tr>
<tr>
<td>Microbiological</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total Coliforms 100 ml</td>
<td>0</td>
<td>482</td>
<td>74.15</td>
</tr>
<tr>
<td>Faecal Coliforms 100 ml</td>
<td>0</td>
<td>386</td>
<td>59.38</td>
</tr>
</tbody>
</table>

* Total number of samples = 650

Source: Metropolitan Borough of Calderdale
Environmental Health Department
The report notes that the most effective method of achieving compliance in Calderdale is by extending the distribution system of the public water supply to enable the majority of properties presently using private water supplies to be connected to it. The feeling gathered during the study is that the majority of householders using private water supplies would be reluctant to connect to the public water supply even if it was made available. The reasons for this are twofold: firstly and obviously, the annual charge made for the water through the rates for the property (private water is free); secondly, the perceived dissatisfaction with the public water supply which is frequently discoloured.

There will be a number of properties where connection to the public supply will be impractical. In these cases the best option is for the statutory water undertaker to adopt these private supplies and become responsible for disinfection, treatment and maintenance. The consumers would pay for the water provided in the same manner as other users of the public water supply via an annual water rate. This approach would solve the problems of ownership of the supply, access for maintenance and riparian rights, which cause much confusion at present.

If this course of action is unacceptable, then it will be necessary for individual users of private water supplies to install and maintain domestic treatment units.

Yorkshire Water Authority will only lay mains where the cost of the installation is met from the accrued water rates of the properties served. This in effect means that water mains are not being extended into the rural areas. The Local Authority can, however, use a provision of the Water Act 1973 to guarantee the payment of the cost of water main to the YWA. What this amounts to is that the Local Authority pay the difference between the cost of the mains and the accrued water rates. The Environmental Health Committee has a budget of £10,000 for these schemes, and given the rapidly escalating costs of main laying, very few schemes are undertaken. For example, a recent scheme to connect four properties cost approximately £25,000, so the cost to the Local Authority was almost a third of the budget tied up for twelve years for four properties only.