ROAD VERGES ON RURAL ROADS

Management and other factors

A report based on information given
by County Council Highway Departments
in England & Wales in 1972.

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INDEX

TABLES
(short title)

SUMMARY

This report is based on visits to 45 English and 13 Welsh County Council Highway Departments in 1972 and its object is to give information on the factors affecting the management of land associated with public highways in rural areas. The report is written from the point of view that this land provides habitats for wild plants and animals. An estimate is made of approximately 440,000 acres in the category of 'associated habitat' within the functional boundary of rural highways (excluding the metalled roadway), of which approximately 240,000 acres are grassland managed by mowing and the remainder ditches, boundary features and waste land.

Average costs of mowing for 1971 were: Trunk roads £63 per mile, Class I £37, Class II £30, Class III £24 and Unclassified roads £22; a figure of approximately £3 million was estimated for the overall cost of grass mowing in England and Wales, representing about 4.97% of the overall highway maintenance budget. Costs of tractor mowing have been calculated at an average of £3.50 per acre per occasion, which is considered to be low, for comparison with spraying of growth retarder plus selective weedkiller at £11.31 per acre.

The functions of roadside verges are discussed and related to the reasons for their management in terms of engineering and safety, amenity, weed control, conservation and public relations. The management policies and practices of the 58 counties are described and attention is drawn to the wide range of programmes and methods used. Mowing was almost universally by flail machine, handwork and other machines having been almost entirely superseded. Chemical spraying for total weed control was practiced by all counties; selective weedkillers, mainly for the localised control of agricultural weeds, were used by a majority of counties but about a third did not use them. Growth-retarder sprays, usually with the addition of selective weedkillers, to reduce mowing, were only used extensively by five counties (of which one did not propose to use them in 1973), to a lesser extent by three counties and to a minor extent by eight counties.

The physical structure of verges is discussed and related to factors such as drainage and the desirability of vehicles using the verge as a pull-off. Different kinds of material used to construct or make up verges, and the possible long term effects of these on the vegetation are described, together with the grass seed mixtures used for reseeding bare areas.

Attitudes of County Highway Departments to highway tree planting in general, and boundary reinstatement with especial reference to hedges are noted together with problems of management of established hedges and roadside ditches.

CHAPTER I. EXTENT AND FUNCTION OF ROADSIDE VERGES

INTRODUCTION

This report is based on information given to the author during visits to County Surveyors or their delegated officers at various times during the first half of 1972. The interviews took the form of a set of standard questions and were recorded on a proforma to give comparable data. All the mainland counties of England and Wales, the Isle of Wight and Anglesey were visited with the exception of Middlesex, making a total of 58 (45 English and 13 Welsh) County Authorities.

The object of the survey was to obtain first hand information on various aspects of the policies and attitudes of Highway Departments to the management of roadside verges and other factors relating to them. The need for this information had become increasingly urgent as part of the Nature Conservancy's research programme into the conservation importance and management of roadsides, as well as for giving advice and answering the questions of a wide range of organisations and individuals on these topics.

A previous postal survey in 1964, besides being out-of-date, had not proved very successful through lack of comparability in the replies, although some of the replies did provide some very detailed and useful information. A similar postal survey in 1970/71 by Dr. E.M. Buckle (1971) on behalf of the Settle and District Civic Society, whilst again providing some interesting data, was necessarily limited in its scope.

To some extent the information reported is subjective in that the answers to some of the questions, such as the reasons for mowing road verges, represent the personal opinion of the officer interviewed. However, as this officer was usually either the person responsible for formulating policy, or for implementing it, the report should present a cross-section of the thinking behind policies and principles of roadside management in 1972. During the course of the interviews it was interesting to note that disagreements often arose between officers when more than one representative of a Highway Department was present. This suggested that apart from one or two generally agreed points, such as the need to maintain sightlines at bends and junctions, most other matters to do with roadsides were matters of opinion between one individual and another, or a committee or a pressure group and that these might change with changes in the personalities involved.

This report concerns rural roads, the majority of which are the responsibility of County Councils or County Councils as agent authorities for the Department of the Environment (DoE). So far as the Trunk roads including Motorways under the control of DoE are concerned, management is governed by technical memoranda and directives that are issued from time to time. Nevertheless, in the treatment of roadsides these directives are open to a wide range of interpretation by County Councils

and may sometimes be ignored. Council roads are subject to an even wider range of attitudes, policies and practices, as will be seen. Because of their special interest and creative possibilities Motorway verges, slopes and embankments are the subject of a separate report.

By the time that this report is generally available, the provisions of the Local Government Act 1972 will have come into effect and in some instances very extensive changes in County Boundaries and County administrations will have taken place. Nevertheless, these mostly affect urban areas and except for the amalgamation of Herefordshire and Worcestershire; Huntingdonshire, Peterborough, Cambridgeshire and the Isle of Ely; Leicestershire and Rutland; Cumberland, Westmorland and N. Lancashire; together with some more fundamental changes in Yorkshire and Lancashire and the north east, the effect on rural road administration may not be very far reaching. Regardless of the changes in boundaries, it may be assumed that the same personalities will be involved, even if they are not responsible for exactly the same areas as before. Thus, although this report may not be strictly applicable to the post-1974 County boundary situation, the general matters reported should still be relevant and it is hoped useful to new administrations in defining their policies in regard to what might be described as rural road habitat management.

FUNCTION OF ROADSIDES

The function of roadsides was described by one officer as giving visibility at bends and as a place to deposit apparatus (including that of statutory undertakers), and snow. This might also have been extended to mention safety, as a place to pull off a vehicle in case of emergency, as a place to deposit materials, as a place for drains or as a soakaway for drainage water, and as giving structural support to the road formation. In strictly engineering terms these might be the only functional attributes. However, road verges do have other functions which although incidental and accidental to their main use, are important in social terms. In landscaping, verges play an essential part in 'fitting' a road into its surroundings and in this sense are psychologically important to the road user; they also have amenity functions, which include the separation of pedestrians and horse riders from vehicular traffic and the provision of an area of countryside to which the public has unhindered access within limits imposed by traffic. Road verges are also becoming increasingly recognised for their importance in the conservation of the natural fauna and flora of the countryside. Many aspects of the functions of road verges, together with their management and other factors were discussed at a symposium in London in 1969, to which the reader is also referred (Way, 1969).

ACREAGES AND OTHER STATISTICS

In a previous paper (Way, 1970 from data collected in 1967), a total of 429,186 acres of roadside habitat comprising grass verges, unmanaged areas, ditches and boundary features was calculated for rural roads in England and Wales. It has always been of interest to cross check this figure. In 1972, 16 Highway Departments (28%) were able to give approximate acreages of grass verges mown by them and in one or two instances more detailed figures were available (Tables 1 and 2).

Table 1. Total acreage and average acreage per mile of mown verges on County roads, figures from 1972 survey.

County	Acreage of mown verge	County road mileage	Acres of mown verge per mile of County road
Midland Counties			
Bedfordshire	2500	856	2.92
Huntingdonshire	2000	820	2.44
Leicestershire	4233	1988	2.13
Rutland	600	319	1.88
Warwickshire	2913	2754	1.06
Eastern Counties			
(Norfolk	8439*	4792	1.76*)
Lincoln - Lindsey	8450	2627	3.22
Yorkshire - East Riding	5500	2270	2.42
Southern Counties			
Sussex - East	2290	1634	1.40
Sussex - West	2773	1289	2.15
Southwestern Counties			
Cornwall	2000	4041	0.49
Somerset	1523	4260	0.35
Pembrokeshire	4000	2023	1.98
Upland Counties			
Derbyshire	2093	2202	0.95
Breconshire	900	1109	0.81
Glamorgan	762	1373	0.56
			av 1.65 (excluding Norfolk)

(*Estimated from mileage of different classes of road in Norfolk at standard verge widths of 12 ft for Trunk roads, 10 ft for Class I, 8 ft for other classified and 6 ft for unclassified. Assuming whole area mown.)

Using the average figure of 1.65 acres of mown land per mile of road from the table and assuming that this represents 64% of the total acreage of available habitat (including hedges, ditches and other areas, not necessarily all on highway land) associated with A roads, 50% of the total habitat acreage of B road verges and 52% of the total habitat acreage of C road verges (data from 1967 survey, unpublished), on 6,143 miles of A(T) road, 12,863 miles of Principal road and 120,629 miles of 'other' roads (MOT statistics for County roads 1968, data used in 1970 calculations), a figure in this survey of 439,769 acres has been obtained for the overall acreage of land associated with highways in England and Wales, excluding the metalled carriageways. This figure compares with 457,240 acres for 'roads' in Britain given by Stamp (1962) and 513,000 acres by Best (in Stamp, op.cit.). However Stamp's figure was based on an average width of 21 feet, whilst Best's was based on an average of 60 feet for Class I roads, 15 feet for Class II and 24 feet for Class III, so that (with the exception of Best's figure for Class I roads) their figures more nearly apply to the acreage of metalled road per se, as opposed to the total acreage taken up by highways in the wider sense. In fact the widths used by them are about half those found for the average width of the whole highway (e.g. metalled road, verge and boundary) in the Nature Conservancy's 1967 survey (unpublished), and if one assumes that the other half is verge and 'habitat' as defined above, there is a reasonable level of agreement between their figures and the figure of 429,186 acres of verge for England and Wales from the 1967 survey and 439,769 acres from the 1972 survey.

Whilst there is encouragingly close agreement on the total acreage of verges from the data collected in 1967 and in 1972 there is some discrepancy between the calculations of acreages associated with different classes of road: A roads were calculated at 14,927 acres in 1972 (81,398 in 1967), B roads at 42,448 in 1972 (98,395 in 1967) and other roads at 382,394 in 1972 (249,393 in 1967). This results from lack of detail in the 1972 data; it is generally true that the more important roads have wider verges and a greater acreage of land associated with them in proportion, so that the acreages for class of road calculated from the 1967 data would be more likely to be correct than those deduced from the 1972 figures.

Two counties were able to break down their acreage figures to class of road and give average figures for widths of verges that are of interest (Table 2).

Table 2. Acreages of mown verges by Class of road. Somerset and Glamorgan. Recent date.

	Class of road and mileage		Av. width of mown verge	Acreage mown (both sides of road)	Av. acreage mown per mile of road
Somerset	T	117	6'3"	175	1.56
	I	407	4'4"	442	1.1
	II	294	4'1"	300	1.0
	III	1569	3'7"	1411	0.9
	Unclassified	1873	3'3"	1521	0.8
	Total	4260		3849	
Glamorgan	T	61	3'3"	54	0.8
	I	260	1'2"	87	0.3
	II & III	422	2'9"	308	0.7
	Unclassified	630	2'0"	313	0.5
	Total	1373		762	

Unfortunately both Glamorgan and Somerset are counties with narrow verges and represent only one end of the topographical range (Table 1). The very narrow verges on Class I roads in Glamorgan may stem from the fact that many of these roads are in industrial or built up areas, or run in valleys. No figures from other counties giving detail of this sort were available, nor considered as being of more than academic interest by highway departments; although with increasing application of work study to highway maintenance operations (see Chapter 3) they may become of greater concern in the future.

Taking again the figure of 1.65 acres of managed roadside per mile of road, and the 1968 MOT statistic of 140,116 miles of county roads, the acreage of grass cut on roadsides in England and Wales works out to 231,191 acres. Indications are that about 75% of the approximately 12,000 acres of Motorway banks and verges are cut, giving a further 9,000 acres and an overall total of managed land of approximately 240,000 acres. This figure compares with the figure of 300,000 acres given by Chadwick (1969) as an estimate of the acreage of roadside verges under the control of highway authorities in the English counties.

OCCURRENCE OF ROADS

In Table 1 the counties have been grouped in a number of obvious geographical relationships and it is interesting to note that the average acreage/mile of mown verges tends to fit into the same pattern. It would be wrong to try to draw too many conclusions from the data and no doubt excellent reasons could be adduced to

explain aberrant results for any of the counties individually. Nevertheless there are clear differences between the upland counties, the southwestern counties, and the rest; it is evident that there is scope here for interesting work on the historical, topographical and land use aspects of road development. In addition the density of roads for individual counties has been calculated by dividing the total road mileages from the 1972 data into the county acreages (Municipal Yearbook, Anon. 1973) (Fig. 1). In this figure the majority of counties fall into an arbitarily drawn band that indicates, as might be expected, that the mileage of County roads increases with the acreage of the county. On this analysis Pembrokeshire, Warwickshire, Cornwall and Devonshire have a slightly greater mileage of road, whilst Lancashire, Northumberland and North Riding have a much less mileage, and Essex, Lindsey, Cumberland, Westmorland and Wiltshire a rather less mileage for their size than might be expected. It should be noted that these calculations are based on mileages of County roads and do not include roads, mainly in built up areas, administered by other authorities. The acreages of these authorities are however included in the county figures.

Not too much significance should be attached to this analysis, which does, however, indicate a remarkably uniform density of rural roads over the Country as a whole.

CHAPTER 2. REASONS FOR MANAGEMENT

Chadwick (1969) at the London symposium on Road Verges gave the following requirements for a verge maintenance policy:

"(a) to ensure the proper surface water drainage of the highway;
(b) to provide a footwalk or refuge for pedestrians (not necessarily paved);
(c) to prevent obstruction by overhanging trees or hedges, both within the width of the highway and for visibility;
(d) to provide visibility at bends and junctions;
(e) to control those weeks listed in the Weeds Act, 1959;
(f) to preserve and where possible to improve the amenities of the road and the adjoining countryside."

Underwood (1969) at the same symposium gave the following engineering functions of a verge management policy:

"(a) to maintain the stability of the road structure, that is by ensuring that slopes and cuttings are not subjected to erosion or "slips". To prevent vegetation from encroaching on the carriageway or obscuring kerb lines and interfering with passing pedestrians and vehicles;
(b) to provide adequate visibility at bends and junctions;
(c) to allow light and air to the road surface thus avoiding deterioration from continuous dampness, and preventing icy conditions during periods of sub-zero degree (C) temperature in the winter."

The report of the (Marshall) Committee on Highway Maintenance (Anon, 1970), under the heading of Amenity Functions, states that the object of grass, tree and hedge cutting is "to prevent obstructions of sight lines at bends and traffic signs, to inhibit the growth of injurious and other weeds (in accordance with the Weeds Act 1959), to maintain a tidy appearance and, in the case of trees adjoining roads, to prevent them becoming a danger to road users". The Committee report goes on to discuss briefly some of the factors affecting standards of grass cutting and mentions the interest of conservation organisations in respect of wildlife.

In the 1972 survey, Highway Department officers visited were asked to give the reasons for management of roadside verges as practised by their County Council, in order of priority if possible. The results of this enquiry are shown in Table 3; the reasons should be taken in most instances as referring specifically to the mowing of roadside grass.

Table 3. Number of County Highway Authorities giving stated reasons for management of roadside verges and indication of priorities. 58 authorities.

	First priority	Second priority	Lesser
Safety and visibility	50	8	0
Amenity	5	16	15
Keeping the highway unobstructed	2	0	5
Weed control (including the 1959 Weeds Act)	0	10	23
Drainage	0	13	7
Control encroachment of woody plants	1	0	3
Access to hedges and ditches	0	0	4
Maintain stability of the formation	0	0	3
Provision for pedestrians*	0	0	2
Litter control	0	0	2
Enable vehicles to pass in narrow lanes	0	0	1
Tradition	0	0	1
Snow control	0	0	3

*Generally included under 'safety'.

In contrast, five counties specifically said that control of vegetation for pedestrians was no longer generally required, twelve counties specifically did not count weed control as a reason (including two counties who did not consider measures even against statutory injurious weeds under the provisions of the Weeds Act), twelve did not think that grass cutting had any effect on drainage and nine were not influenced by amenity considerations.

From this information, reasons for mowing roadside grass can be divided into a) those for engineering and traffic purposes, and b) those for amenity, weed control, wildlife conservation and public relations purposes. Not included in this analysis are other management works on roadsides that are necessary from time to time for purely engineering reasons, such as siding (the shaving away of soil and vegetation from the edge of the metalled road) or the maintenance of drainage grips

ENGINEERING AND TRAFFIC

These are divided into considerations of safety, and considerations of the engineering aspects of the road formation.

Safety

All counties cited safety as a prime reason for grass cutting, although eight did not give it top priority and three others added qualifications on economic or resource grounds. All counties emphasised the requirement to maintain sight lines on bends and at junctions and many included visibility of traffic warning and other signs. Although a number mentioned pedestrians within the general heading of safety and all counties were especially concerned about the hazards for children walking to school, the majority of counties either provided made-up footpaths where there was much pedestrian traffic, or relied on pedestrians to create and maintain their own paths by use, or did not have a general problem with pedestrians. A small number of counties were concerned about making provision for horse riders but in one county there was an antipathy to horses because of the damage that they did to the verge. Several counties attached importance to the psychological effects on drivers of a feeling of enclosure from vegetation crowding in on the carriageway and the actual danger of damage to paintwork of vehicles especially by woody vegetation, leading motorists to keep to the centre of the road. Clear delineation of the edge of the highway and revealment of obstacles in the case of motorists running-off the carriageway onto the verge were further points mentioned.

Whilst there is no doubt about the safety aspects of kerb revealment, sight-lines at dangerous bends and junctions and the clearance of road signs, the general contribution of roadside grass mowing to safety is an article of faith rather than an established fact. Mr. Jenner (1969 and private communications), the County Surveyor of Hampshire, reporting on the Hampshire County Council policy not to cut roadside verges in 1968, stated that he and the Chief Constable were satisfied that there was no increase in the accident rate in the County in that year on that account. They thought in fact that people tended to drive more carefully when the visibility was restricted by uncut vegetation. Nevertheless, whilst there had not been an actual increase in the accident rate, they thought restricted visibility on roads with already substandard alignments could increase the risk of accident. Standards of alignment of roads are relative to the speed of the traffic using them, and in many country roads it might be argued that by increasing the standard the Authority is only inviting the motorist to go faster and increase for other reasons the risk and severity of collisions. Similarly an analysis of accidents by the Police in Gloucestershire in 1971 did not indicate that long grass obstructing visibility was a contributing factor in any accident (pers. comm.).

The purpose of these remarks is not to suggest that safety is not an important reason for managing road verges, but rather that an uncritical assumption that mowing verges is essential to safety may not always be true.

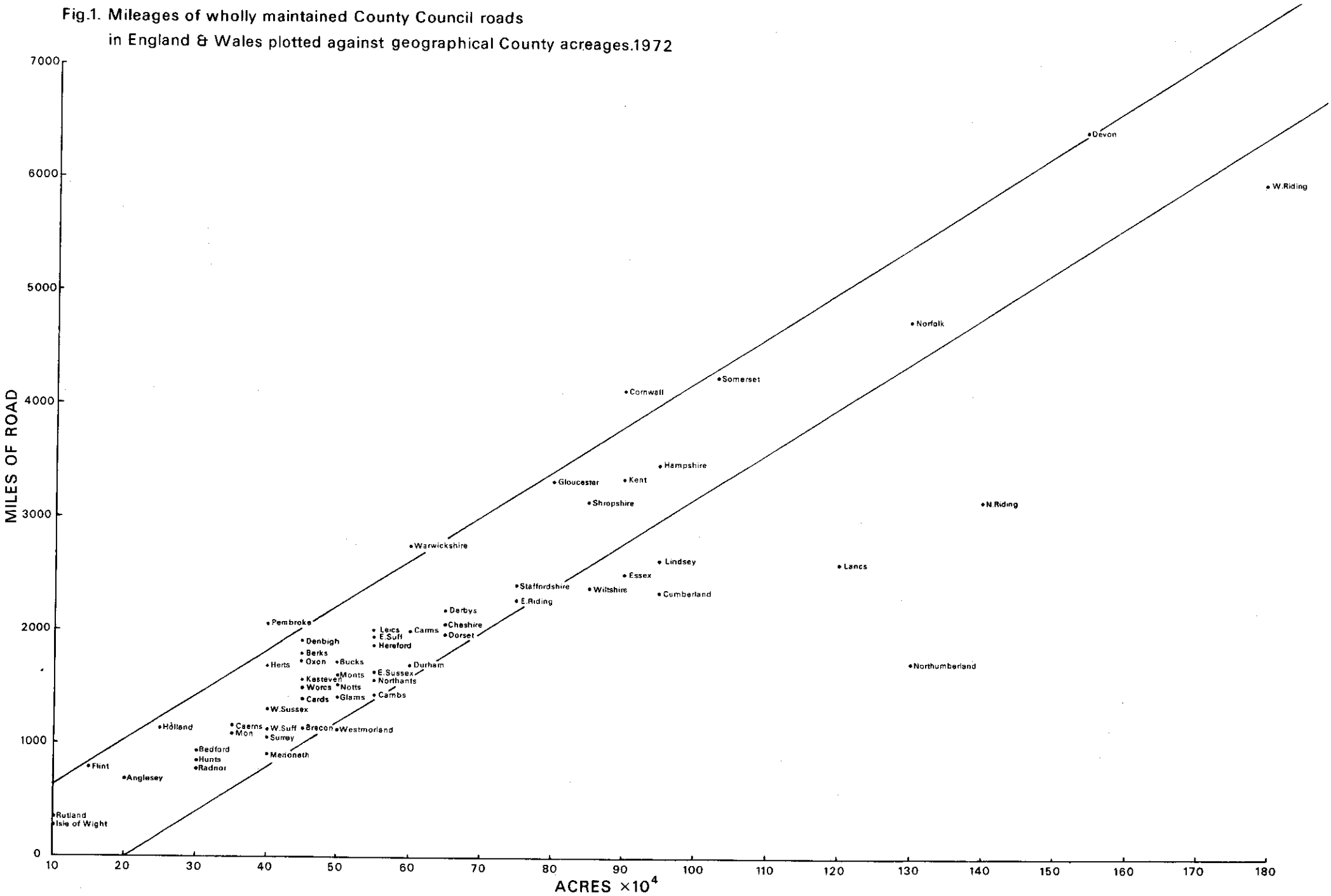
Engineering

In purely engineering terms, the management of road verges would be concerned with maintaining the stability of the road formation, and primarily with questions of surface and subsurface drainage.

Although 20 counties gave drainage as a reason for cutting roadside vegetation (Table 3), another 20 did not consider this a factor and were more concerned about keeping their drainage grips and channels clear by other methods. It is a matter of observation that mowing machines often ride over and miss the sides of drainage grips and channels leaving long tufts of vegetation. Consequently ordinary mowing may contribute little to water movement. It is likely that several of the 20 counties who did give drainage as a reason were in fact thinking more specifically of channel clearance as a management operation, as opposed to grass mowing. However, there were six counties who mentioned the advantage of letting air and light into the highway to help keep it dry and this could be a useful aspect of mowing. Two counties noted blocking of pipes by roots; other counties mentioned the effects of vegetation extracting sub-soil water in the course of growth. Eleven counties described problems with accumulation of cut vegetation blocking drains; one said this problem did not occur with flail cuttings, another said that flail cuttings were less of a problem than haymower cuttings, two others said that flail cuttings were much more troublesome than those from the haymower. In connection with the drainage of the verge itself one county noted how much more difficult wet verges were to cut than dry ones, although with side mounted mowing machines this was less of a problem as the tractor itself did not necessarily have to travel over the wet ground.

Although not specifically mentioned, one of the engineering functions of roadside vegetation is the control of erosion by binding the formation together. Plants with different rooting characteristics have varying importance in this respect and management to encourage a wide variety of plants ranging from deep tap rooted species to wide spreading fibrous rooted ones would give maximum support. Management of newly sown areas following road improvement is recommended with this object in mind at a period when the formation may be especially liable to erosion (DoE Technical Memorandum T5/68).

Fig.1. Mileages of wholly maintained County Council roads
in England & Wales plotted against geographical County acreages.1972



Fire and snow control were other highway reasons given. Only one county mentioned fire as a hazard from uncut vegetation in dry periods. Although roadside fires do occur their occurrence is relatively rare and so unpredictable that fire prevention is not a prime reason (as it is for instance in parts of America) for grass cutting in Britain.

Nine counties mentioned snow in connection with verges, but only two gave it as a reason for cutting vegetation: both were Welsh upland counties. One county found on moorland roads that rushes (Juncus spp.) were particularly associated with anchoring snow and starting drifts. Generally verges were found useful for banking up snow from the carriageway and in one county this was given as an ancillary reason for widening verges. Two counties mentioned damage to verges (and particularly kerbs) from snow ploughs and the need to reconstitute affected areas.

AMENITY

Amenity in one form or another was discussed by all the speakers at the 1969 symposium (Way, 1969) in London and at a second symposium in Edinburgh in 1970 (Way, 1970A). A wide range of opinion was expressed as to what constituted amenity, but it did seem that 'what was appropriate' should be applied to built up areas, whilst 'natural development' was desirable for rural roads in the countryside. General criticism revolved around the extension of suburban standards of tidiness into rural areas, and applied to major roads as much as to minor ones.

It is assumed that the aims of amenity management are threefold:

(a) to provide a pleasant appearance in the context of the surrounding areas;
(b) for recreational use by walkers, horse riders, picnickers, naturalists, where appropriate and also nesting areas for pheasant, and other game;
(c) for control of litter.

From Table 3, 36 counties mentioned amenity as a reason for cutting vegetation including five who gave it as the main reason for doing so with greater priority than safety. Thirteen counties, however, either did not think that amenity was an economic reason for management or were only concerned with it in built up areas. In order to catch the flavour of this very subjective topic some edited comments are given (numbers of counties, where more than one, expressing the same view, in brackets) on the question of amenity as a reason for management:

(a) Keep in perspective (3)
(b) Requirements vary with the place (2)
(c) Only in built-up areas
(d) The most important reason (5) Stressed as a reason
(e) Not a country/rural problem (8)
(f) A consideration, not a reason. Not a factor (4)
(g) Tidiness not wildflowers (8) No public pressure for wild flowers

(h) Not necessarily tidiness (3) except possibly on motorways complimented for leaving flowers
(i) Encourage spring flowers. Don't try to make a lawn (2)
(j) Appearance and amenity includes 'weeds'.
(k) Matter of cost, would like to cut more. Uncut areas at back of verge look 'scruffy'.
(l) Close mown grass = tidiness = view of the public and the traveller.
(m) Houseproud, pride in neat and tidy appearance (3)
(n) Tourist area (4). Keep tidy, cut right back, looks neater.
(o) Not a parks department. Amenity cutting kept to a minimum.
(p) Aim to keep as natural as possible in rural areas.
(q) Pressure from urban and suburban people coming out to live in the country to keep the verges tidy.
(r) Country people complaining about untidy verges.
(s) Mainly country people complaining about loss of wild flowers
(t) Avoid disturbance of pheasants' nests (5) and local landowners
(u) Litter control (2) Tidy verges remain tidy.
(v) Farmers want on verges (wildflowers etc.) what they have lost in their own fields.

and to sum the situation up:

(w) Give a pleasant impression. Road to fit the surroundings.
(x) The public expects road verges to be cut and the Highway Department would consider that good enough.

In built-up areas the problems of hay-fever sufferers might well be considered under this heading, though whether they would regard the control of pollen production by cutting in June an amenity or a necessity, is debatable. However, control of grass for this purpose is only a practical possibility in built-up areas and villages.

Clearly there are amenity reasons for managing roadside verges, even if they are interpreted differently by different people. However, this does imply active management as for engineering purposes, with an assessment of the differing aspects of amenity appropriate to different areas, including natural development in its place, just as much as tidiness.

WEED CONTROL

Weeds as undesirable plants on roadsides fall into three categories:

(i) highway weeds obscuring sightlines and signs. Plants that encroach onto the carriageway or damage it,
(ii) agricultural weeds and the statutory obligations under the Weeds Act (1959),
(iii) amenity weeds that are considered unsightly, e.g. hogweed (Heracleum sphondylium), or likely to invade gardens, e.g. dandelions (Taraxacum officinale).

Highway weeds

These are specifically tall growing plants that can cause a visibility hazard, of which cow parsley (Anthriscus sylvestris) was mentioned by 27 counties, nettles (Urtica dioica)(including an element of unsightliness) by 14, hogweed (Heracleum sphondylium) (also considered unsightly) mentioned by five counties, hemlock

(Conium maculatum) by three counties and rosebay willow herb (Chamaenerion angustifolium) by four counties. Japanese knotweed (Polygonum cuspidatum), an aggressive potential problem plant, was mentioned by two South Wales counties. Other plants that were mentioned by name as highway weeds were in fact objected to on some other sort of amenity ground or supposed public dislike. These included meadow sweet (Filipendula ulmaria), brambles (Rubus spp.), docks (Rumex spp.), poppy (Papaver spp.), charlock (Sinapis arvensis), dandelion (Taraxacum officinale) and coltsfoot (Tussilago farfara).

Agricultural weeds

The problem of roadsides as a source of agricultural weeds and the economic significance of any that do occur is discussed elsewhere (Chancellor 1969, Way 1970). The relevance of the statutory obligations of the 1959 Weeds Act in respect of docks (Rumex crispus and R. obtusifolius), thistles (Cirsium vulgare and C. arvense) and ragwort (Senecio jacobaea) as problem agricultural weeds in 1973 is criticised. It is argued on ecological grounds that the cutting of roadside verges has no influence on the weed flora of agricultural land over the country as a whole, although in specific and very local areas or in the neighbourhood of high value seed crops, weed control on roadsides would be in the interests of good husbandry.

Nine counties gave control of agricultural weeds generally as a priority reason for cutting roadsides and twenty four counties gave the statutory provisions of the 1959 Weeds Act specifically as the reason (totals in Table 3). Within these totals eleven counties gave weeds generally and seven counties the Weeds Act as a consideration for management. Nine counties did not consider weed control a reason for cutting roadsides, including one county which had no sympathy for farmers on this question. In connection with the Weeds Act, twenty four counties mentioned docks, sixteen mentioned thistles and thirteen ragwort as the species about which they received complaints.

Amenity weeds

There are a number of plants such as docks, mugwort (Artemesia vulgaris) and hogweed that are considered by sections of the public as being unsightly; and others such as dandelion as being traditionally and uncritically as weeds, or such as nettles as being dangerous. A number of highway departments considered that they had a duty to control plants of this sort, especially in the vicinity of built-up areas, as part of their public relations and that this was another reason for roadside management.

Whereas certain plants in certain places are undesirable or cause a hazard, this should not in the 20th Century brand them as universally objectionable. The question of what is or is not a weed under given circumstances is still treated highly subjectively, whereas there would be advantages if the existing knowledge about the characteristics of these plants were applied objectively. This applies particularly in relation to agricultural weeds and to 'amenity' weeds as described above.

CONSERVATION

Whereas ten or even five years ago it would have been unusual (but not impossible) to find a County Highway Department that considered or was sympathetic to wildlife conservation as a factor in roadside management, it was encouraging in 1972 to discover a wide measure of interest in conservation as a useful function of the land associated with highways.

Eleven counties (Cambridgeshire, Devonshire, Hampshire, Isle of Wight, Kent, Leicestershire, Surrey, West Sussex, Worcestershire, North Riding and West Riding of Yorkshire) had policy documents, minutes of County Council and Departmental meetings or instructions to mower operators, that specifically referred to conservation. It is possible that other counties also had similar documents which were not available at the time of the survey. In addition the majority of counties had some degree of liaison with the County Naturalists' Trust and arrangements for protecting sites of particular wildlife interest.

The importance of areas such as roadsides in the conservation of wild plants and animals has been widely recognised by the public as well as by ecologists, and was discussed by a number of authors at the symposia on Road Verges already referred to; in discussing the importance for Conservation generally of these areas, emphasis was placed on management. It follows, ipso facto, that the interests of wildlife conservation are further reasons for the sympathetic management of roadside verges by Highway Departments.

PUBLIC RELATIONS

In formulating their verge maintenance programmes counties are clearly influenced by what people (either in organisations, or individually) say they want. Where there is a conflict of interests, grounds for taking one course of action or another are necessary. In so far as the wishes of the people can be identified, satisfying public opinion is a good reason for managing roadsides.

It has been said that conservationists want the verges left alone, town dwellers want them kept as lawns, farmers want them cultivated, and Highway Departments want to save cash. Whilst in practice there is not quite this

degree of polarisation of ideas between the different interests, Highway Departments do receive two basic complaints from the public: either there is too much cutting or too little. These views are expressed either through organisations or by individuals. Organisations (e.g. AA, RAC, CPRE, CPRW, NFU, Naturalists' Trusts) tend to work through the County Highways headquarters, whilst individuals also do this, or else approach the Area/Divisional surveyor direct. However, it should be noted that in any county the number of complaints in any one season may number fewer than a dozen unless a really controversial policy is adopted, such as the non-management policy of Hampshire in 1968, when there may be a great deal of comment both by individuals and by organisations.

In general there is greater public pressure for more cutting rather than less, and although much of this is probably related to tidiness in built up areas, there may be an undercurrent of public feeling that tidiness should also be extended into the countryside, allied with concern for safety, more often expressed by country dwellers themselves. Parish Councils are active in demanding high standards, although there appears to be an element of competitiveness, one Parish complaining when it finds that another Parish's roads have been cut before its own.

Whilst complaints of insufficient cutting tend to be associated with built up areas or local safety hazards on sight lines, complaints of too much cutting tend to be more concerned with the general treatment of verges in the countryside, and the effects of this on natural development and wildlife. The transformation of a lushly growing, colourful area into a brown mulch of cut vegetation calls for a great deal more comment than is ever expressed in formal communications to Highway Departments. It is also, possibly, easier to comment on something that has not been done rather than in the negative sense about something that has been done. For this reason complaints about over-cutting are confined to a relatively small number of correspondents.

Whilst the complaints of individuals very often receive more attention than is generally realised, the comments and constructive suggestions of organisations, as representing a greater number of people and often resulting from public discussion, are more valuable to Highway Departments.

Farmers represent a special case in the countryside. Because they are responsible for the look of so much of the land (urban dwellers have generally no responsibility in this way) they can be forgiven for being concerned about adjacent areas not under their control. Farmers' interests in roadsides are shown below under a number of headings with the numbers in brackets of counties in which a particular factor was mentioned by the Highway Department as having been the subject of discussion.

Weeds (22)
Physical access to hedges and ditches for management (13)
Sightlines to farm and field entrances and safety in general for pedestrians and farm traffic (6)
Use for haymaking or grazing (6)
Use as potential cultivatable land (including encroachment) (5)
Use as areas for dumping (storing) sugar beet, dung, etc. (2)

In most counties the NFU (National Farmers Union) handle general complaints on the part of farmers, but in fact only six counties mentioned specific liaison over roadsides with the local NFU so that it can be assumed that roadside management is not a very pressing problem with farmers at county level.

SUMMARY

Table 4 has been drawn up to summarise the principle points dealt with in this chapter, and to suggest the importance that might be given to the various factors.

Table 4. Suggested priorities that might be given to stated reasons for roadside verge management. A general assessment based on practical and economic considerations.

Category	Main reason	Good reason	Reason	Consideration	Not a good reason
Traffic and Engineering	Safety, especially: i. Maintenance of sightlines and revealment of traffic signs. ii. Delineation of the highway. iii. Control of encroachment of vegetation onto/into the carriageway.		Drainage Erosion control Pedestrian refuge	To eliminate fire hazards. To provide a place for snow banking. To provide a pull-off for vehicles. To encourage pedestrians and horse-riders to keep out of the way of traffic.	
Amenity	i. Tidiness and litter control in built-up areas. ii. Maintenance of a pleasant and natural appearance in rural areas.	Encouragement of attractive wild plants and natural features in rural areas.		To provide opportunities for recreational walking, picnicking etc. For horse riding. For recreational parking of vehicles and caravans (if approved as a use of the ground).	Attempts to achieve suburban standards of tidiness in rural areas.
Weed control	Control of local severe infestation of agricultural weeds in vicinity of high value crops.	Control of weeds in early years of establishment of a new sward following road improvements etc.	To control tall growing highway weeds.	To comply with the provisions of the Weeds Act (1959).	General attempts to control unspecified agricultural weeds.
Wildlife Conservation		To provide positive management for wildlife conservation as a useful function of the land.			
People	i. For public relations generally. ii. To help farmers with field entrances and access to hedges and ditches for maintenance.		To meet reasonable complaints from organisations.	To meet reasonable complaints made by individuals.	To meet unspecified complaints about untidiness, or unspecified complaints of weeds, unattractive plants, poisonous plants and 'hurtful' plants (e.g. nettles).

CHAPTER 3. MANAGEMENT POLICIES AND PRACTICES

This chapter outlines the various management policies and practices for grasscutting on the roadside verges of roads in rural areas of England and Wales. In Table 5 (pages 22-27) a synopsis of information from the 58 counties is presented, grouped so far as possible in terms of the treatment of the different classes of road in decreasing order of priority. It will be seen that management policies vary widely between the counties, and also within the thirteen subgroups identified. Looking at the variety of programmes for Trunk and Principal roads (or in some instances Trunk roads only) (Table 6, page 28) it will be seen that there are at least eighteen different timings, frequencies and widths of verge cutting for these classes of road alone, not including the ten counties in group 19 that do not fit into any of the other groups. An attempt has been made to produce a similar table for Class III and Unclassified roads but this became so complicated as to be quite unrealistic. The conclusion to be drawn from this great variety of methods of verge maintenance may be, that up to very recently, control of vegetation has not been a subject for more than a moderate degree of management concern. However, now that the management of roadsides is becoming a more sophisticated operation, compared to the previously autonomous activities of the lengthsmen or the haphazard operations of small farmers on contract, the situation is changing.

In 1972 it was evident that some counties (Table 5) exercised strict central control from the Highway Department's headquarters, whilst in other counties responsibility was almost completely delegated to Divisional or Area Surveyors to discharge within the limits of their budgets. With the introduction of Bonus Incentive Schemes, Work Study and programming of work (see also Chapter 4) there is likely to be an increasing amount of central control although this will still have to be interpreted on the ground according to vagaries of weather, availability of labour and machines and the actual need for grass cutting. Central control becomes more complex in those counties that have widely varying topography or land use, as for example between coastal areas and high moorlands, or holiday areas and areas of intensive agriculture. There will always, therefore, be a significant degree of delegation from Central Headquarters to Divisions and scope for interpretation by the officers in charge of them. It will, consequently be necessary that a sympathetic understanding of the various criteria for management is shared not only between headquarters staff, but also between the managers and work people directly concerned with the work on the ground. In addition where cost/benefit assessments are made and applied to Incentive Schemes, it will be important that concern about costs is not allowed to override judgements about the varying levels and quality of the benefits. Incentive Schemes tend to encourage

quantity of product but not quality, unless there is a higher level of supervision than is normally possible for such work as roadside grass cutting.

It will be seen from Tables 5 and 6 that, in spite of some highly publicised opinion, there are very few counties who use growth retarder/selective weedkiller sprays on a significant scale (Gloucestershire, Staffordshire, Carmarthenshire) or on a more limited scale (Worcestershire, Breconshire, Glamorgan) on Trunk or County roads. Two quite extensive users of sprays (West Suffolk and Monmouthshire) have recently (1972/1973) stopped or very much reduced their use. The subject is more fully discussed in Chapter 4. It will also be seen that for rural areas the majority of counties cut no more than three times on major roads and less frequently, often only once a year, on minor roads. Many counties have adopted a policy of 'intensively' managing only the first one or two swaths (a swath = the cutting width of the machine used) next to the carriageway with less frequent management of other areas, even on Trunk roads. It will be seen for instance in Table 6 that Groups 2 - 5 delay the cutting of the back verges until the autumn whilst others in Groups 6 - 8 never cut these areas unless a specific problem arises. Only Lincolnshire - Holland, Cheshire, Somerset and West Sussex* appeared to apply a rather intense system of management; the former claimed to have very wide verges and only to cut three swath widths on each occasion, whilst Cheshire, Somerset and West Sussex claimed to have very narrow verges on twisting roads, where two swath widths might often be the whole extent of the verge. It should be noted that these programmes only apply to rural areas, and that all counties emphasised the priority of maintaining sight lines on corners and at intersections of all classes of road, so that these areas generally receive more intense management. However, Table 6 also shows that for Trunk and Principal roads many counties (Groups 9-11, 14-18) cut the whole verge in the period June/July/August during the time of greatest growth and flowering of wild plants. It is no doubt this mid-season cutting of the whole verge and destruction of stands of plants in full flower that elicits the majority of public complaint on amenity or conservation grounds on roads of all classes.

There have been very great changes in the status and management of verges from the time of the early use of chemical sprays in the early 1950s, and the phasing out of the traditional lengthsmen and hay-mower machines in the late 1950s and during the 1960s. It is probable that over the next few years with changes in the organisation of local government, the need to economise on non-productive works and the growing public awareness of the amenity and conservation

*A different policy introduced in 1973.

aspects of roadsides, that a more uniform and rational approach to management will evolve. It is to be hoped that it will be possible then to follow the resulting policies consistently over many years so that the socially useful amenity and conservation attributes of verges can have a chance to develop naturally in the long term. It is not envisaged, necessarily desirable or even practical, that every Authority should follow exactly the same programme but it is desirable that there should be some agreement over which practices are beneficial, and which are not, and some greater understanding of their effects. It seems therefore, that after a twenty year period of considerable change, there is now the likelihood in the forseeable future of a period where the criteria for, and methods of, grass control will not change very much. It will be important for the countryside that programmes of vegetation control to be practiced during this period are practical, economic and sympathetic to the natural as well as the engineering features of the considerable acreage of land involved. At the present time, however, it is some measure of the fluidity of the situation that seven Counties (Devonshire, Hampshire, Isle of Wight, Warwickshire, West Suffolk, West Sussex and the North Riding of Yorkshire)have more or less altered their programmes for 1973 from that of 1972.

The following papers on roadside management have been issued by the Ministry of Transport and by the Department of the Environment. Circulars are issued as advice to Local Authorities in general, whilst Technical Memoranda are instructions issued to agent authorities only.

August 1955	Circular 718 to all Highway Authorities. Advice on the subject of the use of phenoxyacetic acid based hormone weedkillers. Based on an agreement with the Nature Conservancy.
April 1956	Circular 726 to all Highway Authorities stressing dangers of spray drift from the use of weedkiller sprays and of damage to crops.
March 1965	Technical Memorandum T2/65 to agent authorities for Motorways and Trunk roads. Instructions for the establishment and maintenance of grass side slopes, verges and central reservations. Including standard maximum heights of vegetation and mowing frequencies required to achieve them.
- 1967	Circular Roads 45/67 to all Highway Authorities. Advice on the care and maintenance of trees and hedgerows so as to retain amenities without endangering road users.
September 1968	Technical Memorandum T5/68. Superseding T2/65 to agent authorities for Motorways and Trunk roads. More exact instructions and details on the maintenance of established turf, and on the use of chemicals with reference to conservation of wildlife.
- 1970	Marshall Committee report on Highway Maintenance. Section 16 to Appendix 1 "Standards for Amenity functions" include grass cutting.

July 1971	Letter HE 138/4/02 to Divisional Road Engineers (DoE), Welsh Office and Scottish Development Department stressing conservation value of roadside verges and requesting that this should be brought to the attention of Highway Authorities for consideration in the management of their roadsides.
April 1971	Technical Memorandum H4/71 to Agent Authorities for Motorways and Trunk roads. Instructions on the treatment of central reserves of dual carriageway roads, including management of grass.
July 1973	Circular 90/73 to update circular 45/67 on the Inspection, Maintenance and Planting of Trees on rural roads.
- 1973	Circular in preparation, updating the specific advice on the use of weedkiller/growth regulator sprays originally set out in Circular 718 of 1955, and giving advice on general aspects of roadside management, the frequency and time of cutting of grass.
- 1973	Technical memorandum in preparation to update T5/68.
- 1973	Circular, in preparation (to amplify Circular 99/72 on 'Tree Planting Year 1973') on the Inspection, Maintenance and Planting of Trees on Urban roads (see Circular 90/73 above).

Although a number of these papers were issued as instructions for the treatment of verges on Motorways and Trunk roads, it is evident from Table 6 (for Trunk roads) that they have been interpreted very widely and a similar situation obtains for Motorways (Way - report in preparation).

In addition, an attempt was made in 1966 by the British Standards Institute to produce a British Standard for the maintenance of grassed areas, including different types of verges classified as 'fine', 'medium' and 'rough'. This Standard has not yet been published, partly through lack of interest from potential users (pers com.).

Table 5. Management of rural roadside verges by the County Councils of England and Wales, grouped according to similarities of approach on the different classes of road, 1972.

GROUP A. Trunk roads treated differently to other classes.

COUNTY	TRUNK	PRINCIPAL	CLASS II	CLASS III	UNCLASSIFIED
1. KENT Detailed policy with Headquarters control.	Flat areas cut frequently to keep to a maximum height of 6 ins. Banks cut once a year when convenient.	3 or 4 cuts. Keep first swath to 6 ins. by cut in April/May and again immediately following completion of first round. Can have a third cut following the second. Fourth cut of the whole verge September - November, or the third cut can be delayed and be of the whole verge in September - November period. Aim to have all verges in a tidy state by beginning of the winter.			
YORKSHIRE, W. RIDING Detailed policy drawn up in 1968, revised in 1971.	3 cuts of level verges up to 10 ft. from carriageway in May, July and August/ September. Other areas 1 cut but not in spring/early summer.	A. Central reserves and areas between carriageway and footways, 2 cuts in May and August/September. B. Between footway, or carriageway (where no footway) and effective boundary 2 cuts of one swath in May and August/September. Other areas, including slopes, between effective and actual boundaries left uncut or 1 cut in August/September as appropriate. No cutting in rural areas where grass is less than 9 ins. Slopes to be all cut or not cut at all to avoid artificial discontinuities. Moorland roadverges not cut, often grazed.			
ANGLESEY	2 cuts, whole width, May and August.	2 cuts at most, start in May, finish in August/September. In fact most verges are banks. In many instances will only cut the visibility splays and leave the rest.			
PEMBROKESHIRE Topographically very varied and no overall County policy. Left to Divisional Surveyors discretion.	3 cuts, of whole verge, in May, June/July and August, mainly for holiday traffic.	A. In south and areas of faster grass growth. Essentially 3 cuts: first swath all round in May, first swath and remaining areas cut in June. First swath again all round in August and other areas as necessary for safety etc. Faces of hedge banks cut in June/July. B. Slower growing areas and the North. Safety areas cut at the end of May. All other areas, 1 cut starting end of June and taking may be two months to get round all the roads, so some verges not cut until August.			
2. SUFFOLK, WEST In 1973 it was expected to control growth by cutting and that there will be no contract spraying. Local applications may be made on visibility splays by direct labour.	A. Spray MH/24D, 18 miles of A45(T), up to 6 ft, both verges; whole verge width cut in autumn. B. Remaining mileage 2 cuts, one in summer and one in autumn or as required.	A. Spray MH/24D to 50% of verges, either 3 ft. or 6 ft. in May and either respray in June or cut at some time. B. Remaining mileage 2 cuts first in May of one swath and the whole verge in the autumn.	2 or 3 cuts as required of first swath during summer. Whole verge in September. Some local use of growth retarder on bends. Will cut right back to the boundary on any road at request of Parish Councils.		
WESTMORLAND Controlled from Headquarters.	Including amenity Cl I roads in Lake District. 2 or 3 cuts of the whole verge to maintain at a height of 4-6 ins. Start at end of May in south of the County and a bit later in the north.	2 cuts, first swath end of May and second cut of whole verge in July/August.	1 cut of one swath about July/August. Some roads never cut. Wide differences in growth in different parts of the County and between lowlands and uplands.		
CARMARTHENSHIRE Controlled from Headquarters.	All sprayed up to 8 ft, MH/24D, and cut once later. Unsprayed part of verge cut at time of cut of sprayed area.	A. Some sprayed with the Trunk roads. B. Others 1 cut in June, or 2 cuts in May/June and in August.	1 cut per season as convenient. Roads generally very narrow.		
3. LINCOLN, LINDSEY	4 cuts. First three of one swath, start April/May and go on to fourth cut in Sept. On one occasion (not necessarily the last) cut whole width of verge.	Principal 3 cuts, two of one swath begin in May, third of whole width in September.	Class I & II non-principal $2\frac{1}{2}$ cuts, two of one swath and a final full width cut every other year.	1 cut per year of remaining verges as convenient.	
4. NORTHUMBERLAND Working towards Marshall Committee recommendations. Controlled from Headquarters in accordance with published programme.	Eight week cycle starting in late May, continuing to Sept. (e.g. about 3 cuts) of first 6 ft. Remaining level areas on the occasion of the second cut, and slopes and banks at the same time.	As (T) except slopes and banks cut every second year; but side banks to ditches cut yearly.	Sixteen week cycle for first 6 ft, (e.g. 1-2 cuts), side banks to open ditches cut once a year, all other areas every other year.		1 cut of first 6 ft. or as required for visibility. Side banks to open ditches 1 cut per year; all other areas every third year.
SHROPSHIRE Guided by Marshall Committee recommendations and MOT circular T5/68.	2 cuts, full width both times, first in May and second when vegetation reaches about 12 ins.	2 cuts of 2 swaths as for (T). Back verge never cut, no problems.	Cl II and trafficked Class III also others in cuttings, 2 cuts of one swath, in May and subsequently as required. Back verges not cut.		III and Unclassified generally: 1 cut of the width necessary for safety.

COUNTY	TRUNK	PRINCIPAL	CLASS II	CLASS III	UNCLASSIFIED
5. GLAMORGAN County policy to cut as often as required to avoid having to pick up cuttings. Otherwise left to Divisional Surveyors discretion.	Generally as often as required to avoid picking up. Depends on which Division, e.g. East cut fortnightly from first week of April, South and West monthly, North less frequently as mostly hill areas.	Principal roads up to 5 cuts at four to six weekly intervals for flat areas. Start cutting banks in mid-May.		Non-principal, mostly hedges and banks, 2 cuts; first at the end of May/beginning of June, second in August/September.	
6. ESSEX County policy.	3 cuts of level areas in May, July, and end of season, mainly by contract. Banks uncut.	3 cuts, first two of one swath in May and July. Third cut of whole verge possibly in September.			2 cuts, first of sight lines, and second of one swath. Back verges not cut and apparently no problems.

GROUP B. Trunk and Principal roads treated differently to other classes.

COUNTY	TRUNK	PRINCIPAL	CLASS II	CLASS III	UNCLASSIFIED
1. BEDFORDSHIRE	3 cuts. First in May/June of one swath, second whole verge in July, especially to control weeds. Third in autumn of one swath.		Essentially the same as more important roads but with less priority and often less frequently. Aim to cut all areas during the main growing season to control weeds.		
BERKSHIRE	3 cuts. First in late April of one swath, second of whole verge and third of one swath by the end of September.		2 cuts, first of one swath during late spring/summer, second of the whole width in autumn.		
CHESHIRE	5 cuts. First in May whole verge, also third and fifth of whole verge. Second and fourth cuts one swath only. Aim to keep vegetation to 6 ins. for visibility; as roads often twisting easier to cut whole verge than be selective.		4 cuts if start in May, or 3 if start in June. Early cuts of one swath only, final cut in September/October of whole verge. But note that some hill roads very narrow or remote and are rarely if ever cut.		
CUMBERLAND Generally at discretion of Area Surveyor.	2 cuts, at end May/beginning of June and six-eight weeks later, of full width but depending on growth of grass. Most but not all Principal roads, and all (T) roads treated in this way.		Generally one swath 1 or 2 cuts per year on a cycle with more important roads having priority, but at the discretion of the Area Surveyors who also apply their discretion to cutting of back verges, some of which never get cut. In hill areas lack of growth and grazing combine to give control in many places.		
DERBYSHIRE Policy governed by limitation of resources.	3 cuts on an eight week cycle. First and second cuts of two swaths, final cut in autumn of whole verge.		2 cuts of two swaths on a twelve week cycle. Every second year one of the cuts will be of the whole verge. Thus half the mileage of verges are intended to be cut full width each year.		
DEVONSHIRE New policy document in 1973. Based on DoE recommendations and report of a working party accepted by the Roads Committee of the C.C.	On new verges aim to maintain vegetation at 6 ins. to promote good grass sward establishment. Thereafter first 6 ft. of verges and central reserve etc. to be kept to 6 ins, remaining areas to 12 ins. by approx 6-8 and 12-16 week cutting cycles respectively. Slopes only to be cut when needed for visibility, weed control, reduction of fire hazard, access to structures, after die back in the autumn.		3 cuts, first of one swath in April/June, second of up to two swaths if necessary in June/September, and third in September onwards whole width of all flat verges. Banks and hedges only cut for visibility or other strictly highway purposes.		
DURHAM Generally depends on the availability of men and machines.	2 cuts. First at end of April/beginning of May of one swath. Second all flat areas cut back at a time depending on amount of growth, aiming to leave tidy for the winter.		2 cuts, with some very minor roads only having 1 cut in the period June/July. One swath only as a rule but cut remaining areas every two or three years to control woody growth and give access for ditch cleaning etc.		
GLOUCESTERSHIRE Working toward Marshall Committee recommendations. Wide discretion left to the Divisional Surveyors.	A. Spray about half the mileage with MH/24D or MH/MCPA 6 feet wide in late April or May. May have to cut once before spraying if application is delayed. B. 3 cuts of first two swaths (6 ft.). Back verges of all areas cut in September or some years not at all.		1 or 2 cuts in early summer and again in the autumn usually of one swath. Back verge not cut. No general application of chemical sprays on these roads.		
HAMPSHIRE New policy for 1973 with emphasis on wildlife conservation. Drawn up at a meeting of Divisional Surveyors and accepted by the Highways Committee of the C.C.	2 cuts: Flat verges one swath of 8 ft. wide by rear mounted flail starting 1 June. Remaining areas, central reserves and ditches at time of second cut beginning 1 September. Banks and narrow verges one swath of 4 ft. with midmounted flail beginning 1 May (or two swaths if required). Second cut all areas after 1 September. Inaccessible areas to be left unmanaged.		2 cuts. First of one (or two if necessary) swath starting 1 May with midmounted flail or where economic an 8 ft. swath on flat areas with rear mounted flail. Second cut following the first of whole verge going as close as possible to hedges and ditches without damaging them.		

COUNTY	TRUNK	PRINCIPAL	CLASS II	CLASS III	UNCLASSIFIED
LANCASHIRE Varied topography. No overall policy except to minimise expenditure.	2 cuts. Start in June.		1 cut except for some very minor roads where there may be no cutting in any given season. Cutting is mainly for weed control and must be done by 1st of August. Start cutting as late as possible to save money, but actual date may depend on the state the vegetation was left in at the end of the previous year. *Special problems* exist in the Lake District.		
LEICESTERSHIRE County instructions based on Marshall Committee recommendations.	4 cuts or as required to keep the first swath down to 6 ins. in height from May to September. Remainder of verge 1 or 2 cuts, in May and in autumn to keep vegetation to 12 ins.		2 cuts of first swath in May and in autumn to keep height down to 12 ins. Remainder 1 cut, in autumn, after dispersal of seed of wild plants. Cuttings and embankments generally kept to 12 ins. In general permitted maximum height of vegetation related to traffic density of the road.		
LINCOLN - KESTEVEN	A. A1(T) 5 cuts, all areas, between April and October. B. Others, 3 cuts, late April/May, June and autumn, one swath. Remainder of verge no management until necessary and maybe none at all in any given season.		2 cuts, of one swath, beginning after the more important roads have had their first cut, usually end of May or into June and second in the autumn. Back verges nothing until something is necessary.		
STAFFORDSHIRE	Spray plus 2 or 3 cuts. May apply additional spray in the autumn. Third cut of the whole verge, but sprays and other cuts of 6-8 ft. width. Sprays have been used for 10 years or more.		2 cuts, in early summer of one swath, and whole verge later in September. Will spray if thought appropriate.		
SUFFOLK - EAST	3 cuts, starting in April and ending in September. First two of one swath, final cut of whole verge. On dual carriageway roads keep vegetation to 4-6 ins.		3 cuts if possible, with last cut of whole verge. If a whole width cut not possible in any one year on a particular road, then it will get priority for cutting whole width the next year.		
SUSSEX - EAST	3 cuts. First in May of one swath, second in July of whole verge and third in September of one swath. Whole verge cut in July as machines have difficulty with dense vegetation later in the year.		Following the first cut of major roads cut other roads either a) full width, or b) one swath only. As cycle continues, verges may get up to 3 cuts but those that were only cut one swath early on, will not have back verges cut unless there is a serious complaint about weeds, untidiness, etc. Decision to cut whole verge or only one swath made on Highway safety and engineering criteria only.		
WARWICKSHIRE Headquarters control following work study investigations. Policy under discussion with view to possible changes.	A. Spray 16 miles selected by-passes and central reservations with MH/24D in April and again in June to obviate cutting. Began in 1968 with spraying of areas difficult/dangerous of access but have extended applications to adjoining areas as the opportunity arose. B. 3 cuts of remaining mileage, first in May/June of one swath, second of whole verge in July/August and third to tidy-up in the autumn.		2 or 3 cuts. If only two cuts, the second will be of whole verge in the autumn rather than during the summer.		
WORCESTERSHIRE	A. Spray 15% of mileage with MH/24D late April/beginning of May, plus a cut later if required. B. 2 or 3 cuts starting in May of a 6 ft. swath. Back verges cut in the autumn.		2 cuts of one swath. Back verges generally left uncut.		
YORKSHIRE - E. RIDING	2 cuts, first in May of one swath, second of whole verge in August, or 3 cuts with the whole verge cut in mid-summer and one swath otherwise.		2 cuts on priority basis after principal roads, first cut of one swath, second of whole verge. Some may not get the second cut in a particular year and so will get priority in the next year. Scrub will be allowed to develop up to 5 ft. from the carriageway. Some very minor roads may not get their verges cut at all in a particular year.		
YORKSHIRE - N. RIDING Based on MOT Technical memo T5/68, DoE memo H4/71 and recommdations of the Marshall Committee. Headquarters control.	1 cut of ordinary verges of dual carriageways, central reserves and some of the wider verges of rural principal roads. Otherwise maintain front verge to 6 ins. in height and back verge to 12 ins. by cutting as required. On moorland roads only one swath maintained and this to be kept to 12 ins. in height.		Maintain to maximum of 12 ins. in height generally by 2 cuts, first of one swath in May/June and second of whole verge in August. Moorland roads one swath only, 2 cuts to control weeds.		
BRECONSHIRE Divisional Surveyors have wide discretion.	A. Spray about 150 miles of verge MH/24D in spring and again later if required. B. 3 cuts, whole verge in early-mid May, July and autumn.		*Where practicable 1-3 cuts per year, normally whole of flat areas. Dates of cutting* depending on availability of machines and to some extent on requirements of nesting birds, flowering plants etc. Quite large areas of steep banks, common land etc. where no management is carried out.		

COUNTY	TRUNK	PRINCIPAL	CLASS II	CLASS III	UNCLASSIFIED
2. SOMERSET Cutting policy evolved in 1963.	4 cuts of the whole verge (but verges tend to be narrow) starting in April and going on until September/October in a 5-6 week cycle. Keep height of vegetation to about 9 ins. Final cut mainly to tidy up for the winter.		2 cuts of whole verge. First in May/June after Principals complete, second in the autumn. Hedges and banks - 1 cut up to 8 ft. height if within 6 ft. of the carriageway.	2 cuts generally but done on a priority basis so that some minor roads will get first cut after second cut of other roads.	
SUSSEX - WEST Evolving a new classification of roads with minimum maintenance for the lowest category. Radical change of policy to be introduced in 1973.	6 cuts of whole verge in April/May and finish in September on a 4 week cycle.		6 cuts: 5 of a single swath and a final whole width cut at the end of the season.	4 cuts: 3 of a single swath and a final whole width cut at the end of the season. Roads in deep cuttings left with slopes unmanaged and natural vegetation encouraged.	
RADNOR Largely left to discretion of Divisional Surveyors.	Generally 3 cuts, whole verge on each occasion. First cut in May/June, others as required. Cutting starts earlier in the eastern valleys. On high ground very little growth and usually only one cut per year required.		Generally 2 cuts of the whole verge, first cut early in the season, second for winter tidy-up.	1 cut generally in autumn to tidy-up for the winter.	
3. BUCKINGHAMSHIRE Overall Headquarters control but wide discretion left to Divisional Surveyors.	3 cuts of two swaths, with the back verge cut sometime after June, usually in August.		2 cuts of two swaths, back verge every second year.		1 cut of two swaths. Remainder every third year.
CORNWALL County policy based on Marshall Committee recommendations.	3 cuts of two swaths, first between end of April/beginning of June, second in June/July, third in August/October. Remaining areas not managed though programme only dates from 1971 so may have complaints in the future.		1 cut of two swaths in late June/July and possibly a tidy-up cut at end of the season. Remaining areas not cut (see Principal roads).		1 cut of two swaths in late June/July. Remaining areas not cut.
HEREFORD Working towards recommendations of the Marshall Committee.	3 cuts. First in May/June and second in July of two swaths, third in September generally of whole verge. These roads have priority for use of cutting machines.		2 cuts. First of one swath in May/June. Second as convenient of whole verge in late summer/early autumn.		1 cut of one swath as convenient each year.
HUNTINGDONSHIRE Working towards recommendations of the Marshall Committee.	3 cuts. First in May of one swath, second and third later, both of whole verge. (On the A1(T) cut all flat areas on each occasion).		2 cuts. First of one swath in May and later of full verge.		1 cut full width per annum.
LINCOLN - HOLLAND Overall control influenced by Agricultural considerations.	3 or 4 cuts of three or four swaths to keep down to a maximum of 12 ins. Remainder of verge only cut by request, mainly for weed control.		4 cuts of two swaths to keep to a maximum of 12 ins. Remainder of verge never cut except by request.		3 cuts of one swath to keep to 12 ins. approximately.
NORFOLK Based on MOT Technical memo T5/68 and Marshall Committee recommendations. Discretion left to Divisional Surveyors.	Two swath width kept to maximum height of 6 ins, remainder to 12 ins. by cutting as and when necessary.		2 cuts of one swath on level verges with further cut at the discretion of the Divisional Surveyor. Full width cut every other year or sometimes longer intervals.		1 cut of one swath per annum.
CARDIGANSHIRE	3 cuts. First in May and third in late summer/autumn of full width. Intermediate cut of one swath only.		2 cuts. First in May/July of whole width, second in autumn of one swath. Follow principal roads in rotation depending upon importance.		1 cut in late season of whole width to tidy-up for the winter.

GROUP C. Trunk, Class I and II treated differently to the rest.

COUNTY	TRUNK	CLASS I	CLASS II	CLASS III	UNCLASSIFIED
1. DORSET	3 cuts. First cut in April of one swath, second 8 weeks later of whole width and third in October also full width.			1 or 2 cuts depending on intensity of use of road. First cut whole width, second of one swath.	
FLINTSHIRE Influenced by topography.	3 cuts, first in May of one swath, and a full width cut at some later date.			1 cut usually in late summer/autumn of the whole verge.	
MERIONETHSHIRE Working towards recommendations of the Marshall Committee. Discretion left to Divisional Surveyors.	3 cuts. First in May of one swath, second in July of whole verge and a final cut of the whole verge in the autumn. Verges generally very narrow except where there have been widening schemes.			1 cut in July or later of the whole verge. Quite a lot of handwork on the minor roads and in the hills. Generally, cutting carried out as required.	
MONTGOMERYSHIRE Working towards recommendations of the Marshall Committee.	2 cuts of one swath, first in May, second in July/August. Growth starts earlier in the low lying areas and is greatest there. Any road over 900 ft. only cut once because of the lack of growth.			1 or 2 cuts depending on intensity of use: if cut once, usually done in July or later.	
2. MONMOUTHSHIRE Generally left to discretion of Divisional Surveyors.	2 or 3 cuts of one or two swaths on each occasion. Either May and June/July, or May, June/July and August. On priority roads second cut may be made before first cut on other roads. Back verge left unless it is very untidy.			2 cuts in June and July/August. Bus routes get priority.	1 cut at end of season in August. Many are very narrow.

GROUP D. All roads except Unclassified treated the same.

COUNTY	TRUNK	CLASS I	CLASS II	CLASS III	UNCLASSIFIED
SURREY	2 or 3 cuts of one or two swaths beginning April/May and continuing up to September, but no cutting of back verges before August in order to conserve wild plants. Many roads very narrow and two swaths would often take in most of the verge. This is general policy for most roads down to busier Class III.				1 cut per annum or sometimes every other year, but generally at least one swath per year not before mid-August if possible.
CAERNARVONSHIRE	3 cuts. Two swaths for the first and second cuts in May and July, whole verge cut in August. Special amenity roads get more attention. Note that many roads are metalled from boundary to boundary and drainage is piped.				1 cut of whole verge in August.

GROUP E. Priorities not necessarily related to class of roads.

COUNTY	TRUNK, CLASS I, CLASS II, CLASS III and UNCLASSIFIED
CAMBRIDGESHIRE County policy evolved after discussion with Conservation and other County organisations.	Three zone policy with more important roads having priority for resources: A. First swath, 4-5 cuts on main roads down to 1 cut on lowest priority. Average of 3 cuts. In the period mid April/May continuing until September, mostly on a 6-8 week cycle. B. Second swath. Generally 2 cuts at time of second and third cuts of first swath. C. Remainder. 1 cut in August/September to fit in with general programme.
HERTFORDSHIRE A minimum maintenance policy based on work study, centrally controlled.	Generally cut the first swath on all roads on standard cycles depending on work study, routing of machines, traffic density of road. Not necessarily associated with class of road. Not more than 6 cuts, more usually 2. Cutting starts in April/May, ends in September. Remainder of verge is cut when it starts to be a problem but would not allow scrub to develop.
ISLE OF WIGHT Policy under review.	Minor roads have priority. Generally 2 cuts at least for all roads. First cut in April/May of whole verge, second in June/July, and third in August into September to tidy-up for the winter on roads where visibility is the greatest problem.
NORTHAMPTONSHIRE	Generally 3 cuts, first swath in May/June, second in June/July full width and third cut as required for visibility. All roads do not get the same treatment but policy is for at least one full width cut all round by the end of the year (October).
NOTTINGHAMSHIRE	2 cuts all round County road begin in early May with two swaths (about 6 ft. 6 ins.), and in July whole verge all round up to the hedge. Finally selected roads would get a further cut of two swaths.

COUNTY	TRUNK, CLASS I, CLASS II, CLASS III and UNCLASSIFIED
OXFORDSHIRE A minimum maintenance policy.	(T) and Class I roads kept to higher standard than the remainder. Generally one swath width all round beginning in April and thereafter as required. Remainder of verge 1 cut per year, often in the winter.
RUTLAND County policy centrally controlled.	2 or 3 cuts. All roads start early May and cut one swath all round the County. May take major roads first, but only in so far as most economical route allows. When first swath complete, all round the County again in July/August of whole verge, although will not cut unnecessarily. A small length of major roads and other priority places will have a final single swath cut in autumn.
WILTSHIRE County policy.	3 cuts of one swath through the season on all roads. Back verges not cut.
DENBIGH	Aim to cut all verges full width at some time in the season. Priority given to visibility on (T) roads at beginning of season. Start in May with a cut of one swath, when completed start on other roads depending on their importance. When all cut come back to (T) and Principal roads for second cut of two swaths. These roads will have a third cut later, as required, of whole width of verge and at about same period in late summer or autumn other roads will have their second cut, also of the whole width.

Table 6. Grass cutting programmes for Trunk and Principal (Class I) roads, 1972. Showing approximate month of cutting and number of swaths cut.

Group	County	Ref. to group in Table 5	No. of cuts	Times and width of cut. (x1 = one swath; x2 = two swath; xW = whole width; A = April, M = May, J = June, Jy = July, Au = August, S = September, O = October) 1	2	3	4	5	6	Notes
1	Notts	E	2	M x 2	Jy x 2					
2	Durham	B1	2	M x 1		S x W				
	Montgomery	C1	2	M x 1	Jy/Au x W					
3	Suffolk E	B1	3	M x 1	Jy x 1	S x W				
	Suffolk W	A2	3	M x 1	Jy x 1	S x W				Where not sprayed. Trunk roads only.
	Surrey	D	3	M x 1	Jy x 1	S x W				
4	Bucks	B3	3	M x 2	Jy x 2	Au x W				
	Worcs	B1	3	M x 2	Jy x 2	S x W				
	Caerns	D	3	M x 2	Jy x 2	S x W				
5	Cambs	E	3	M x 1	x 2	x W				
	Denbigh	E	3	M x 1	Jy x 2	S x W				
6	Kesteven	B1	3	A/M x 1	J x 1	J x 1				Except A1(T) cut whole verge five times.
	Wilts	E	3	M x 1	Jy x 1	S x 1				
7	Cornwall	B3	3	M/J x 2	Jy x 2	S/O x 2				
	Derbys	B1	3	M x 2	Jy/Au x 2	S/O x 2				
	Glos	B1	3	M x 2	Jy x 2	S x 2				Where not sprayed.
	Hereford	B3	3	M/J x 2	Jy x 2	S x 2				
	Monmouth	C2	3	M x 2	Jy x 2	Au x 2				
8	Lindsey	A3	4	M x 1	J/Jy x 1	Au x 1	S x 1			Whole verge cut on one of the occasions. Trunk roads only.
	Herts	E	3 or 4	A/M x 1	x 1	x 1	x 1			
9	Beds	B1	3	M x 1	Jy x W	Au/S x 1				
	Berks	B1	3	A/M x 1	J/Jy x W	O x 1				
	Northants	E	3	M/J x 1	J/Jy x W	S x 1				
	Rutland	E	3	M x 1	Jy x W	Au/S x 1				
	Staffs	B1	3	M x 1	Jy x W	S x 1				
	Sussex E	B1	3	M x 1	Jy x W	S x 1				
	Yorks E	B1	3	M x 1	Jy x W	S x 1				
10	Northumbs	A4	3	M/J x 2	Jy/Au x W	S/O x 2				Trunk roads only.
11	Dorset	C1	3	A/M x 1	J/Jy x W	S/O x W				
	Hunts	B3	3	M x 1	Jy x W	S x W				
	Warwicks	B1	3	M/J x 1	Jy/Au x W	S x W				
	Merioneth	C1	3	M x 1	Jy x W	S/O x W				
12	Cards	B4	3	M x W	J x 1	S x W				
13	Leics	B1	4	M x W	J/Jy x 1	Jy/Au x 1	S/O x W			
14	Cumbs	B1	2	M/J x W	Jy/Au x W					
	Lancs	B1	2	J x W		Au/S x W				
	Salop	A4	2	M x W	J/Jy x W					Trunk roads only.
	Anglesey	A1	2	M x W	Au x W					
15	Essex	A6	3	M x W	Jy x W	S/O x W				Trunk roads only.
	W'morland	A2	3	M/J x W	J/Jy x W	Jy/Au x W				Trunk roads only.
	Yorks W	A1	3	M x W	Jy x W	S x W				Trunk roads only.
	Brecon	B1	3	M x W	Jy x W	S/O x W				Where not sprayed.
	Pembs	A1	3	M x W	J/Jy x W	Au x W				Trunk roads only.
	Radnor	B2	3	M x W	J/Jy x W	Au x W				
16	Holland	B3	3 or 4	M x 3	J/Jy x 3	Au/S x 3	S/O x 3			Wide verges.
	Somerset	B2	4	A/M x W	M/J x W	J/Jy x W	Au/S x W			
17	Cheshire	B1	5	M x W	J x W	Jy x W	Au x W	S x W		
18	Sussex W	B2	6	M x W	J x W	Jy x W	Au x W	S x W	O x W	Change to new policy in 1973.
19	Devon	B1	)							
	Hants	B1	)							
	I. of Wight	E	)							
	Kent	A1	)							
	Norfolk	B3	)	Either insufficient information, impossible to summarise or a new programme since 1972.						
	Oxford	E	)							
	Yorks N	B1	)							
	Carms	D	)							
	Flints	C1	)							
	Glamorgan	A5	)							

CHAPTER 4. VERGE MANAGEMENT - METHODS AND COSTS

This chapter discusses the methods of management of roadside vegetation by machines or chemicals, and estimated costs. It should be noted that the information on which it is based was collected in 1972 but generally refers to 1971.

MACHINES

Four kinds of machine, conventionally described as flail, (reciprocating) cutter bar or haymower, horizontal rotary cutter, and cylinder cutter, are available in a variety of forms for grass cutting and vegetation control. From Table 7 it will be seen that the flail is almost universally used in rural areas, replacing hand labour and the cutter bar over the period approximately from 1963 to 1970. The majority of these machines are owned by County Councils although in some instances, notably Durham, Cambridgeshire and Essex, the machines are generally hired on contract. Flails were developed from silage harvesters by the Hampshire County Council in 1963 and have gone through a number of hydraulically operated or direct drive type modifications over the intervening years. Current models are versatile and powerful; although it is claimed by a small number of Councils that flails cannot satisfactorily deal with dense vegetation after the middle of July, most Councils do not have this difficulty. The limiting factor may be the power available from the tractor rather than any inadequacy of the cutter itself. The outstanding advantage of the flail has been the mulching of the cut vegetation, encouraging its biological breakdown and eliminating the problem of carting. Rotary machines also mulch the vegetation but are less versatile, only operating satisfactorily on the flat. Flails are available in rear mounted or side mounted forms, greater width of cut is possible with the rear mounted (up to 7 feet) machines and these are most economically used on the flat. As the cutting head necessarily follows the tractor these machines cannot be used on most ordinary roadside banks, but with specially modified low centre of gravity tractors (e.g. as pioneered in Leicestershire) they can be used on slopes up to 1 : 3 on the Motorways and similar areas providing the ground is dry. Side mounted machines are more flexible, usually equipped with a 3 foot to 3 foot 9 inches cutting head, although more recent models may go up to 6 feet. Most Highway Departments find that 3 foot 9 inches is quite adequate and that the 6 foot head is too wide for general work. Machines in common use reach out in an arc from the tractor from 5 feet to 23 feet depending on the model, the most popular ones reaching out to about three widths of the cutting head or approximately 10 feet. The heads can be angled to cut either the near or the far side of adjacent hedges or banks, or to reach down to clean out the near or far side of ditches or at any other angle between these extremes. Because the tractor can very often operate from the carriageway, use of the machine is not restricted by wet ground conditions. Mini-

Table 7. Types of cutting machines used in rural areas for grass cutting by County Councils in England and Wales, 1972.

Beds	Flails.
Berks	Flails. Height regulated to cut at about 4 ins. Have been used in the County exclusively for the last 3 to 4 years.
Bucks	Flails beginning in 1963/1965 period. Some rotary and still some cutter bars.
Cambs	Mostly flails, but some cutter bars used by Contractors.
Cheshire	Flails and rotary. Height of cut regulated.
Cornwall	Cutter bars to 1969 (with picking up) and gradually more flails. All flails since 1971.
Cumberland	Mostly flails. Less than 50 miles by cutter bar.
Derbys	Mostly flails on rural roads.
Devon	Flails.
Dorset	Flails. No cutter bars since 1966.
Durham	Mostly contract cutting by flail but still some by cutter bar.
Essex	Flails.
Glos	In November 1971 had 32 flails and 4 cutter bars.
Hants	Flails. Last cutter bar in 1965.
Hereford	Flails. Cutter bars up to about 1966.
Herts	Flails. Change over from cutter bars over the last 10 years.
Hunts	Flails. Last cutter bar on contract in 1970.
I. of Wight	All side mounted flails since about 1964.
Kent	Flails. Height regulated at 1 to 2 ins. Change over from cutter bars in the 1968 period.
Lancs	Flails.
Leics	Mostly flails, height regulated to 4 ins. Still have some cutter bars in one Division.
Holland	Height regulated flails. Some haymaking by farmers using cutter bars.
Kesteven	All flails since 1971, previously a decreasing number of cutter bars.
Lindsey	Mostly flails. Change over from cutter bars since 1967. Rear mounted flail used where possible for economy.
Norfolk	Flails. Height of cut set on own machines but not on necessarily Contractors.
Northants	Flails, best on banks and uneven ground but not so quick as cutter bars on the flat. Some haymaking.
Northumbs	Flails. Last cutter bars in use about 1969.
Notts	Mostly flails, occasional cutter bar used by farmer contractors.
Oxford	Flails, height regulated.
Rutland	Flails. Some farmer contractors with cutter bars. A little haymaking by farmers.
Salop	Mostly flails, some cutter bars on contract.
Somerset	Flails, last cutter bars in 1964/65.
Staffs	Mostly flails but also some rotary cutters.
Suffolk - East	Flails, height regulated. 7 ft. rear mounted for flat areas, 5 ft. side mounted may be too big and 3 ft. often adequate.
- West	Flails since 1968. Operators told to cut at height of 3-4 ins. generally, but closer in the autumn.
Surrey	Mostly flails.
Sussex - East	Flails set to cut at not less than 3 ins. A little haymaking by farmers.
- West	Flails set to cut at not less than 3 ins.
Warwks	Flails.
Westmorland	All flails since 1969.
Wilts	Flails.
Worcs	Flails.
East Riding	Mostly flails but some cutter bars and farmer contractors using cutter bar.
North Riding	Flails, some on contract, also some cutter bars on contract.
West Riding	Flails, height regulated to cut at 2-3 ins. Also hired flail and cutter bars.
Anglesey	Flails. Cutter bars replaced over the last 5 years.
Brecon	Flails. Last cutter bars about 1962.
Caerns	Flails. Went straight from handwork to flails.
Cards	Flails.
Carms	Flails, height regulated at 3-4 ins. Last cutter bar in 1969/70.
Denbigh	Flails.
Flints	Flails, height regulated at 3-4 ins. Last cutter bar about 1966.
Glamorgan	Flails, also some triple gang mowers where possible. Very concerned about grass cuttings being left to lie.
Merioneth	Flails. Never used cutter bars.
Monmouth	Flails.
Montgomery	Flails, height of cut regulated on own machines but may not be on hired ones.
Pembs	Flails with height of cut set 'fairly high'.
Radnor	Flails since early 1960s, height regulated at about 2 ins.

tractor or pedestrian operated forms are available for use in places inaccessible to larger machines.

Rotary cutters, as noted, are best used on the flat or small angles of slope and are most commonly used for amenity cutting in urban areas or on prestige roads in the country. Because they cut the vegetation rather than macerating it, they need less power and are faster. Hand and mini-tractor operated forms are again available and are useful in places inaccessible to full scale tractor equipment.

Cylinder mower machines are only suitable for use in intensively managed high-amenity situations, and are not of interest in the context of this report. They are unlikely to be more widely used because of the high risk of damage to the cutters from stones and litter, their inability to cut coarse vegetation and the need for a smooth unobstructed surface on which to operate.

The reciprocating cutter bar haymower, now almost entirely replaced by the flail, was, even in its more sophisticated modifications, essentially an agricultural machine. Not being purpose-designed for use on roadsides and similar areas it was essentially a stop-gap between the hand labour of the lengthsmen and the coming of modern equipment. It had two major drawbacks in not being sufficiently robust, and in the need in many situations to pick up and cart away the cut grass, unless the vegetation was frequently mown and cuttings were too short to pose a problem. Nevertheless it had some advantages: the power requirement was low because the vegetation was cleanly cut at the base so that the height and volume to be cut was immaterial. In the hands of a skilled operator it was quicker and less tiring to operate (requiring less concentration and being quieter with less vibration and dust), especially in its mid-mounted form. The width of cut was 4 to 5 feet, rather more than the average side-mounted flail, which contributed to the faster speed of cutting, but with the modern trend to single swath cutting (see below) this increased width would not necessarily be an advantage. Although the cut vegetation following the use of a cutter bar was always regarded as a problem, it was not always collected, and one difficulty that did arise was with mats of dead material blocking the knives of the cutter bar itself on the occasion of a return visit. The cutter bar was competitive in cost per acre cut (see below under Costs) with the rear mounted flail and considerably cheaper to operate than the side mounted flail. There are still many situations in which the cutter bar would be as efficient a machine for roadside grass cutting as any of the others available, especially if management regimes were operated that prevented the grass growing to a length that produced problems of disposal of the cuttings after it was mown.

With rear mounted machines of all sorts a difficulty arises with the cutting of vegetation that has been flattened by the tractor wheels going before. These

machines are also more difficult than side-mounted machines to operate in the vicinity of obstructions.

In some counties the height at which vegetation is to be cut is prescribed and the height regulated on the machine (Table 7); the most usual setting is a nominal 3 inches above soil level. In other counties the setting of the height is left to the discretion of the local depot or sometimes to the tractor driver. Height setting on contractors equipment may be less closely supervised than on equipment owned or maintained by County Councils. Whereas the height at which vegetation is cut has an effect on the development of the sward regardless of the kind of machine used, too close cutting with the modern power flail and rotary machine can be extremely damaging and in extreme cases destroy the sward completely, creating bare patches. There are still flail machines in use, for example, that have no roller or skid attachment to prevent the operator accidentally dropping the cutting head down into the ground and rotavating the verge. There also seems to be some misunderstanding of the Marshall Committee recommendations and the DoE Memorandum (T5/68) specifying the heights (although these cannot be critical) at which roadside vegetation should be maintained. Two heights for rural roads of 6 inches for the first six feet and 12 inches for other areas are quoted and instances have occurred where it has been thought that these refer to the height to which the vegetation should be cut, rather than the height that it should not be allowed to exceed before cutting again in the usual way.

CHEMICALS

The uses of chemicals for control of vegetation on roadsides fall under three headings of total weed control, selective weed control and growth retardation.

Total weed control

All counties use total weedkillers although some [e.g. Cumberland (except by special permission), Isle of Wight, Northumberland, Warwickshire and Westmorland] confine their use to built up areas, whilst many others put restrictions on their use outside these areas. The most common applications are to footpaths or footways, around flagstones and at the back of footpaths, between paths and structures. Other common uses include the edge of the carriageway in a band 6 to 12 inches wide, or on or just behind kerbstones; also quite commonly around street furniture, signs and lamp standards. Total herbicides are rather less commonly used in drainage grips and channels and French drains but reportedly not in ditches. Other uses include pretreatment of the foundations of new constructions (especially footpaths); on the carriageway and especially down the little travelled central strip of very narrow lanes, at the foot of walls but rarely on the walls, and for control of weeds in hedge bottoms particularly during the first few seasons after planting (see Chapter 6). Various traditions exist in different counties so that for instance

in Lincoln - Lindsey, East and West Suffolk they are not used on road edges or kerbs. In Northamptonshire they are used on kerbed edges only. In Essex they are extensively used in drainage channels.

The following basic chemicals are used (Common names according to BS 1831 and supplements) (technical details based on Fryer and Makepeace, 1972). They may be applied either as sprays, or as dry granules, or as pellets.

(a) Root absorbed residual herbicides

Atrazine Simazine	Total herbicides, giving a season or more persistence
Borate Bromacil	Total herbicides, single season persistence only
Dichlobenil Chlorthiamid	Total herbicides, single season persistence only
Monuron Diuron	Total herbicides, giving a season or more persistence

(b) Foliage and root absorbed herbicides

Sodium chlorate	(+ fire depressants) Total herbicide with 3 months to a seasons persistence
Picloram	Affecting mainly broad-leaved species, persistent for more than one season

(c) Foliage absorbed herbicides

Aminotriazole	Broad spectrum herbicide, persistence of one to two months
Paraquat	Total herbicide. Non persistent
Dalapon	Affects narrow leaved species (e.g. grasses), persistence of three to four months
2,4-D;MCPA 2,4,5-T	Affect broad leaved species (flowering herbs & woody plants), persistence of a few weeks to six months

Some of these compounds are used in commercially formulated mixtures to take advantage of different characteristics of compounds in the three groups. A popular mixture is a combination of monuron/2,4-D/sodium chlorate, and another widely used mixture is comprised of diuron/dalapon/MCPA. Several mixtures contain either atrazine or simazine as one of the components and both of these compounds are quite widely used on their own; diuron is also quite widely used alone, but not monuron. Neither aminotriazole nor picloram are applied alone in highway situations. Chlorthiamid and, less frequently, dichlobenil are used specifically for weed control in hedge bottoms during establishment. The most commonly used compound, either alone or in combination, is sodium chlorate, which has also been available the longest.

It appeared from the survey that the choice of chemical to use was not critical in most counties, and in many instances was decided on grounds of cost alone, without regard to effectiveness or persistence. Likewise contracts were often

for application of herbicide in a particular situation (e.g. so many miles of kerb) without the type of chemical to be used, species of plants to be controlled or length of persistence of effect being specified.

Selective weed control. This is practised for a number of purposes including i) the control of injurious weeds as defined (Weeds Act, 1959); ii) the control of other weeds, however defined, in established vegetation; iii) the control of broad leaved plants in the early years of establishment of a grass sward in order to aid establishment, and to control the agricultural weeds that might appear in abundance at that time; iv) the control of woody vegetation either encroaching on established herbaceous vegetation, or after cutting back as for instance along infrequently managed green lanes, bridleways or footpaths.

The sprays used for these purposes are based on 2,4-D or MCPA for herbaceous weeds, and 2,4,5-T, or 2,4-D + 2,4,5-T for woody growth: special formulations of 2,4-D and MCPA are available for non-agricultural situations, including roadsides, but ordinary agricultural formulations may also be used alone or in mixtures with other common herbicides, e.g. mecoprop, for wider spectrum control. Alternatively compounds for control of individual species of plants may be used such as asulam for docks (Rumex spp.).

The use of selective weedkillers is shown by counties in Table 8. Explicit details are lacking for those counties for which no comment is shown, but it was generally understood that they either did not use selective weedkillers or only, as with the majority of other counties, used them in limited local applications to particular stands of weeds, usually following complaints from local farmers or landowners. Eleven counties specifically did not use them at all, and in some others there were severe restrictions: for instance in Cumberland the County Surveyor's approval was required for any application of chemicals, and in Dorset that of the Chairman of the Highways Committee. On the other hand extensive use of selective herbicides was made in Co. Durham, Staffordshire and Glamorgan.

Growth retarders with or without addition of a selective weedkiller (2,4-D or MCPA).

The only growth retarder in common use at the present time is maleic hydrazide (MH) which may be, and often is, combined with 2,4-D. The purpose of the 2,4-D is threefold - a) to help stick the MH onto the foliage of plants in the event of wet weather, b) to kill tall growing broad-leaved herbs (in the event most other herbs are killed as well), c) for the apparent synergistic effect is has with MH to further suppress the growth of certain species of grass. In recent years a chemical named chlorfurecol has been developed and this is now being marketed in a mixture with MH to which it is claimed to have a complementary effect, particularly on some tall growing herbaceous species not always affected by MH.

Table 8. Use of selective weed killers, 2,4-D or MCPA (and others as named) by County Councils on rural roadsides in England and Wales, 1972. Injurious Weeds as defined in Weeds Act (1959).

Beds	-
Berks	-
Bucks	At Divisional Surveyors discretion to deal with local complaints. Asulam used for docks.
Cambs	Some use in response to complaints, especially in the fens. Most weeds cut before seeding.
Cheshire	Some use in response to complaints about injurious weeds. Asulam used for docks.
Cornwall	Local use for injurious weeds and tall plants on sightlines.
Cumberland	County Surveyor's authority required for use on bad infestations of injurious weeds.
Derbys	Isolated local applications to tall growing weeds.
Devon	-
Dorset	Chairman of Highway Committee's approval required before use on local bad infestations of weeds following receipt of complaints.
Durham	6 ft. strip on about 200 miles of Trunk and Class I roads sprayed with 2,4-D. Used at discretion of Divisional Surveyors in other places.
Essex	Limited application on the Brentwood by-pass 1972. Not used previously.
Glos	On newly seeded verges and local areas of bad agricultural weeds, including nettles.
Hants	-
Hereford	On all roads except Unclassified to control local infestations of weeds. Generally applied by contract.
Herts	-
Hunts	Very local applications by knapsack sprayer.
I. of Wight	No recent use.
Kent	Very infrequently for bad infestations of weeds.
Lancs	Not used. Weeds are cut.
Leics	Very occasional use of 2,4-D for dandelions, or of picloram/2,4-D mixture for docks.
Holland	On newly seeded areas and to deal with specific problems.
Kesteven	No use.
Lindsey	Knapsack sprayer applications on bad infestations mainly in the midsummer period.
Norfolk	No use.
Northants	? Use on herbaceous weeds. 2,4,5-T used on woody stumps after bushing back green lanes and other areas of scrub encroachment.
Northumbs	-
Notts	No use.
Oxford	No use.
Rutland	On new improvements. Brushwood killer (2,4-D/2,4,5-T) to prevent scrub regrowth.
Salop	-
Somerset	On new improvements for the first two seasons following seeding.
Staffs	Extensive use on a wide variety of plants. MCPA used in preference to 2,4-D.
Suffolk - East	-
- West	On new improvements for the first two seasons following seeding.
Surrey	Will consider for use on injurious weeds.
Sussex - East	Local applications by knapsack sprayer mainly for injurious weeds.
- West	Local applications to weeds on banks inaccessible to cutting machines.
Warwks	-
Westmorland	-
Wilts	Only for exceptional stands of agricultural weeds; negligible use. 2,4,5-T for scrub control in green lanes etc.
Worcs	-
East Riding	No use.
North Riding	No use.
West Riding	Will use where needed but no routine applications.
Anglesey	Minor use on improvements by knapsack or hand lance.
Brecon	Local spot applications for control of particular weed problems.
Caerns	No use.
Cards	On new improvements and elsewhere to control injurious weeds.
Carms	Limited use.
Denbigh	No use.
Flints	-
Glamorgan	MCPA used on up to 90 miles of verge per annum. All Trunk road flat areas treated once in four years and also flat areas on some other roads. For weed control. Dalapon in ditches for control of reedmace (*Typha latifolia*).
Merioneth	No use.
Monmouth	-
Montgomery	Knapsack application to injurious weeds on bare ground (e.g. grit dumps etc.).
Pembs	No use.
Radnor	Use kept to a minimum for control of bad infestations of weeds.

Table 9. Use of Chemical sprays (MH with or without addition of 2,4-D) for the control of growth of vegetation by County Councils on rural roadsides in England and Wales, 1972.

Beds	Not used. Tested in 1962.
Berks	Not generally used following experiment in 1967, but there is some local use in one Division.
Bucks	Not used. Tested in 1963.
Cambs	Not used. Have been tested. Would use if there could be shown to be advantages.
Cheshire	Have used on central reserves of dual carriageways. Not satisfied with result but might try them again.
Cornwall	Starting a 3 year trial in 1972 for use of MH + 2,4-D on central reserves and bottom 9-12 ins. of hedge banks.
Cumberland	Not used. Experiment in 1964 not very effective.
Derbys	Not used.
Devon	Not used but might be prepared to at some future date on major roads.
Dorset	Not used.
Durham	Only on Motorways at present though might extend to major roads. Not entirely satisfied with the effect.
Essex	Not used.
Glos	Extensive use, increasingly of MH alone without addition of 2,4-D. Hope to get whole season control of growth.
Hants	On about 50 acres of otherwise inaccessible ground. Unlikely to increase use.
Hereford	Application of MH/2,4-D to approx 32 miles of Trunk roads in 1970 and 1971 but not continuing in 1972 as a result of change of County Policy on standards of vegetation control.
Herts	Fairly extensive use in 1960s but discontinued. A trial in 1971 was satisfactory and now considering more widespread application in 1972.
Hunts	Not used.
I. of Wight	Not used now but did in the mid 1960s.
Kent	Not used.
Lancs	Not used.
Leics	Not used. Trials in the early 1960s.
Holland	Not used but considering use in the future if economic.
Kesteven	Not used.
Lindsey	Not used after trials.
Norfolk	Not used.
Northants	Not used in rural areas.
Northumbs	Not used. Trials in the early 1960s.
Notts	Not used.
Oxford	Limited use on central reserves of dual carriageways where difficult/dangerous to cut.
Rutland	Not used for the last five years but might again if reassured about the hazards.
Salop	Not used.
Somerset	Not used.
Staffs	About 360 miles of road (? 720 miles of verge) sprayed.
Suffolk - East	Not used.
- West	121 miles (242 miles of verge) of Trunk and Class I sprayed in 1972 but expect to be able to control growth by cutting in 1973.
Surrey	Local use in inaccessible places. Not opposed to more extensive use but do not see any need at present.
Sussex - East	Not used.
- West	Not used but would be prepared to for difficult banks, central reserves etc. if economic.
Warwks	Selected by-passes and central reserves, mileage increasing since 1968. About 28 miles of verge in 1972. Spray in April and in June to avoid cutting.
Westmorland	Not used nor any foreseeable likelihood of use.
Wilts	Not used.
Worcs	About 15% of Principal road verges sprayed.
East Riding	Not used.
North Riding	Not used nor any foreseeable likelihood of use.
West Riding	Not as a routine but considering for central reserves of Trunk roads. No use in the National Park.
Anglesey	Not as a routine, but might if there was heavy pressure of use on cutting machines.
Brecon	Used on a comparatively small proportion of road mileage of Trunk and Class I roads fairly consistently. Not opposed to more widespread use but not keen on it either.
Caerns	Not used.
Cards	Not used.
Carms	All Trunk and about 20 miles of Class I sprayed both verges to a width of 8 ft. Intend to continue but unlikely to extend use.
Denbigh	Not used.
Flints	Not used.
Glamorgan	Some use in intensively managed areas, also on verge and central reserves of dual carriageways after initial cut. Would use more extensively if economic.
Merioneth	Not used.
Monmouth	Extensive use up to 1971, but from 1972 discontinued except where crash barriers etc. make cutting impossible.
Montgomery	Not used.
Pembs	Not used.
Radnor	Not used.

Table 9 shows details by counties of the use of growth retarder chemicals to control growth, and particularly the height, of vegetation on rural roadsides. Of the 58 counties visited, 42 did not intend to use growth retarders at all in 1972; a number of them were opposed to the use of chemicals for this purpose on amenity or environmental grounds. Others, however, would have been prepared to use them in 1972 (or at any time in the future) if there seemed to be an economic advantage. The 16 counties that did intend to use growth-retarders in 1972 are classified below:

(a) Extensive use (over 100 miles of verge)

Cornwall - start of 3 year trial on 80 miles of Trunk roads and up to 1000 miles of a 9-12 inch band at the bottom of hedge banks inaccessible to cutting machines.

Gloucestershire - about half the mileage of Trunk and Class I roads (approximately 440 miles of verge).

Staffordshire - all Trunk and Class I roads (358 miles ≡ 716 miles of verge) and any other road as required.

West Suffolk - 242 miles of verge on Trunk and Class I roads in 1972 but discontinuing in 1973.

Carmarthenshire - all Trunk (95 miles) and about 20 miles of Class I roads, approximately 230 miles of verge.

(b) Restricted use

Warwickshire - about 28 miles of verge mostly on dual carriageway central reserves.

Worcestershire - about 15% of Principal roads (? 37 miles of road).

Breconshire - some Trunk and Class I road verges (but see Table 5, p.24).

(c) Minor local use. Central reserves, round crash barriers, on inaccessible banks etc.

Berkshire, Hertfordshire, Hampshire, Oxfordshire, Surrey, Anglesey, Glamorgan and Monmouthshire (restricted use after 8 or 9 years of extensive use, see p.38).

The reasons given for using sprays and some other details are analysed below. It is assumed that the users are generally satisfied with the degree of control of growth that they obtain.

(a) Extensive users:

Cornwall - for control of growth of vegetation in dangerous (central reserves) or inaccessible (hedge bottoms) situations.

Gloucestershire - to liberate machines in early part of the year to work on non-principal roads. Hope to get a complete seasons control of growth after spraying but may have to cut once as well later in the season.

Staffordshire - to save labour and put back date of first mowing. Also for weed control. Spray application in spring may be followed by two or three cuts of the first swath, or by a second spray in the autumn.

(West Suffolk - to liberate machines for use on less important roads. In 1971, but not 1972, chemical spraying was cheaper than cutting.)

Carmarthen - to liberate machines for use on less important roads. Growth is held back significantly.

(b) Restricted users:

(Herefordshire - to liberate machines for use on less important roads. To control weeds that would have to have been sprayed anyway. Satisfied with results though economics were marginal. Discontinued in 1972 because of change of County Policy - see Table 9).

Warwickshire - originally for control of vegetation in dangerous or inaccessible places, but subsequently including some neighbouring areas as well. Spray in April followed by one or two cuts, or spray in April and June.

Worcestershire - to liberate machines for use on less important roads. Few complaints received. Head Office approval required before any sprays applied and sprayed areas subsequently to be left as long as possible before cutting.

Breconshire - to liberate machines for use on less important roads. Discolouration of vegetation noted. Neither particularly keen nor particularly opposed to use of sprays. Concerned about other than purely economic considerations, e.g. amenity, effects on the environment, danger of spray drift.

(c) Minor users:

Berkshire - for effective control of growth in special situations. No discolouration of vegetation.

Hampshire - for use in inaccessible places. About 50 acres in all.

Hertfordshire - had a successful trial in 1971 that saved four cuts; considering wider use.

Oxfordshire - for use on dangerous central reserves of dual carriageways.

Surrey - rarely for use in inaccessible places.

Anglesey - occasionally, to control growth (if there is too much work for the mowing machines).

Glamorgan - for use in intensively managed (urban) areas saving up to 10 cuts in 12 weeks. Also on central reserves and verges of dual carriageways. Probably not economic on other roads but would use more extensively if it were. Generally cut once before spraying. Supervised by the Horticultural Superintendent.

Monmouthshire - up to 1971 to delay time of first cut by at least a month. Cost of spray equivalent to cost of a single cut. Quicker than cutting and liberated machines for use on less important roads. From 1972 no use except in inaccessible places following a change in County Policy.

Reasons for not using sprays or for restricting their use are analysed below, broadly under six headings with the numbers of Counties contributing each reason in brackets.

(a) Satisfied with cutting and see no reason to use sprays (11).

(b) As a result of trials, or from other sources, doubt that there is an economic advantage in the use of chemicals. In some instances satisfied that there is not (26). Economics not considered because there was no intention of using sprays anyway (2).

(c) Public pressure on amenity/conservation/environmental grounds against spraying (28), as the result of a CPRE report (1), because of effects on cover for game (birds) (1), complaints about dying plants (2). Policy not to use sprays in rural areas (1).

(d) Difficulties of application including timing and weather (6), not satisfied with control of growth (10), discolouration effects (3), opposed to the use of selectives (3) and use of MH by itself encouraging weeds (1). Shortage of skilled operations (1). Sprayed vegetation more difficult to cut later (1).

(e) Agricultural considerations and specifically danger of damage to neighbouring crops from spray drift (23).

(f) Opposition by the County Council Highway Committee (7), opposition within the Highway Department (10).

Two counties thought that spray applications were more trouble than they were worth and did not see the point in unnecessarily becoming involved in controversial activities, a third (small) county thought that they were not worth the trouble for their small mileage. One county did not like the implications of the long term involvement that was necessary for the successful use of sprays in the face of possible changes of standards and policies in the future. Two other counties had found sprays useful in the early 1960s when lengthsmen were being phased out, or the cost of picking up cuttings from cutter bar mowings were producing problems; the introduction of the purpose designed flail machines, which were generally more acceptable, had done away with the need for sprays.

COSTS

Appendix 7 of the Marshall Committee report, Tables 2 and 3, gives information on costs of grass cutting. This has been used here to calculate (Table 10) the costs per mile for the five classes of road for the nine counties concerned (designated A - J). Three were unable to provide information and in so far as the authorities chosen were intended to represent the remainder, it appears that a third of the County Highway Departments did not know at the time of compilation of the Marshall Committee Report what grass cutting was costing. The figures in Table 10 are calculated by taking the <u>total expenditure</u> per mile on all maintenance functions for the individual classes of road from Table 2 (of Appendix 7) of the report, and the <u>relative expenditure</u> for grass cutting in column (e) of Tables 3.1 - 3.5, to give the cost per mile of grass cutting.

Table 10. Cost per mile per season of grass cutting on separate classes of rural roads in nine counties reference A - J, calculated from figures given in Tables 2, and 3.1 - 3.5 of Appendix 7 of the Marshall Committee Report (1970).

Marshall Committee Report County reference	Trunk £	Class I £	Class II £	Class III £	Unclassified £
A	59.4	55.5	47.7	26.7	37.2
B	-	-	-	-	-
C	87.1	66.3	47.8	31.3	38.0
D	48.2	33.1	28.7	17.1	11.0
E	360.7	290.7	187.2	135.8	67.6
F	33.5	26.9	21.1	11.8	17.0
G	86.5	61.9	41.2	22.5	22.1
H	-	-	-	-	-
J	-	-	-	-	-
Average	112.56	89.00	62.23	40.87	32.15
excluding E	62.94	48.74	37.30	21.88	25.06

Counties C and G appear to spend about twice as much as D and F, with A tending towards the higher amounts. The expenditure by E was several times more than any of the others and on most roads was the second most expensive maintenance operation (out of twelve headings) after resurfacing; in other counties grass cutting had rather less priority for resources. However, in all counties grass cutting was at least the third most expensive item on unclassified roads.

From Table 8 of Part B of Appendix 4 of the Marshall Committee report (reproduced here as Table 11) it is possible to calculate standard costs per acre (1969) for grass cutting and this is done below for two applications of flail machines, and for the mid-mounted (reciprocating) cutter bar for comparison. An acre is equivalent to 1 mile by eight feet. The SMV's (Standard Minute Values) are work study estimates based on average values from a large number of Authorities and take into account the actual time on the job including lost and wasted time caused by hold ups, breakdowns and other factors.

1. Mid-mounted flail: multi-swath. Assume 3 foot cutting head. SMV per 100 linear yards = 3.4
   therefore 100 square yards in 3.4 minutes
   1 acre (4840 square yards) in 164.56 minutes
   cost @ tractor driver 75p and tractor/flail 30p per hour + 15% (1973) = £2.35
   therefore to mow 1 acre = £6.45 per cut.

Table 11. Standard Minute Values for grass cutting, verges, ditches, hedges from Report of the (Marshall) Committee on Highway Maintenance p175 and 176 (reproduced by permission of HMSO)

		SMV	Unit
MOWING AREAS			
Tractor and 3 gang cylinder mower	84"	1.2	100 Sq. Yd.
Pedestrian-controlled auto-scythe		4.8	100 Sq. Yd.
Cylinder mower (pedestrian-controlled)	30"	3.5	100 Sq. Yd.
Cylinder mower (pedestrian-controlled)	27"	3.8	100 Sq. Yd.
Cylinder mower (pedestrian-controlled)	24"	4.1	100 Sq. Yd.
Rotary mower (pedestrian-controlled)	24"	7.9	100 Sq. Yd.
Scythe		27	100 Sq. Yd.
Hook		66	100 Sq. Yd.
Rake cuttings into heaps		12	100 Sq. Yd.
Trim edges		20	100 Lin. Yd.
Trim around obstruction (tree or post) by hook		1	Occasion
MOWING VERGES			
Mow verges either single kerbside swathe or full width, including essential travelling between cuts.			
Mid-mounted reciprocating - single swathe		1.5	100 Lin. Yd.
Mid-mounted reciprocating - multi swathe		2.0	100 Lin. Yd.
Mid-mounted flail mower - single swathe		2.6	100 Lin. Yd.
Mid-mounted flail mower - multi swathe		3.4	100 Lin. Yd.
Rear-mounted flail mower - single swathe		1.2	100 Lin. Yd.
Rear-mounted flail mower - multi swathe		1.4	100 Lin. Yd.
TRIMMING VERGES			
Set out line and cut back grass verge		71	100 Lin. Yd.
Set out line, cut back grass verge and weed path - average quantity of weeds		380	100 Lin. Yd.
Set out line, cut back grass verge and weed path - large quantity of weeds		520	100 Lin. Yd.
Level soil on verge with tractor and grader blade		17	100 Sq. Yd.
Level soil on verge by hand, soil already *in situ*		90	100 Sq. Yd.
Level soil on verge by hand, soil imported and dumped in heaps		150	100 Sq. Yd.
Sow grass seed		23	100 Sq. Yd.
DITCHES (3'-4' wide, 2'-6' deep)			
Dig out and regrade ditch by hand		12	Lin. Yd.
Dig out and regrade ditch by $\frac{1}{8}$ cu. yd. hydraulic excavator tractor		6	Lin. Yd.
Clear out heavy undergrowth		2.3	Lin. Yd.
Dig grip or outlet 3' x 12" x 6" approx.		10	Occasion
HEDGES			
Cut back hedge, and burn trimmings 8' high x 3' wide		16.5	Lin. Yd.
Cut back hedge and burn trimmings 4' high x 3' wide		8.4	Lin. Yd.

2. Rear mounted flail: multi-swath. Assume 6 foot cutting head. SMV per 100 linear yards = 1.4
therefore 200 square yards in 1.4 minutes
1 acre in 33.9 minutes
cost (charges as above*) to mow 1 acre = £1.33 per cut.

3. Mid-mounted reciprocating cutter bar; multi-swath, without picking up. Assume 6 foot cutting head. SMV = 2.0 minutes per 100 linear yards
therefore 200 square yards in 2 minutes
1 acre in 48.4 minutes
cost (charges as above for convenience*) to mow 1 acre = £1.90.

*[Capital cost of cutter bar mower and power requirement less than for rear mounted flail and both less than for side mounted flail]

The average mowing season can be taken as 22 weeks per machine, or 110 working days, from which ten days can be subtracted for workshop maintenance (private communication). In a season of 100 eight hour days therefore, the average side mounted flail mower with 3 foot cutting head and operator can be estimated to cut 292 acres and cost £1880.

Examples of SMVs reported by three Counties (L, M and N) for comparison with the published Marshall Report figures (in brackets, see Table 11) are given below:

County L, 1971. Side mounted flail, one mile x one swath in 100 minutes.
SMV = 5.65 minutes/100 linear yards (2.6).

County M, 1972. i. 3 feet 6 inches wide side-mounted flail single swath.
SMV = 3.15 minutes/100 linear yards (2.6).

ii. 5 foot rear-mounted flail single swath.
SMV = 2.9 minutes/100 linear yards (1.2).

iii. 7 foot rear-mounted flail mower single swath under ideal conditions on flat unobstructed ground.
SMV = 2.2 minutes/100 linear yards (1.2).

County N, 1972. i. 3 foot side-mounted flail
SMV = 3.2 minutes/100 square yards (2.6).

ii. 6 foot rear-mounted flail
SMV = 1.7 minutes/100 square yards (0.6).

iii. Pedestrian operated machine (Rotary mower).
SMV = 5.25 minutes/100 square yards (7.9).

iv. Hand cut by hook.
SMV = 73.5 minutes/100 square yards (66.0).

v. Hand cut by scythe.
SMV = 33.3 minutes/100 square yards (27.0).

On this limited evidence the Marshall Report SMVs appear to be optimistic taken over a season's working; the figures there are quoted as being calculated on a number of samples assessed in consultant's visits, and may represent a target rather than an universally attainable standard.

In the visits on which this report is based, of the 58 English and Welsh County Councils, 13 (22%) were unable to give any information on the costs of grass cutting; this compares with the figure of 33% from the smaller sample of English, Welsh and Scottish counties derived above from the Marshall Report (see page 39). In explanation, an attitude was expressed that mowing was traditional and necessary, that there was little opportunity to economise and that detailed costing would be a pointless and time-consuming exercise.

Some costs per mile for the 1971 season (unless otherwise stated) are shown in Table 12 for a number of counties.

Table 12. Cost per mile of grass cutting per season on separate classes of rural County roads for 1971, except where indicated. The Principal road and Numbered road classifications overlap and so are shown separately.

County Ref.	All roads £	T £	Principal £	I £	II £	III £	U/C £	Non-Principal £
35	-	50	-	25	19	10	5	-
34	(72)-90-(112)	-	-	-	-	-	-	-
36	-	100	-	40	21	19	19	-
24	-	-	56	-	32	32	24	-
37 1970		*(12)-48-(77)	-	-	-	-	-	-
1971		(16)-64-(97)	-	-	-	-	-	-
23	37	-	-	-	-	-	-	-
39	-	-	112	-	60	60	28	-
40	-	27	14	-	-	-	-	4
10	-	25	23	-	17	8	8	-
31 1970		58	-	39	25	15	8	-
(1971 one particular road		*65)	-	-	-	-	-	-
41 1970		30 - 40	-	12	8	5	3	-
42 1969	*38	-	-	-	-	-	-	-
1971	17	-	-	-	-	-	-	-
5	-	106	-	58	46	43	28	-
29 1972		113	65	-	-	-	99	48
33	20 - 30	62	-	50	43	23	15	-
30	-	46	36	-	-	-	12	15
27	30	-	-	-	-	-	-	-
Average cost (* excluded)	40	63	51	37	30	24	22	22

The figures can be compared with those given in Table 10 (derived from the Marshall Report) for similar classes of road. A substantial measure of agreement exists, especially if the unusually high figures for Authority E in the Marshall Report are excluded. The wide range of costs for the different classes of road reflects not only differences in County standards but also other factors, such as topography. The range for instance in 1971 for ref. 37 of £16 to £97 per mile for Trunk roads allows for high moorland stretches requiring minimum cutting at one end of the scale to intensively managed areas in the lowlands at the other end. The averages given at the foot of the table are presented as an indication of the amounts involved and the relationships between the different classes of road without claiming in any way to be other than reasonable estimates. However, they are of the right order of magnitude taken with the figures given in the Marshall Committee Report and have been used in conjunction with the road mileages shown in Table 13 to arrive at a figure of £2,941,527 based on the individual classes of road for the cost of rural road grass cutting in England and Wales in 1971. A previous estimate for 1967 (Way 1970) based on 1.5% of total maintenance expenditure for that year was £2,035,500; whilst Chadwick (1969) made an estimate of between £1.5 M and £3 M.

Table 14 shows some costs per acre for grass cutting (1 acre ≈ 1 mile x 8 foot wide or 2.7 miles at 3 feet wide) and chemical spraying together with some other information for a number of counties in 1971.

The cost per acre figures for tractor mowing show a range from £0.70 to £11.13 with an average cost of £3.50, which appears to be on the low side. Chadwick (1969) estimated £5 - £10 per acre, Underwood (1969) quoted £4.16 for general work by side mounted tractor flail and £5.0 per acre for the more difficult back verge. The available figures shown for 1972 give an average of £4.78. As will be seen from the notes, costs can vary very sharply between easy work on unobstructed flat areas compared to difficult sites. Costs of spraying without any subsequent management give an average of £11.31, rather more than twice the cost of cutting. Underwood (op.cit.) gave £15 approximately for chemical application by tractor mounted equipment in 1969 based on 1968 experience. (c.f. figures on pages 40 and 42).

Table 15 gives the costs of grass cutting as a percentage of the maintenance budgets for a number of counties. Some authorities made a distinction between general maintenance (e.g. excluding surface dressing, maintenance of road signs, winter gritting) and all maintenance; the figures given here are assumed to be the percentage of all maintenance except when stated.

Table 13. County Council mileages of wholly maintained roads by classes of road.

	Trunk	Class I	Class II		Class III		Unclassified	Total
Beds	59	94	59		267		377	856
Berks	79	226	182		498		783	1768
Bucks	48	201	-	694	-		768	1711
Cambs	95	133	207		440		567	1442
Cheshire	201	232	-	756	-		891	2080
Cornwall	147	286	356		1536		1716	4041
Cumbs	156	142	229		828		990	2345
Derbys	108	274	-	996	-		824	2202
Devon	189	449	-	2843	-		3024	6505
Dorset	55	238	214		690		756	1953
Durham	56	239	216		469		702	1682
Essex	82	212	319		821		1054	2488
Glos	171	266	303		-	2559	-	3299
Hants	146	333	220		1154		1621	3474
Hereford	75	200	180		650		777	1882
Herts	103	195	167		476		721* (with green lanes)	1662
Hunts	78	78	140		255		269	820
I. of Wight	-	45	34		70		89	238
Kent	108	311	279		937		1726	3361
Lancs	212	227	192		834		1139	2604
Leics	106	180	233		616		853	1988
Holland	50	60	88		424		506	1128
Kesteven	62	137	140		570		635	1544
Lindsey	122	307	270		952		976	2627
Norfolk	123	396	500		841		2932	4792
Northants	125	171	-	673	-		607	1576
Northumbs	145	246	357		947		1021	2716
Notts	110	211	-	522	-		657	1500
Oxford	133	148	-	698	-		720	1699
Rutland	21	35	-	20	-		243	319
Salop	147	222	327		1162		1281	3139
Somerset	117	407	294		1569		1873	4260
Staffs	130	230	163		768		1098	2389
Suffolk - East	65	137	271		659		820	1952
- West	30	133	-	516	-		436	1115
Surrey	48	127	94		254		514	1037
Sussex - East	53	221	-		1360		-	1634
- West	43	263	123		398		462	1289
Warwks	168	158	282		846		1300	2754
Westmorland	76	107	88		378		462	1111
Wilts	131	301	173		994		756	2355
Worcs	50	197	-	752	-		500	1499
East Riding	93	172	228		691		1086	2270
North Riding	126	327	226		1123		1349	3151
West Riding	327	599	486		1242		3338	5992
Anglesey	22	64	-		591		-	677
Brecon	113	53	65		439		439	1109
Caerns	74	101	104		398		443	1120
Cards	71	99	201		514		460	1345
Carms	95	150	183		789		780	1997
Denbigh	80	128	221		671		766	1866
Flints	42	120	56		240		280	738
Glamorgan	61	260	-	422	-		630	1373
Merioneth	104	91	76		291		327	889
Monmouth	86	70	118		333		446	1053
Montgomery	121	43	185		541		710	1600
Pembs	71	95	140		579		499	1384
Radnor	45	63	91		309		239	747
	5754	11210	9080		29463		49238	118147
				8892 (Cl II & III)		2559 (Cl III & UC)		
						1951 (Cl II, III & UC)		

Table 14. Costs per acre per occasion for cutting or spraying County rural roads. Figures quoted in 1972 as referring to 1971 unless otherwise stated.

County Ref.		Cutting Cost per acre per occasion £	Spraying Cost per acre per application £	Notes. (Costs shown per acre)
1		4.10 - 5.50		
2	1968	*1.75		1968 hedge cutting per mile x 4 ft height: £0.94
	1972	*2.96		1972 hedge cutting per mile x 4 ft height: £1.63
3		2.00 (5 ft flail)		
4	1972	*(2.9)-4.00-(11.13)		£34 per acre for hand cutting
5		7.00		6 ft swath width on Trunk and Class I roads
6	1964	*2.00 - 3.00	*12.00 - 13.00	
	1972	*4.00 - 6.00	20.00 + cost of cut later	
7		3.26 (4 ft flail) *1.20 (5 ft cutter bar)	18.46	1962 Rotary £2.58, Cutter bar £1.60 (and £12 to pick up). Flail £1.26, per acre
8		0.70 - 2.00	*2.00 (selectives only)	Total weedkillers @ £19 and kerb spraying @ £56
9		3.40 - 5.80		
10		3.00		"1 spray cost equivalent to 2 cuts"
11		3.60		For single swath; increase by a third for multi-swath, and more if vegetation left to be cut at end of the season becomes very coarse.
12		*0.97 (7 ft rearmounted flail) 1.82 (4 ft side mounted flail) *1.32 (7 ft triple gang mower)	*MH @ 6.00 for materials	Cutting on banks costs twice as much as on the flat.
13		6.84 (3.46 for labour)		
14	1971	5.32	4.35	
	1972	*6.05	*7.92	Wages represent 57% of the cost of mowing.
15		2.00	9.00 (chemicals @ 8.00)	
16		3.00	10.15	
17		2.30 (0.70 for labour)		
18		1.50		
19		2.00		
20		2.00 - 2.40		Trunk and Class I.
21		2.00		
22		1.50		Consider cost of spraying chemicals about the same as a single cut.
23	1972	*3.62	10.00 + cost of 2 cuts later	1960 Cutter bar @ £3.62 but £64 to cart.
25		4.20		
26		3.00		
29	1972	*7.00 side mounted flail *3.48 rear mounted flail *9.87 pedestrian mower *93.90 hand by hook *42.50 hand by scythe		
30		5.00 - 10.00		
31		7.50	7.20	
32		7.00		May be a five times difference in cost per acre depending on site.
Average 1971 (*excluded)		£3.50	£11.31	
Average 1972 (for side mounted flail)		£4.78		

Table 15. Grass cutting as percentage of County Council Highway Maintenance expenditure, 1971.

County Ref.	Percent
1	5.0
43	6.0
35	2.5
22	12.5
24	11.0
38	*10.0 - 18.0 of general maintenance 1972
25	1.0
44	*20.0 of general maintenance, 5% of total maintenance
26	3.0
38	*14.0 of general maintenance, 10.5% in 1969, 12.2% in 1970
28	8.0
27	7.0
30	2.0
43	*16.5 of general maintenance 1972
31	4.0
40	4.0
3	0.6
33	3.0
Average (*Excluded)	4.97

The average of 4.97 can be compared with the average of 8.12% derived from the percentage figures for grass cutting quoted in column E of Tables 3.1 - 3.5 of Appendix 7 of the Marshall Report. Both these figures are considerably higher than the 1.5% used in the calculation on 1967 figures referred to above (Way, 1970) to arrive at the cost of grass cutting in England and Wales and which had originally been quoted by Underwood (op.cit.). Chadwick (op.cit.) estimated grass cutting costs as representing between 5% and 15% of the total cost of general maintenance according to the class of road. In 1972 the view was expressed by two counties that implementing the recommendations of the Marshall Report for standards of grass cutting would add to existing costs. This appears to be borne out in the figures for reference 38 (Table 15), where the Marshall recommendations are followed, and a gradual increase in the proportion of the general maintenance budget attributable to grass mowing is shown for the years 1969 to 1971.

CHAPTER 5. VERGE CONSTRUCTION AND DISTURBANCE

PHYSICAL CHARACTERISTICS

Roadside verges may be flush with the metalled carriageway or higher (upstanding), they are rarely downsloping at the kerb, although further back from the road edge they may slope away. Upstanding verges may be from four or five inches high to as much as twelve inches or more, very often as a consequence of the build-up of material excavated from roadside ditches or from erosion of the travelled way over long periods, but arising from other causes as well. In the early construction of some roads, material was excavated to the foundation level and used to form the verges to the road, but in others, earth from the roadside itself was used to bind stone and slag metalling to form a waterbound carriageway. In modern times with the continual resurfacing of roads there is a tendency for the carriageway to gradually become raised up from verges that were originally flush, and there is consequently a need after a period of time either to skim the surface of the road before resurfacing (partly) to reduce height, or else to make up the verges by the importation of new material.

On the majority of roads, particularly minor roads, the cross-section of the roadside verge is essentially an historical accident, and the road engineer may not want or need to modify them. However, where there have been road widening schemes, or other improvements and new verges formed, a variety of considerations apply and general specifications (Anon, 1969) have been laid down for the construction of roadside earthworks as distinct from the carriageway itself.

The major consideration in the construction of new earthworks is drainage and co-factors in their formation include aspects of safety and the desirability or otherwise of allowing vehicles onto the verge. The nature of the ground generally and its drainage characteristics together with the need to provide artificial drainage, sometimes piped, may often be controlling influences in the design of new verges, although the more subjective preferences of the engineer in charge can be the deciding factor. In fact it is doubtful if many verges on rural roads are 'designed' and it is much more likely that they just 'happen'. In 1972, 26 Highway Departments favoured upstanding verges and 14 flush with a further 6 who favoured flush in some situations (usually on main roads) and upstanding in others. The reasons given for upstanding formations included the opportunities for positive, directed drainage (10), to prevent erosion, to give strength to the formation, for safety, and specifically to keep traffic and caravans off the verge (22). On the other hand, 13 counties liked to have flush verges, either level or sloping down from the road, for drainage purposes, for ease of pull-off for vehicles (4) and for the greater ease of mowing on a flat level verge (8). Observation indicates that

flush verges are prone to considerable erosion and rutting by vehicles, whilst if the edge of the carriageway is not stone-kerbed there may be additional fretting away of the edge of the road metal.

In the construction of the roadside verge itself, where this occurs as a deliberate programme of work, materials may come from a variety of sources depending on local geology and other factors. In general the ground is brought up to the required level either with excavated material from the roadway itself, or with imported material, and then topped off with up to 6 inches of top soil and sown with a grass seed mixture, or sometimes turfed. If the material to build the verge up is imported it may be in the form of rubble and old road material, or else unmodified material excavated from other civil engineering works. If the former it may contain appreciable quantities of mortar and ground lime, which, in districts with acid soils, produce base rich conditions that may in time support communities of plants atypical to the surroundings. Where topsoils are obtained from agricultural land or from sugar beet or carrot washing plants these may contain significant residues of inorganic fertilisers as well as agricultural weed seeds. In hilly counties there may be movement of topsoil from valleys or coastal areas for use in the uplands, introducing new soil factors into roadsides in these situations. In some parts of the country there is a chronic shortage of fill material to build roadsides up where there is a requirement to do so, and in others a shortage of topsoil with which to finish them off. In Leicestershire and in Breconshire excavated top soil from jobs in hand is banked to be used as required, whilst in East Sussex some 10,000 tons of material from mechanical sweepings are collected at depots and composted for use on new developments or for levelling-off existing verges.

SEED MIXTURES

Specifications for application of fertilisers and the standard grass seed mixture to be used on Trunk and grant-aided Principal roads (where the Highway Authority receives a central government grant from the Department of the Environment) are laid down in Paragraph 612 and Clauses 2615 and 2616 of the Department's Specifications for Road and Bridge Works (Anon, 1969). Although application of fertiliser may not be practised widely in the establishment of grass on County (e.g. non-grant-aided) roads the standard seed mixture is extensively used as shown in Table 16. Whilst this seed mixture has been criticised, mainly because of the vigorous growth of the S23 rye grass that is the principal component, it is cheap, effective and easily available. A number of counties have received advice from various sources on mixtures more suited to their particular conditions, and details of these are shown in Table 17. The general object has been to attempt to develop dwarf growing, minimum maintenance

Table 16. Use of standard DoE (Department of the Environment) grass seed mixture and/or C.C. (County Council) specifications on non-grant-aided road verges.

Bedfordshire	DoE but would like to try some low growing/minimum maintenance species.
Berkshire	DoE
Buckinghamshire	DoE
Cambridgeshire	DoE
Cheshire	DoE
Cornwall	DoE but would like to use finer grasses, especially on central reserves.
Cumberland	DoE
Derbyshire	4 alternative mixtures prescribed by Derbyshire Farm Institute for different soil types.
Devonshire	DoE, but have also had trials with wild flower seeds collected by school children.
Dorset	DoE. Also two Dorset Agricultural College mixtures for general use, and housing estate use.
Durham	CC specification, ? From Edinburgh School of Agriculture.
Essex	CC specification (but similar to DoE) for own works.
Gloucestershire	CC specification of Canadian Red Fescue for own works.
Hampshire	CC specifications basically rye grass, fescue and clover mixtures.
Herefordshire	DoE
Hertfordshire	DoE
Huntingdonshire	DoE
Isle of Wight	CC specification.
Kent	CC specification.
Lancashire	DoE
Leicestershire	CC specification and trials with low maintenance mixtures.
Lincolnshire - Holland	DoE
- Kesteven	DoE
- Lindsey	DoE
Norfolk	DoE
Northamptonshire	DoE
Northumberland	DoE. Planning Department investigating mixtures for reclamation areas and Highway Department interested in the results.
Nottinghamshire	DoE
Oxfordshire	DoE but interested in finding alternative mixutres.
Rutland	Use Leicester CC specification.
Shropshire	Basically DoE but will vary to get cheaper mixtures from merchants.
Somerset	CC specification - B mixture for verges and C mixture for banks. Evolved after trials in 1965.
Staffordshire	CC specification evolved by Staffordshire Farm Institute.
Suffolk - East	DoE
- West	DoE
Surrey	DoE but may vary at Divisional Surveyors discretion in particular localities.
Sussex - East	CC specification for county road works.
- West	DoE
Warwickshire	DoE
Westmorland	DoE or strip turf from one area to be used on another.
Wiltshire	DoE
Worcestershire	DoE
Yorkshire - East Riding	DoE but trying other mixtures, also heather for moorland roads.
- North Riding	Area surveyors specify mixtures for their own areas.
- West Riding	CC specification.
Anglesey	Local mixtures as available.
Breconshire	DoE generally but will also use whatever the contractor advises.
Caernarvonshire	Not necessarily DoE, often use a commercial dwarf grass seed mixture.
Cardiganshire	DoE generally but also any other seed that is available.
Carmarthenshire	DoE
Denbighshire	DoE
Flintshire	DoE
Glamorgan	DoE
Merionethshire	CC specification.
Monmouthshire	DoE
Montgomeryshire	DoE
Pembrokeshire	Mostly rye grass mixtures but buy cheapest available and/or allow to develop naturally.
Radnorshire	Local mixture as available. Like to have quite high percentage of clovers.

Table 17. *Individual* County specifications for grass seed mixtures for non-grant-aided road works.

CAMBRIDGESHIRE

Westerwold ryegrass	50 lbs
Certified Lamora perennial ryegrass	40 lbs
Dutch White clover	10 lbs
Creeping bent	10 lbs
Salad burnet	2 lbs
	112 lbs

DERBYSHIRE

a) For heavy or wet soils at 40 lbs/ac

Chewings fescue	30%
Canadian meadow fescue or Perennial ryegrass S23	30%
Crested dogstail	20%
Rough stalked meadow grass	10%
Brown top (Oregon)	10%

b) For light or dry soils at 40-50 lb/ac

Canadian creeping red fescue	40%
Chewings fescue	25%
Hard fescue	12½%
Smooth stalk meadow grass	12½%
Brown top (Oregon)	10%

DORSET

Perennial ryegrass S23	41%
Creeping red fescue S59	18%
Crested dogstail	17%
White Clover S100	8%
Smooth stalk meadow grass	16%

CO. DURHAM

Perennial ryegrass S23	80%
Wavy mountain hair grass	6.25%
Red fescue S59	5.5%
Timothy	4.5%
Crested dogstail	2.75%
White clover S184	1.00%

ESSEX

Perennial ryegrass - Mixed (Irish) grade A	63%
Timothy S51	23%
Crested dogstail (New Zealand)	14%

GLOUCESTERSHIRE

Canadian creeping red fescue (for initial cover; rely on naturally occurring seed in the soil to provide other species)	100%

HAMPSHIRE

a) Perennial ryegrass S23	95%
New Zealand white clover	5%
b) Creeping red fescue	80%
Perennial Pelo ryegrass	15%
White clover	5%
c) Red fescue Fallax	10%
Red fescue genuina	15%
Agrostis tenuis	12½%
Annual meadow grass	2½%
Rough stalked meadow grass	10%
Smooth stalked meadow grass	5%
Yorkshire fog	10%
Perennial ryegrass Pujberg verna	20%
White clover	5%
Bromus inermis	10%

ISLE OF WIGHT

Canadian creeping red fescue	60%
Chewings fescue	10%
Smooth stalked meadow grass	10%
Crested dogstail	10%
Hard fescue	10%

KENT

a) For 'hundred verges'

Perennial ryegrass S23	85 lbs
Creeping red fescue S59	13 lbs
Smooth stalked meadow grass	7 lbs
Crested dogstail	7 lbs
	112 lbs

KENT (Cont'd)

b) For Chalk Cuttings

Sheeps fescue	12%
Meadow grass	12%
Creeping red fescue (F.rubra ssp. rubra)	12%
Brown top bent	12%
Hop trefoil	5%
Wild white clover	5%
Red clover	5%
Sainfoin	12%
Kidney vetch	12%
Burnet	4%
Birds foot trefoil	5%
Wild chicory	2%
Yellow mignonette	2%

LEICESTERSHIRE and RUTLAND

a) Chewings fescue	40%
Creeping red fescue S59	30%
Sheeps fescue	10%
Brown top	10%
Rough stalked meadow grass	10%
b) Commercial varieties of:	
Smooth stalked meadow grass	40%
Creeping red fescue	30%
Chewings fescue	30%

SOMERSET

B Mixture:	
Perennial ryegrass S23	75%
Danish creeping red fescue	25%
C Mixture:	
Canadian creeping red fescue	50%
Chewings fescue	5%
Hard fescue	5%
Crested dogstail	10%
Brown top (Oregon)	20%
Danish smooth stalked meadow grass	5%
Wild white clover	2½%
Suckling clover	2½%

STAFFORDSHIRE

a) Meadow fescue	35%
Rough stalked meadow grass	15%
Timothy	20%
Perennial ryegrass S23	20%
Crested dogstail	5%
Clover	5%
b) Creeping red fescue	40%
Timothy	25%
Crested dogstail	35%

EAST SUSSEX
(N.B. Changing to standard DoE mixture)

Short seed perennial rye grass	90%
Danish creeping red fescue	5%
Crested dogstail	2½%
Rough stalked meadow grass	2½%

EAST YORKSHIRE

Trials with a commercial mixture of:

Perennial ryegrass S23	60 lbs
Creeping red fescue	30 lbs
White clover	22 lbs
	112 lbs

WEST YORKSHIRE

Perennial ryegrass	60%
Crested dogstail	21%
Rough stalked meadow grass	8%
Chewings fescue	7%
Brown top	3%
Clover	1%

swards. However, the likelihood is that with the general movement towards standardisation encouraged by the Marshall Committee Report, the standard DoE mixture will continue to be widely used:

DoE specification for grass seed:

Perennial rye grass S23	60 lbs
Red fescue S59	20 lbs
Smooth stalked meadow grass	10 lbs
Crested dogs tail	12 lbs
White clover S100	10 lbs
	112 lbs

costing approx £40 for certified seed. Two application rates are specified of not less than 1 lbs to 90 square yards (approx. 54 lbs per acre) for verges and central reserves, and 1 lb to 60 square yards (approx. 81 lbs/acre) for side slopes. Cost of seed in 1973 was about £19 and £29 per acre respectively. In addition establishment of grass on new works may be contracted out to specialist firms without detailed specifications of the seed mixture to be used. This especially occurs where hydroseeding techniques are used. There have been some attempts to incorporate seed of wild broad leaved plants and shrubby species such as heather, gorse and broom and even trees such as beech into the basic grass/clover mixtures, with varying success both by drilling and hydroseeding. This is a subject of considerable conservation and public interest, and one to which a great deal more research effort might be directed. Turfing is apparently not widely practised, although in Westmorland turves may be stripped from an improvement site before works begin, to be laid at other sites where work is just completing.

After seeding and germination of grass it is general practice to mow frequently, both to encourage development of a close sward and to control agricultural weeds. Several counties spray with selective weedkiller during the first two years for weed control, although there are a number of other counties that do not.

DISTURBANCE AND POLLUTION

Disturbance to established roadside verges may arise from deliberate dumping and building up by Highway Departments, from the activities of statutory undertakers, from use by farm machinery or other agricultural operations such as sugar beet dumps and ditch cleaning, or from their legal and illegal use by the public. One of the most damaging causes of disturbance, the driving of cattle from field to milking parlour, has declined. Some of these forms of disturbance may be very local and others more widespread but regardless of their cause they all affect the roadside vegetation to a greater or lesser degree, and often create conditions favourable to invasion by aggressive agricultural weeds.

In the building up of verges, materials of all kinds may be used; of particular interest from the point of view of development of vegetation are the use of base rich materials (mortar and rubble) as already mentioned and the contents of road suction sweepers. Generally speaking the latter sweep up grit, soil and vegetable material (leaves and grass clippings) without very much litter from rural roads and in 18 counties this is used for filling in hollows and flattening verges. The effectiveness of this depends on the sweeper operator levelling the material on the verge after emptying the machine and if he fails to do so, more problems are created than solved. Perhaps with the disadvantages more in mind, 22 counties instruct their sweeper operators to empty only at recognised tips and not on the verges. The material if properly spread on roadsides may in the long term create locally different soil conditions and give rise, after initial colonisation by weedy plants, to habitats for interesting plants not otherwise present in the immediate neighbourhood. Apart from this deposition of material by Highway Authorities to fill in wet hollows and other areas, the most common and widespread form of disturbance probably comes from the deposition of spoil following the cleaning of roadside ditches. Ditches can be expected to be cleaned out at fairly regular intervals, and where the spoil is pulled out onto the verges bare ground conditions are again created, often of good soil that may have picked up additional fertilisers from leachates in water running off adjoining land. The build up of ditch spoil material has already been noted as a possible cause of the upstanding nature of many roadsides, but unlike other forms of 'dumping' is composed of native soil materials to the site.

Whatever the provenance of the materials, it has to be recognised that any dumping on, or disturbance of, road verges destroys the existing vegetation and that whilst this might have originally been composed of stable associations of long lived non-weedy perennial plants, the vegetation that succeeds will usually be mainly annuals or short lived perennials, many of which are weedy. Continual dumping and disturbance of road verges for whatever reason tends to add to the problems of the engineer responsible for their management, almost always detracts from their visual amenity and destroys their existing wildlife interest; although other forms of wildlife may come in to occupy the new habitat, these new forms are often of less interest than the original communities.

Illegal dumping by the public and others poses a different problem especially when the materials comprise domestic hardware or such intractable objects as old mattresses, all of which, apart from the affect on amenity and hygiene, make mowing difficult or impossible. However, dumping of this sort has a very local effect, whilst litter although less bulky is generally much more widespread and a great deal more difficult to control. Some counties provide a service with litter bins in

lay-byes but others find it more effective to remove the bins and impose a heavy fine on offenders caught depositing litter. The question of litter impinges on the management of roadside vegetation in two principal ways: by interfering with cutting machinery (as with dumping, except that a dump can usually be avoided) and by its general effect on the amenity aspects of roadside verges, especially where they are being managed for a neat and tidy appearance. It cannot be said that most paper and plastic litter has any effect on wildlife although broken glass is an obvious hazard. Whilst it does not follow (contrary to opinion) that litter is less likely to be left on verges that are kept closely cut, there can be a particularly unsightly time with parts of verges that are only managed once a year, when the area is cut, usually in the autumn, and a whole season's accumulation of litter is shredded and dispersed.

A further form of disturbance is caused by pollution. The effects of salt, both in drainage water and in spray from vehicles, are specifically road generated and have known effects on vegetation: notably on some sensitive decorative shrubs where these have been planted on central reservations and similar areas (Ranwell, Winn and Allen, 1973). Lead can be found in high levels both in soil and vegetation immediately adjacent to the carriageway but these levels reduce logarithmetically with distance from the carriageway (Daines, Motto and Chilko, 1970). The lead levels found do not appear to have any effects on the growth of plants by roadsides, and their significance for herbivorous insects, small mammals and other forms of wildlife are not known, although higher than normal levels in bodies of these animals can be demonstrated (Jefferies and French, 1972; Williamson and Evans, 1973). There is no evidence at present to suggest unusual mortality, or indications of sublethal effects on wildlife on roadsides associated with lead poisoning. Similarly there are no indications of effects on plants or animals associated with the gaseous emissions of hydrocarbons or of oxides of nitrogen. Sulphur in various combinations is present as a pollutant in air generally and whilst some forms of lower plants (lichens and fungi) are certainly affected, any effects on roadside species are more likely to be part of a general pattern of pollution over a wider area.

SUMMARY

It can be concluded from this account that roadside verges are often edaphically and in other ways contrasted to their immediate surroundings. In addition that any given area may at any time be the subject of earthworks or other disturbance that can destroy the existing vegetation and wildlife habitat. Although there are clearly many miles of roadside that remain undisturbed from one decade to another, nevertheless, the pressures even on the most minor roads are mounting.

CHAPTER 6. HIGHWAY TREE PLANTING; BOUNDARY REINSTATEMENT AND HEDGE MANAGEMENT; DITCH MANAGEMENT

TREE PLANTING

The planting of trees on highway land is practised with varying levels of interest by the Highway Departments of County Councils as shown in Table 18 (Page 62); it ranges from plantings of 15,000 trees in Lancashire in three years, 40,000 in four years in the West Riding of Yorkshire, 31,000 per annum in Hampshire, to policies of no financial provision for highway tree planting by the Highway Departments in Essex, Northamptonshire, East Riding of Yorkshire and Flintshire. Many Highway Departments aim at least to plant as many trees as they fell, although not always on the same site.

In the following Counties Horticultural, Arboricultural or Forestry Officers are attached to the Highway Department: Hampshire, Lancashire, Leicestershire, Lincolnshire - Lindsey and Holland, Surrey, East Sussex, Westmorland, Wiltshire, West Riding of Yorkshire and Glamorgan; in most instances these officers have a staff and nursery facilities for raising plant material. Other Counties with tree nurseries run by the County Council include Berkshire, Derbyshire and Kent. In Counties where specialist officers are not attached to the Highway Department, advice is often available from Landscape Architects, Horticultural or Forestry Officers attached to the Planning or Education Departments; in a number of instances finance and advice comes from the County Council's Countryside Committee. Plantings on trunk and grant aided roads have always to be approved and are often designed by the Department of the Environment, financed by the Department and, except where the County Surveyor is the Planting Agent [Kent, Surrey (non-RCU schemes), Glamorgan, West Riding, Lancashire, Leicestershire, Hampshire (non-RCU schemes) and Lindsey], are carried out by the Forestry Commission as the Planting Agent. Maintenance of these plantings, including cutting of vegetation and weeding is done either by the Planting Agent or by the Agent Authority (the Local Council) for General Maintenance, according to arrangements made by the Department.

The planting of trees on County rural roads is essentially divided between the roadside verge proper and other areas of highway land, especially on sites created on off-cuts left after completion of road re-alignments and improvements. Planting on the roadside verge itself is again divided between old established verges and plantings on new verges of improvements, often as part of a landscaping scheme for the whole works. Where there is to be tree planting on verges section 123 of the Highways Act 1959 requires that this should not be done within 15 feet of the centre of the road, but most Highway Departments now stipulate a minimum distance from the edge of the carriageway, varying from 20 feet in Radnorshire to 6 feet in Co. Durham and Kent, and a most

usually quoted distance of 10-15 feet. In addition some counties, such as Cheshire also quote a minimum distance from the boundary hedge (where one exists) in order to allow the neighbouring landowner access for its management. In general, avenue plantings are out of favour and it is more common to plant trees in groups or else as individual specimens. Likewise, significant plantings of trees are most likely to be made on new improvements, or in the vicinity of built-up areas, than in the countryside at large, although some counties (e.g. Lindsey) do actively look for suitable sites wherever they may occur. Those counties that are not in favour of roadside plantings quote safety as a prime reason for not doing so, with the effects of shading and leaf fall on the surface of the carriageway, disturbance of the formation (including switchback effects) and extraction of water from the subsurface as other factors. Besides planting of trees there are also quite extensive plantings of shrubs by some Highway Departments, but these tend to be more in built-up areas or on roundabouts, or as features of new road works than on country road verges.

Planting on other areas of highway land, well away from the carriageway appears to be dependent on County tradition and the individual preferences of Highway Departments, some of which have a long history (remembering that Highway Departments themselves are of comparatively recent origin) of sympathetic management including landscaping and tree planting of the land under their control. Others take a more pragmatic, purely engineering view of their responsibilities. The recently formed Countryside Committees in County Councils can be expected to take an interest in these matters as they do already for example in Cheshire, Essex and Denbighshire.

In addition to plantings made by the Highway Department, plantings may also be made under the aegis of the Planning Department, or by licence by public organisations such as Women's Institutes, or more rarely by individuals. In most cases the subsequent maintenance of these trees (where any arrangement for their maintenance is made) is taken over by the Highway Department. Occasionally it has proved possible to invite the co-operation of neighbouring landowners to plant up their land to complement a highway planting scheme, but the general experience appears to be that whilst landowners will pressurise Councils to plant up highway land reciprocal arrangements are hard to achieve.

Costs of tree planting vary so much from site to site that a realistic 'average' figure is hard to calculate, but costs of £4 to £5 for preparation, purchase/raising, planting and staking a young tree are quoted. Not a great deal is saved by planting two or three year old 'whips' as there are additional maintenance problems of weeding, and of protection against rabbits, but their survival rate may be better.

BOUNDARY REINSTATEMENT

Following the destruction or realignment of the highway boundary as the result of road works, there is an obligation on the part of the Highway Authority to negotiate with the landowner on the nature of the new boundary to be provided. Normally these negotiations are made by the County Land Agent on behalf of the Highway Authority. Three approaches to this matter appear to be popular as shown in Table 19 (Page 65). Either a) 'like is replaced by like' (e.g. a quick hedge by a quick hedge), b) the landowner is given the option (within limits) to say what he wants, or c) a standard structure is provided unless the landowner insists on something else. The principal choices are between (most commonly) a quick hedge and protective fence, a wooden post and rail fence, or a post and wire fence. Many variations on these themes exist according to regional preferences and economics; in addition in stone wall areas some stone walling is provided at a cost of £4 - £5 per yard run, whilst in some arable districts, for instance in Lincolnshire - Kesteven, many landowners prefer to have the boundary left open.

In 13 counties, farmers were said to have a preference for hedges and in 11 not; in two counties there was no detectable trend in farmer opinion. Generally the counties where farmers favoured hedges were in the north or the west whilst those where they did not favour them were in the south. No overall figures are available either for the mileage of roadside hedges destroyed by roadworks each year, or for the mileage of new hedges planted by County Councils, but substantial mileages have been put in by Lancashire, Northumberland, Westmorland and the East Riding of Yorkshire Highway Departments. It might not be unreasonable to estimate that between the 58 counties a total of 100 miles of hedge are planted each year (or 1000 miles per decade) although a high proportion of this would be for reinstatement of a previously existing hedge. The cost of planting a hedge was quoted as £2 per yard run.

The period for which the different counties maintain a newly planted hedge varies from 0 to 12 years with an average in the region of 5 years. In them all the young hedge is protected by a fence on the landowner's side and sometimes on both sides so that it should be stockproof. In some counties further management of the hedge after establishment of the plants is left to the landowner, but in other counties management will continue until the hedge itself is stockproof or first layered. The management includes replacing dead plants, weeding and sometimes cutting. Weeding may be by hand or by use of herbicides: in the case of the latter, commercial formulations of simazine, chlorthiamid, dalapon and MCPA would be used alone or in combination. Other chemicals that might be used include paraquat, maleic hydrazide and picloram. However, considerable damage to the young hedge can be caused by inexpert or careless application of chemicals; from this point

of view the use of granular rather than liquid formulations are favoured. Granules have the additional advantages of saving the carting of water, preventing mistakes due to incorrect dilution of the concentrated material and overcoming the problem of disposal of surplus diluted spray material at the completion of a job. In one county it was reported that costs of £200 were likely for hand weeding a mile of new hedge, whereas by the use of herbicides this could be reduced to £27 for a satisfactory result.

ESTABLISHED HEDGES

Existing hedges, except where they have been planted on highway land by the Council, were considered to be the responsibility of the adjoining landowner and were not managed by Highway Departments, other than where a road hazard existed on bad bends and in similar situations. Councils have powers under the 1959 Highways Act to oblige neighbouring landowners to manage their hedges or can themselves manage a hedge in the interests of the highway and charge the landowner with the cost, either before or after. Different Councils take different attitudes on these matters and whilst many achieve a practical working relationship with hedge owners, in some counties the management of roadside hedges has become a very vexed problem with some bad feeling. In the south-western Counties of Cornwall, Devonshire, Somerset and Dorset special provisions in the 1959 Act allow for the Highway Authority to cut roadside hedges (although the interpretation of this depends to some extent on the definition of a hedge according to terminology of the district) and be eligible for a grant towards the cost from the central Government. However, even in these counties the extent of hedge cutting by Councils is very limited and tends to be confined to areas where there has been a long-standing tradition for the Council to do the work.

Notwithstanding the foregoing, most Councils will control encroachment of woody growth from hedges onto their grass verges, and in the course of cutting the verges may also trim up facing hedges and even the tops of low hedges. However, in some parts of the country the use of flail cutters on hedges is disliked by landowners on account of the tearing action of the flail (as opposed to the clean cut of a proper hedging tool) and impaired wound healing of the wood leading to increased danger of disease. Where deliberate hedge cutting programmes are undertaken a number of counties have, or hire, hedge cutting attachments, or employ hand labour, and this is much to be preferred to the smash and bash use of the flail. Some counties still have gangs of experienced men who can cut and lay hedges and manage them in the traditional way, but these skills are not really encouraged in the aura of twentieth century efficiency so that they can be expected to disappear, as indeed many have over the last decade.

Whether the landowner or the Council undertake the management of a roadside hedge it is necessary for there to be access to it and also for the clippings to be collected up and burnt or carted away. For reasons of access it may be necessary to cut the back of the grass verge when it might otherwise not be done; it has already been noted that there are restrictions in some counties on tree planting where this might interfere with access. Telegraph poles and street furniture of various kinds also provide obstructions to mechanical hedge cutting, complicating otherwise straightforward work. The removal of hedge clippings is often a source of complaint both in terms of amenity and of adding to the difficulties of verge mowing. Technically it is illegal to start a fire within 50 feet of the highway but this does not generally inhibit burning of roadside brushwood.

DITCHES

Most Councils are more willing to manage roadside ditches, even if they patently belong to someone else, then they are to manage hedges. In addition they have powers to enter and clean out ditches on neighbouring landowners property in order to ensure the efficient working of the highway drains and culverts. The inadequacy of farm ditches to carry away highway water is a recurring cause of complaint. As a result, some Councils will employ their powers to oblige landowners to manage ditches and drains, even if this involves delays.

Annual maintenance of roadside ditches is mainly a matter of vegetation control and this can either be done by hand or one of a number of flail or cutter machines that are available. The question of the cuttings blocking the ditches arises. Similarly when the ditches are cleaned out and reformed the spoil presents some difficulties and has to be either spread on the verge, creating quite a lot of disturbance, or carted away. Occasionally herbicides are employed to control growth of vegetation in roadside ditches but this is not generally recommended: total weed-killers are undesirable because some vegetation cover is essential to control erosion, whilst not a great deal can be achieved by the use of selective or growth retarder chemicals. In addition the hazards of using chemicals where they can be transported in flowing water away from the site of application to neighbours land, may lead to legal difficulties that most Authorities would wish to avoid.

As with hedges there are problems of access to ditches for management purposes.

On the question of grass mowingsblocking drainage grips and channels, experience in various counties differed. It has already been noted in Chapter 2 that in some areas cut grass from the use of haymower machines had been a particular problem, whilst in others this had not been so; in the same way cuttings from flail machines have been reported to cause blockages whereas in other counties no difficulty has been found. Special machines with a rotating pipe-cleaner type action have been designed for grip cleaning, but this job is still most commonly done by hand. The spoil from

the grips, especially on raised verges can be quite considerable and is frequently thrown out onto the verge without much attempt at levelling.

Although some Highway Departments consider that open ditches have a greater drainage capacity, many are taking the opportunity with new roadworks to pipe roadside ditches. Piping saves ditch cleaning, gives efficient drainage and provides support to the road. In some places where the highway is very narrow, piping in the ditch may give an extra 2 feet of road: the Milk Marketing Board (responsible for so many improvements to minor Country roads in the 1930s) stipulates a minimum width of metalled road of 8'6" for its bulk milk carriers, and the piping-in of ditches in some parts of the country has proved to be essential to provide this extra width in narrow lanes.

Table 18. Policies for tree planting on highway land by County Councils in England and Wales 1972. Sources of professional advice and of plant material.

Bedfordshire	Tree planting policy began with the Festival of Britain and was continued by the Highway Department until 1971, when the Countryside Committee in the Council was formed and the Planning Department became responsible. About 600 trees planted per year on new and *existing* sites associated with roads, and replacement of trees where affected by roads in areas of high amenity. Mainly indigenous species used.
Berkshire	Recent appointment of Landscape Architect to Highway Department with responsibilities for tree planting. C.C. has a tree nursery of mainly indigenous species. Policy to plant out in clumps rather than lines. No trees to be planted within 10 feet of the carriageway.
Buckinghamshire	No Council or Departmental policy for highway tree planting. Forestry officer in the Planning Department. Highway Department will generally replace trees affected by roadworks rather than initiate new plantings. Smaller decorative trees often used.
Cambridgeshire	Trees for highway schemes bought and planted by the Highway Department on advice from 'Tree and Woodlands' Officer in the Planning Department. Considering starting a small tree nursery. No trees to be planted within 15 feet of the carriageway.
Cheshire	County policy on tree planting administered by the Planning Department. Road schemes joint responsibility of Planners/Highway Dept/Countryside Committee. £2,000 a year from Countryside Committee for tree planting mostly in 'setbacks', lay-byes, picnic areas etc. Licences will also be given to voluntary organisations under the 1971 Highways Act to plant trees but these will generally be maintained subsequently by the C.C. No trees to be planted within 10 feet of the carriageway, nor 4 feet of a hedge, so that a verge of at least 15 feet is usually required before any planting by a roadside will be considered.
Cornwall	About 1800 trees and shrubs planted by the Highway Department in the last 3 years. County tree nursery and advice available from the Planning and Education Departments. Most plantings on improvements and wide verges; no fixed distance from carriageway but generally no trees planted less than 10 feet. C.C. will take over responsibility for Trunk road plantings from the Forestry Commission in due course.
Cumberland	Limited annual programme of tree planting having regard to highway use and positions of services. Growing importance attached to replacement of trees. On County roads licences/permits given to amenity organisations to plant trees.
Derbyshire	Sympathetic to trees and will try to save them where possible. Not much planting by existing roads but will put trees by improvements. Advice from County Horticulturalist and material from County tree nursery. Co-operation with Planning Departments, and Peak Park Planning Board in the National Park.
Devonshire	Highway Department policy to plant up by new improvements but at present very few trees planted by existing roads. Replace trees felled in the course of road works. Advice available from the Planning Department. Material bought in from commercial nurseries, planted by Highway personnel.
Dorset	Any Highway planting done on the advice of the Planning Department but not within 20 feet of carriageway. Not very keen on trees by roads because of their effects on the carriageway.
Durham	Council has Foreman Foresters in north and south of the County and assistants, Forestry Officer in the Planning Department. Material bought in but planted by Council labour. Large highway plantings are especially associated with big highway improvement schemes. No planting within 6 feet of carriageway.
Essex	Highway Department policy not to provide trees on new improvements but will be sympathetic and licence others who may wish to. No Highway Department financial involvement. No planting within 15 feet of the carriageway. C.C. working party including Planning Department and Countryside Committee to investigate tree planting by roads, but likely to be a Planning Department responsibility. County Forester in the Planning Department.
Gloucestershire	County Council's Landscape Architect advises. Planting generally depends on availability of finances and the amenity situation.
Hampshire	Highway Department has its own Arboriculturist with a team of 20 and a tree nursery. Approximately 31,000 trees planted per annum. Policy to replace old trees, clothe scars made by improvements, or generally if an area will be made more attractive as a result.
Herefordshire	A well wooded County so no particular need felt for a highway planting policy; however, the 5 Divisional Surveyors given annual budget of £200 each for tree planting at their discretion.
Hertfordshire	About 400 trees planted over the last 5 years, mostly along road improvements. Advice from Landscape Architect, tree specialist in the Planning Department and Horticulturalist in the Education Department. Material bought in.
Huntingdonshire	Highway Department spends £300-£400 per annum on tree planting and about 4000 plants put out in recent years. Mainly by new improvements, and other suitable places although not a great number of the latter. Underground services get in the way.
Isle of Wight	Highway policy to plant trees, mostly on new improvements in clumps, rarely by side of roads and not within 10 feet of the carriageway, 150 planted in 1971. Advice from a member of the Planning staff, the Forestry Commission and an outside consultant.
Kent	Highway Department keen to have trees by roads but anticipate problems from icing/shading, overhang, root effects on the formation and shielding of street lighting. Planting and maintenance by the County Estates Department who have a tree nursery.
Lancashire	Horticultural Officer prepares schemes (sometimes in co-operation with Planning Department) and has horticultural gangs in each Highway Division who do planting and maintenance. Over the last 3 years 15,000 standard trees were planted on County roads, 5,000 shrubs and 300,000 quicks including those used for hedging (q.v.).
Leicestershire	Highway Department has own Horticultural section (and tree nursery) who do roadside planting and also provide a service to other Departments. 30,000 trees planted per annum (not all by roads). No planting within 10 feet of carriageway.

Table 18 (Cont'd)

Lincoln - Holland	Highway Department has Arboriculturalist with a tree nursery actively looking for suitable sites. Expect to plant 4 trees for every one felled. Planting in groups where possible.
- Kesteven	Highway Department finances tree planting by improvements and on some older verges, finance for other County road planting schemes from Countryside Committee. Advice available from Forestry Officer in the Planning Department, but work done by Highway Department. Prefer planting to be not less than 15 feet from carriageway.
- Lindsey	Highway Department has Horticulturalist with a team of 9 and a nursery. Actively looking for suitable sites for planting, including agreements with landowners to plant frontages. Plantings more generally by existing roads than by new improvements. 87,577 trees planted over the last 10 years and 732 planting schemes completed.
Norfolk	County policy to plant roadside trees and encourage co-operation from neighbouring landowners to put in amenity plantings on adjacent land. Council employs two foresters. 5,484 (deciduous) trees planted on 318 sites since 1967.
Northamptonshire	No Highway Department policy for tree planting and not interested, although will do some planting. Planning Department may do some schemes by roadsides but if they do they have to maintain. Will permit planting by other organisations so long as trees not closer than 10 feet to the carriageway.
Northumberland	Extensive plantings by County roads: £5,000 per annum budget. Advice available from Planning Department. Also permit other organisations to plant trees but not within 12 feet of the carriageway. Like to plant in clumps, not in avenues. Problems with underground services.
Nottinghamshire	About 12,000 trees planted in the last 3 years in suitable places. Usually plant close and expect to thin. Planting done by team from the Planning Department but Highway Department pays except in high amenity areas, picnic places etc.
Oxfordshire	Forestry Officer newly appointed with expectation of County policy on highway planting being drawn up.
Rutland	Amenity plantings and to suit the landscape. Advice from Farm Institute. Plant along roads as well as on 'off-cuts', but not within 15 feet of the carriageway.
Shropshire	Limited planting under central control. Advice available from Horticulturalist in the Education Department.
Somerset	Try to plant more than remove but not much spare land. Advice available from Horticultural Section in the Planning Department. Planting done by contract.
Staffordshire	Council's Forestry Officer advises on tree planting schemes running at about £3,000 per annum.
Suffolk - East	Active planting of trees and several hundred planted in 1971/72 in a wide range of suitable places. Advice from Arboriculturalist in the Planning Department.
- West	Highway Department does a certain amount of planting on outsides of bends after realignment of roads, and in similar places, but is not keen on widescale planting mainly on grounds of safety. Will advise organisations and individuals where trees may be planted within the Highway boundary.
Surrey	Highway Department has an Arboriculturalist with a small tree nursery but mostly buys plants in. Main plantings in connection with new improvements and also with landscaping schemes. In 1971/72 planted 1585 trees, 4664 shrubs and 24,500 hedge plants (q.v.).
Sussex - East	Forestry Officer in the Highway Department but available to other departments as well. Highway Department policy to try to plant 2 trees for every one cut down, although not necessarily at same site. Aim to suit the landscape, plant in clumps rather than avenues.
- West	Highway Department policy to use trees to regulate the shape of earthworks and pick up the line of existing woodlands. Do not like to plant avenues and no planting within 10 feet of the carriageway. Advice from Landscape Architect. About 2,500 trees and 5,000 shrubs planted in 3½ years. Would like to encourage contracts for planting of new road schemes with maintenance for three years.
Warwickshire	Highway Department aim to plant more than they fell (1970/71 felled 223 trees, planted 1082). Advice available from Landscape Architect in Planning Department. Tree nursery raises about 2,000 plants yearly. Find that plantings by other organisations costs more in the long term than if the Council had done them in the first place.
Westmorland	Highway Department policy to plant all improvements with trees if appropriate, and to replace trees that have had to be felled. Over 1000 trees planted in one year recently. Foreman Forester in the department advises. 'Men of the Trees' permitted to plant on highway land under supervision.
Wiltshire	Highway Department has its own Horticultural section which raises plants. About 10,000 trees planted, notably on big by-pass schemes, in the last 3 years.
Worcestershire	Highway Department would not generally initiate tree planting schemes and has no policy of planting along established road verges. Planting schemes may be quite extensive on new improvements, usually on advice of the Forestry Officer and the Planning Department.
Yorkshire - East Riding	Highways have no financial involvement with trees on roadside verges and do not encourage their planting there mainly for safety reasons. Will encourage their planting in clumps or in hedges but not less than 15 feet from the carriageway.
- North Riding	No set Highway Department policy and planting usually at the discretion of the Area Surveyors. Often done to please neighbouring landowners but noted that no reciprocal arrangements forthcoming. No nursery, buy plants in centrally.
- West Riding	Highway Department has Horticultural section and increasing number of planting schemes for new improvements and by-passes, but a decreasing number on established road verges. Plantings are for conservation, amenity and bees. About 40,000 trees planted over the last 4 years on sites by County roads, mostly in groups but some as individuals. Would plant more if there was more labour available. Instructions to mower operators are not to cut within six feet of planted trees and also to leave naturally regenerating woody growth, including gorse.
Anglesey	Will plant trees where there is a suitable site and have spent about £1500 in the last 5 years on trees. Will also plant trees paid for by subscriptions given by local organisations.
Breconshire	Opportunity planting on off-cuts and suitable sites. Advice available from the County Horticultural Officer.

Table 18. (Cont'd)

Caernarvonshire	Small number of trees planted each year, generally in clumps, often in conjunction with the CPRW. Generally on off-cuts and similar places but not within 10-12 feet of the carriageway. Advice is available from Landscape Architect in the Planning Department.
Cardiganshire	Highway Department attempts to preserve trees where possible. Employs consultants when it requires advice.
Carmarthenshire	No Highway Department policy, generally too little room on County roads and fewer than 100 trees per year planted. No professional forester but advice is available from Landscape Adviser in the Planning Department.
Denbighshire	No definite programme of tree planting but will plant extensively if an opportunity arises. Advice from Forestry Commission or Horticulturalist at the local Agricultural College. Also advised by Countryside Officer in the Planning Department and the Countryside Committee.
Flintshire	Planting on County roads would not be encouraged.
Glamorganshire	Highway Department will plant as circumstances arise but do not have a laid-down policy. Very amenity conscious and will try to preserve existing trees. Horticultural section in the Highway Department have own glasshouse and tree nursery, and do planting. Most planting schemes are on Trunk and Principal roads, very little on non-principal and unclassified.
Merionethshire	Not a great deal of planting on County roads, and where there is any done under the supervision of the County Horticultural Officer. Forestry Commission do plantings on main roads.
Monmouthshire	Special section in the Planning Department advises Highway Department, and will do planting on highway land or contract Forestry Commission to do it.
Montgomeryshire	Becoming more concerned especially with possibilities of planting on 'off-cuts' and land left waste from improvements. Would not plant on normal verges. Advice available from Horticultural Officer in the Education Department and also the County Land Agent.
Pembrokeshire	County policy to plant trees, especially on improvements in clumps. No avenue planting. Advice from local nurserymen, who do planting and subsequent maintenance on contract. No Council Horticultural Officer. Pembrokeshire Countryside Unit, Parish Councils and local organisations all active with proposals for tree planting.
Radnorshire	No tree planting policy. Would not plant less than 20 feet from the carriageway.

Table 19. Forms of reinstatement of boundaries following roadworks, and period of after-maintenance of hedges. County Councils in England and Wales, 1972.

		Maintenance period for hedges, years.
Bedfordshire	Traditionally offer a quick hedge and double fence, but hedges less in demand now.	3
Berkshire	Hedge usually offered; with wire and dropper, or wood fence protection	1½ - 2
Buckinghamshire	Generally post and rail but will provide live hedge where required.	-
Cambridgeshire	Provide what is required. In claylands generally plant a quick hedge protected by wire or wood fence.	1
Cheshire	Provide hedges where required.	5
Cornwall	Standard Cornish 'hedge', or post and rail fence, or quick and sometimes beech hedge, as required.	-
Cumberland	Provide what is required. Replace hedges with quick or beech, gap-up and control weeds in maintenance period.	5
Derbyshire	Plant hedges where required; also rebuild walls. Gap-up hedges and control weeds in maintenance period.	3
Devonshire	First offer a fence, but will plant hedge and protect with a post and rail fence if landowner insists.	½
Dorset	Provide what is required, generally a fence but sometimes a hedge.	3
Durham	Generally provide like-for-like, most often quick hedge and post and rail fence. Farmers prefer hedges or walls to wire. Gap-up, cut and control weeds during maintenance period.	5
Essex	Most farmers prefer post and rail fence. Very few hedges planted.	1
Gloucestershire	Provide like for like or adjust compensation terms if something better is required.	3
Hampshire	Farmers generally reluctant to take a hedge, most prefer post and rail fence. Minimum maintenance of hedges.	2 - 3
Herefordshire	Provide what is required, generally quick hedge protected by post and wire. Will maintain until first layered which is done by experienced C.C. labour. Contract firm sprays hedge bottoms with simazine to kill bottom weeds; pleased with the results.	7 - 10
Hertfordshire	Provide what is required. Quite often hedge protected with post and rail fence.	1
Huntingdonshire	Post and rail fence, if landowner requires hedge then compensation paid to enable him to plant it himself.	5
Isle of Wight	Farmers less keen to have hedges than formerly. Where hedge is planted a protective fence is put on both sides.	3
Kent	Provide what is required, encourage replacement of like with like but very little hedge planting.	1
Lancashire	Have planted large mileage of hedges (see Table 18).	5 - 6
Leicestershire	Quick hedge, protected by timber post and rail fence accepted by most landowners.	-
Lincoln - Holland	Some hedges but mostly on private frontages, rarely on field boundaries.	1
- Kesteven	Quick hedge and post and rail fence offered but many farmers prefer plain fence, open ditch or no boundary at all. Only gap up hedges during maintenance period.	5
- Lindsey	As required. About 4 miles per annum of hedge plus post and rail fence established over the last 3 years.	7
Norfolk	Fences, hedges or walls as required. Extensive hedge planting for the last three years.	3
Northamptonshire	Will plant hedges if required and use herbicides to control weed growth during the maintenance period.	2
Northumberland	80,000 yds of hedge planted in the last 7 years with post and rail protection. Maintain until stock proof. Most farmers like hedges and very few refuse them. Stone walls in upland areas.	5 - 7
Nottinghamshire	Quick hedge with protective post and rail fence is normal. Gap-up and control weeds in the maintenance period.	5
Oxfordshire	Will provide hedge and protective fence as required. Also do some stone walling.	3
Rutland	Generally, hedge protected by post and rail fence positively wanted by most farmers/landowners. Will maintain up to time of first layering which is done by experienced Council labour.	7 - 10
Shropshire	Generally a hedge protected by a post and wire fence favoured by farmers. Hedge maintained up to time of first layering or for first 7 years, whichever sooner. Herbicides used for weed control in hedge bottoms.	7
Somerset	Generally offer post and rail fence. Not often asked for hedge and most farmers do not want them. Some use of herbicides for weed control.	3

Table 19 (Cont'd)

Staffordshire	Generally like-for-like.	1
Suffolk - East	Planting of hedges encouraged but will provide what is required by the landowner.	2
- West	Will plant hedges at the request of landowners, but will take no responsibility after initial planting.	-
Surrey	Post and rail fences, or hedges, to landowners requirements.	-
Sussex - East	Standard quick hedge and chestnut pale fence accepted by most landowners. No particular trends for or against hedges.	1 - 5
- West	Landowners choice normally for quick hedge with post and rail fence. Council prefers hedges as part of the highway design.	3
Warwickshire	Standard quick hedge with protective post and rail fence unless landowner insists on something else.	-
Westmorland	Replace like-with-like and farmers generally accept a hedge. About 10 miles planted over the last 3 years. Maintain for 7 years or until first layered which is done by experienced Council labour.	7
Wiltshire	Generally offer an open fence, unless the landowner stipulates otherwise. Hedges less popular than previously.	1
Worcestershire	Usually a hedge protected by a post and rail fence.	3
Yorkshire - East Riding	Hedge plus post and rail fence offered but not always accepted, although could be becoming more popular again. About 25 miles of hedges planted in recent years. Maintain until stock proof.	-
- North Riding	Landowners quite actively asking for hedge with post and rail fence especially in pasture areas. Stone walls in the Dales. Maintain for 5 years or up to 12 if the Council takes on responsibility for the first layering.	5 - 12
- West Riding	To landowners requirements. Often hedge with post and rail fence. About 2 or 3 miles planted per annum.	5 - 12
Anglesey	Will plant hedge with post and rail fence plus a temporary fence, but most popular is a low concrete wall and wire netting fence. Some full size stone walls also provided.	7
Breconshire	Prefer to provide like-with-like and most landowners are accepting hedges, although some ask for post and rail fence or netting. Some use of chlorthiamid for weed control.	5
Caernarvonshire	Quick or beech hedges offered but many farmers prefer to take compensation instead, or concrete post and wire fences. Some stone walling.	5 - 7
Cardiganshire	Will replace an existing hedge with quick or beech. Most Cardiganshire farmers like to have hedges.	-
Carmarthenshire	Standard post and rail fence but will also provide hedge or hedge and bank on occasions. No particular trend for or against hedges.	-
Denbighshire	Like-with-like or recommend quick hedge and pignetting on the field side, to keep lambs in. Also use beech, hornbeam and privet. Farmers like hedges. Maintain to first layering, gap up and weed control.	7
Flintshire	About one mile per annum of hedge planted with post and wire fence outside, and chain link fence on the inside. Otherwise post and wire fence to landowners requirements. Minimum of stone walling. Gap up, weed and clip during the maintenance period.	5
Glamorganshire	Most farmers satisfied with hedge protected by post and rail fence, or chestnut paling. Hedges of beech, quick or hazel. Maintain for 5 years or to first layering. Pleased with economics of weeding hedge bottoms with herbicides.	5
Merioneth	Standard post and wire fence, with or without quick or beech hedge. Landowners get more compensation if no hedge provided, and many prefer this.	5
Monmouthshire	Standard post and rail fence accepted by the majority. About 30% ask for a hedge which would be gapped up and weeded for 3 years from planting.	3
Montgomeryshire	Standard quick hedge and protective fence accepted by the majority. Will maintain for 7 years or until can be layered, whichever occurs first.	7
Pembrokeshire	All new boundaries have a hedge in one form or another, normally of quicks with a protective fence, but sometimes of the traditional stone bank with a hedge on the top.	2 - 3
Radnorshire	Standard offer of a quick hedge protected by post and wire fence. Will maintain for 7 years or until first layered. Farmers taking a pride in their hedges again.	7

ACKNOWLEDGEMENTS

The compilation of this report would not have been possible without the help and co-operation of the County Surveyors and their staffs of the 58 Counties visited. Thanks are extended to them for giving of their time to the survey and for subsequent assistance on points of detail when requested.

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