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WATERSPORTS NOISE - THE LOCH LOMOND SCENARIO

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1. Introduction and Background

Within Dumbarton District lies Loch Lomond, the largest inland loch (or lake) in Great Britain covering an area of some 70 square kilometres. It is 37 kilometres long and 8 kilometres wide at its broadest in the south, tapering to a point in the north. It contains 38 islands of which 5 are inhabited, and at its deepest it is some 210 metres.

Loch Lomond is not only a leisure sports area, it is also a reservoir serving a large portion of the central belt of Scotland. The last visitor survey indicated 1.9 million visitors during the 1991 season [4]. This popularity, both as a tourist attraction and as a watersports playground within easy reach of the central belt of Scotland has, unfortunately, brought with it problems in terms of disturbance to local residents and other loch users.

The Secretary of State for Scotland appointed a working party to look at the future of the loch, though the option of National Park status was not within its remit. The working party's report was published in July 1993 [24] and confirmed several problems, noise being one of them.

At the present time there is both free and easy access to the loch and no control over any of the many and varied water activities carried on there. If there is an incident of any kind on the Loch then it is exceedingly difficult to identify the individual craft, far less trace the owner.

The Loch Lomond Park Authority Byelaw Advisory Group was formed in mid 1992 and represents all user groups on the loch plus landowners and local authorities. Its remit is to consider problems associated the activities carried out on the loch and to recommend ways of dealing with them. One of these problems is noise.

Powered watercraft have the potential to generate very considerable noise levels and media attention has highlighted the recent public inquiry into the proposal by the National Park Authority to impose a 10 miles per hour speed limit over the entire surface of Lake Windermere, the last bastion of unrestricted speed in the Lake District. Not surprisingly there has been both considerable support for and opposition to the proposal. The debate has brought into sharp focus the noise impact of watercraft on both lakeside residents and other lake users. It has also resulted in a considerable amount of noise testing being carried out, the results of which, and their interpretation and implications, have fuelled the debate at the public enquiry.

Once the National Park Authority proposal was known, all parties interested in the future of Loch Lomond were concerned that if such a speed limit were to be put into place on Lake Windermere then it would undoubtedly drive the larger more powerful craft from the Lake District and onto Loch Lomond. The Byelaw Advisory Advisory Group is of course only too well aware of the likely

consequences and whilst it in no way wishes to pass comment on such a proposal, it has to consider the implications for Loch Lomond should the Windermere speed limit be implemented.

At this point I must add the caveat that all views expressed are my own and are not necessarily those of either Dumbarton District Council or Loch Lomond Park Authority.

2. Noise Levels of Watercraft

Boat noise is generated both by the engine and by the movement of the hull through water. Engine noise is itself a combination of mechanical vibration transmitted through the hull, and exhaust noise. Mechanical vibration is normally reduced by resilient engine mountings and sound absorbent cowlings while exhaust noise is muffled by water cooled manifolds [2, 27]. Despite these sound reduction techniques powered craft can generate high levels of noise. Boat noise does not radiate uniformly in all directions, hence sound pressure levels are generally higher on one side than the other [15, 21].

Jet skis at maximum speed, some 30, 40 or even 50 miles per hour, and at a distance of 25 metres, can produce LAeqs of 67.5 and Lmaxs of 76 [15, 18, 28.39].

Noise levels 25 metres from powered boats travelling at 10 miles per hour are likely to be in the range of 58-64 LAeq and 62-72 Lmax [28.8]. Similar boats at 20-30 mph will probably fall into the range of 62-73.5 LAeq and 66.5-79.5 Lmax, while at speeds of 30-40 mph these figures are likely to rise to 64-73.5 LAeq and 68-77.5 Lmax. At 40-50 mph they may attain 70-79 LAeq and 74.5-83.5 Lmax and at over 50 mph can achieve 81.5-85 LAeq and 85.5-88.5 Lmax [25, 28.9].

These figures relate to boats travelling in a straight line and on calm water. However levels can increase by up to 6 dB(A) when turning and 12 dB(A) when hitting waves [28.8]. As an indication of the very high levels produced by the most powerful craft, a level of 119 dB(A) at 25 metres was recorded during record week on Windermere [28.30].

3. Watersports Codes of Practice

In recent years a number of codes which address the subject of noise have evolved. All recommend noise limits for individual craft though a number also address frequency and duration of events, and encourage levels below the stated limits.

The earliest of these is the 1980 Draft Code of Practice for Water Skiing in Noise Sensitive Areas [27] which recommends a peak level of 75 dB(A) derived from the arithmetic average of 4 straight passes of a boat travelling at a speed of 22 miles per hour at a distance of 25 metres. An option to this is that the 12 hour LAeq, measured at the boundary of the water ski area, should not exceed the ambient, also measured as an LAeq, by more than 7 dB(A).

This document was later submitted to the Department of the Environment which in turn produced a Draft Code of Practice on Noise from Power Boating and Water Ski Racing in 1988 [8]. The revised document quotes the Union Internationale Motonautique racing limit of 95 dB(A) for an individual boat travelling at maximum power at a distance of 25 metres [8, 26]. However the Code also recommends a level of 85 dB(A) when practicing and a level of 75 dB(A) after 6 pm in noise sensitive

areas. The higher noise limits contained in this document reflect the fact that it relates not only to water skiing but also power boating.

In 1989 the British Water Ski Federation produced a Code of Practice for Water Skiing in Noise Sensitive Areas [2] based on the Consultation Draft produced by the Water Space Amenity Commission 9 years before. It simply reiterates the recommendations set out in the 1980 document.

In May 1994 the British Water Ski Federation produced a revised Draft of their 1989 Code, [3] which proposes a maximum level of 75 dB(A), though reduced to 65 dB(A) at a speed of 6 knots.

The current Royal Yachting Association Powerboat Racing Circuit Handbook stipulates a 'Statutory Noise Level' [20] laid down in the 1994 rules of the Union Internationale Motonautique [26]. That level is an Lmax of 95 dB(A) calculated from the arithmetic average of 2 passes at a distance of 25 metres and at full throttle.

Finally, the International Jet Sports Boating Association's 1994 Competition Rule Book [14] lays down a 'Legal Level' of 86 dB(A) at a distance of 15.2 metres.

These codes appear to be sufficiently flexible as to encompass all but the noisiest of the types of craft to which they relate within their guidelines.

4. Factors Affecting Noise Levels and their Transmission

In addition to the usual considerations of weather and topography there are three factors worthy of further comment.

Separation Distance

Recent monitoring indicates that noise from individual powered craft may decay at only 5 or even 4 dB(A) per doubling of distance due to the fact that the noise source is a moving one and there is no sound absorption from a water surface.[15, 28.8]

Some Codes of Practice etc. lay down a minimum separation distance of 500 metres [8, 25] however the value of such an arbitrary figure is questionable. I feel that it is essential to judge the acceptability of an activity by the level of noise impingeing upon the recipient at any given location, not simply by distance.

Multiple Sources

Typically, doubling the number of craft would increase the overall level by 3 dB(A).[25, 28.8] but in addition, the disturbance created may be perceived to be out of proportion to the increase in the number of vessels due to the different sound characteristics and modes of use of the various types of craft.[25]

5. Factors Affecting the Perception of Noise

Frequency of Occurrence

People generally tolerate quite high levels of noise if they know that it will occur only infrequently, perhaps on just a handful of occasions during the course of a year. However as the frequency of occurrence increases so does the annoyance factor.

Times and Days of Operation

Noise is more acceptable when recipients are themselves active and creating their own noise. Boating activity on Loch Lomond can take place from dawn till dusk but the annoyance factor is far greater before 8 in the morning and after 7 in the evening, than during the middle part of the day.

Weekends are regarded as rest days, particularly Sunday. Unfortunately the very day on which residents of the lochside are free to relax in the peace and quiet of a rural setting is also the day that watersports enthusiasts are free to indulge in their hobbies.

Duration

Annoyance is not related solely to the level of noise imposed, another crucial factor is the length of time recipients are subjected to it. Residents become very upset when subjected to a continuous stream of jet skiers cavorting around only 100 yards from their front doors from early morning till late evening.

Character of Noise [28.21]

Although there is debate over the tonality of motor boat noise, all environmental health officers I have spoken to are of the opinion that it is tonal, and that the tones vary with engine speed. Boat noise fluctuates in level in relation to engine speed, orientation of the craft, and whether the craft leaves the water exposing the propulsion system or exhaust. Boat noise is impulsive when the hull thumps against waves or wash, or on re-entering the water. It may also be impulsive when boy racers perform manoeuvres in front of an audience! Since craft travel from one point to another, it follows that a boat is a moving noise source.

All of these characteristics contribute to motorboat noise being perceived as having particularly annoying qualities, while the high levels of noise produced result in it being audible over very considerable distances.

6. Noise Nuisance

Noise is dealt with in Scotland under the Control of Pollution Act 1974 and in England and Wales under the Environmental protection Act 1990. Legislation requires local authorities to investigate complaints of noise and, if they are satisfied that noise constituting a nuisance exists, then they must serve notice requiring its abatement.

Each noise investigation has its own individual characteristics and problems and noise from watersports is no exception.

The environmental health officer is required to serve notice on the person responsible for the nuisance, or, failing that, on the occupier of the premises from which the noise is emitted. This is fairly straightforward in the case of premises but is an entirely different matter in the case of watercraft.

If he is to take the matter to the courts then he must prove nuisance to a particular person, caused by identified individuals, at specific locations, at specific times, arising from specific activities. If a group of individuals is causing the nuisance then each and every individual would require to be identified and their part in the activities clarified.

At the present time the task of identifying the culprit is very difficult, if not impossible on Loch Lomond, since unlike road vehicles, vessels have no unique identifying feature such as a registration number through which their owner may be traced. This is an obvious handicap to any investigation and in my experience deters individuals from complaining in the normal manner. For this reason one of the proposals of the Byelaw Advisory Group which has been accepted by the District Council and submitted to the Secretary of State for Scotland is that a compulsory boat registration scheme be introduced.

7. Criteria

As with any noise complaint, the environmental health officer must assess the noise and judge whether or not, in his opinion, it constitutes, a statutory nuisance. He therefore needs not only to carry out a subjective assessment but he also requires objective standards (or criteria) against which to judge the noise.

Unfortunately no standard has been devised to address this specific problem and it was an opportunity lost when the Noise Review Working Party failed to address this issue in their report published in 1990 [19]. There are however a number of criteria which the environmental health officer uses in relation to other noise sources and which can be considered as indicative standards in this case.

Perhaps the oldest chestnut in the fire is the Final Report of the Committee on the Problem of Noise - the Wilson Report [13]. This recommends LA10 noise levels inside living rooms and bedrooms in country areas of 40 dB during the day and 30 dB at night.

Scottish Development Department Circular Number 23/73, entitled Planning and Noise, [22] recommends, in the case of road traffic, a 'minimum' internal standard of 50 dB(A) L10 while a 'good' standard would be 40 dB(A).

The Noise Insulation Regulations [23] state that if the external L10,18 hour figure exceeds 68 dB(A) then insulation grant is available.

In 1975 the Commission of the European Communities published a report entitled Damage and Annoyance Caused by Noise [6] which recommends an outdoor continuous equivalent level of between 50 and 55 dB(A).

In 1980 the World Health Organization produced a report entitled Environmental Health Criteria 12 - Noise [29]. This suggests a continuous equivalent sound pressure level outdoors of 55 dB(A) during the day and 45 dB(A) at night which equates to indoor levels of 45 and 35 dB(A) respectively.

In 1990 the revised British Standard 4142 - Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas was issued [1]. This standard, unlike all the others, is a relative standard in that the offending noise, measured as an LAeq, is rated by applying various corrections to it and then the background level, measured as an LA90, subtracted from it. A difference of around 10 dB or higher indicates that complaints are likely, while a difference of around 5dB is of marginal significance.

Planning Policy Guidance PPG 24 1994 on Planning and Noise [10] replaces the English Circular 10/73. It suggests that noise levels of less than 55 LAeq,16 hour from either road traffic or from mixed sources need not be considered as a determining factor in granting planning permission for a new residential development, although levels at the high end of the category should not be regarded as desirable.

However of all these criteria, the only one which makes allowance for the tonal quality of engine and exhaust noise, the impulsive nature of hull noise and takes into account duration, day of the week and time of day is BS 4142.

There are two other criteria, both produced by watersports bodies.

The first of these is one first proposed by the Water Space Amenity Commission [27] and later adopted by the British Water Ski Federation [2] as an option to the controlled test at 25 metres. This stipulates that a 12 hour LAeq, measured at the boundary of the water ski area, should not exceed the ambient, also measured as an LAeq, by more than 7 dB(A).
The second is contained in the current Draft Code of Practice produced by the British Water Ski Federation [3] and is based on PPG XX 1992, [9] which proposes an external LAeq,16 hour limit of 55.

I would suggest that those Codes of Practice utilising a 12 or 16 hour Leq are, perhaps, the least onerous. They will, by the very nature of the Leq parameter, understate sporadic periods of loud noise which cause disturbance to local residents and, because of the long time period, will not adequately describe those fluctuations which can be critical from the point of view of annoyance. Not only that but two also use LAeq as ambient rather than LA90 [2, 27].

One fact is clear from the information available. If one considers an external noise standard of 55 dB(A) as suggested by both the EC and WHO documents - and individual boat noise levels of 75, 85 and 95 dB(A) - then craft at distances of 250 metres, 800 metres and 3.5 kilometres respectively could exceed this figure even assuming only a modest 6 dB(A) reduction per doubling of distance.

There is just one other criteria, one which is equally important and which the environmental health officer uses when assessing nuisance - his own subjective judgement. Regardless of measured levels he must always ask himself whether or not he would consider the particular noise in question to be a nuisance based on his own experience and the attitudes and expectations of the general public with whom he comes into contact.

8. Byelaws for Loch Lomond

Byelaws are the means by which the Byelaw Advisory Group are endeavouring to control certain watersports activities and Scottish local authorities are empowered to create byelaws in order to

prevent nuisance or danger, preserve or improve amenity and conserve the natural beauty. This power is contained in section 121 if the Civic Government (Scotland) Act 1982 and enables a district or islands council to regulate both the use of vehicles and the exercise of sporting and recreational activities.

The creation of byelaws is a long and tedious process, however a combination of factors have acted as a catalyst and spurred the Scottish Office into action. Of these factors the two most important were :-

1. The Secretary of State's Working Party which confirmed the problems and recommended that byelaws be introduced to deal with safety and disturbance.[24]
2. A tragic accident which resulted in the death of a woman passenger in a speed boat and was the subject of a fatal accident inquiry. In his findings the Sheriff recommended that byelaws be introduced to improve safety on the loch. [12]

In parallel with this the Local Government etc. (Scotland) Act 1994 removed the right of veto previously enjoyed by those with a proprietorial interest thus simplifying and streamlining the process as a result.

The Loch Lomond Draft Byelaws [17] contain provisions which have a bearing on noise.

One of the proposals put before the Group was to ban the use of certain types or classes of craft, specifically jet skis, principally in an effort to improve safety and reduce noise nuisance. This did not accord with the views of the majority and in any event would not be lawful since a right of navigation exists over the whole of Loch Lomond.

An alternative to this, and, in effect, a method of creating zoning, is to place speed restrictions on sensitive areas. This is the approach adopted by the Group and supported by my department since a reduction in engine running speed will result in a reduction in the level of noise generated.

In consequence, a 6 knots speed limit within 150 metres of the shore is proposed however, following representations, primarily by water skiiers, a limited number of areas have been exempted from this limit. This distance, whilst small, will help keep speeding craft at a reasonable distance from the shore in the vicinity of the main population centres. In addition to the shoreline speed limit there is an overall limit of 50 knots covering the entire loch.

In order to be able to identify individual boats, all powered craft, other than commercial vessels, must be registered and display a unique registration number.

Those conditions relating specifically to the noise sources themselves are :-

1. every powered craft must be fitted with a silencer,
2. the silencer must be well maintained and its efficiency must not be altered adversely and
3. any person operating any vessel so as to cause annoyance creates an offence.

These byelaws are most certainly not a panacea, however they do represent an attempt at controlling the worst excesses of the minority whilst allowing the reasonable and considerate majority to participate in their leisure pursuits without undue restriction.

9. References

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    - No. 9 'Appendices to the Proof of B.N. Smith'
    - No. 21 'Proof of A.J. Bullmore', for Countryside Commission
    - No. 30 'Proof of The Sports Council Volume 2', Section 2, M.A. Kenyon
    - No. 39 'Supplementary appendices to the Proof of B.N. Smith'
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