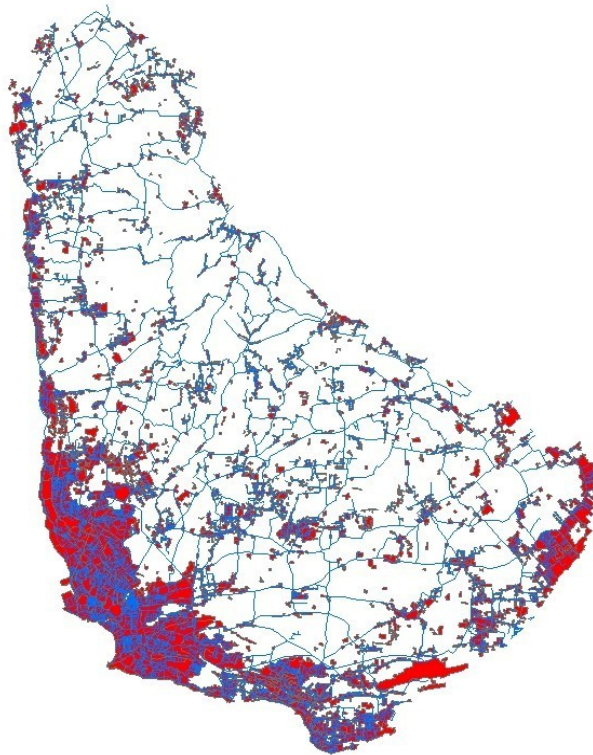




NATIONAL NOISE POLICY 2008



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ENVIRONMENTAL PROTECTION DEPARTMENT

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National Noise Policy 2008

1 Introduction

1. It is generally accepted that environmental noise is essentially a by-product of energy utilisation and a consequence of technological and economic advancement made by a society. The physical characteristics suggest that *sound is an oscillation in pressure in an elastic medium which is capable of evoking the sensation of hearing.*¹ Environmental noise is a component of sound and because of the multitude of human reactions associated with sound, noise is defined as '*unwanted sound*.'
2. The generation of noise has a cultural component and depends on the type of technology, how this technology is used, time of day, duration of exposure and the perception, health, and age of the receiver. Since noise pollution is uniquely subjective, monitoring and regulation is a serious challenge. Despite this, there is the need to *balance* disparate social, cultural and political interest to resolve *conflicts* originating out of noise pollution events.

2 Noise Situation

2.1 Background

3. The current environmental noise situation is such that very little technical data on noise *emission* levels exist. Some haphazard data was collected for occasional environmental impact assessments but this does not provide a comprehensive basis for informing or shaping an effective noise control policy. Therefore the approach employed here is based on a combination of internationally accepted norms, our understanding of the impacts of environmental noise in various local contexts, and strategies adopted by other countries to control noise emissions.
4. The negative impacts of noise have periodically aroused public interest as depicted in several local and regional newspaper articles. These news articles discussed the alleged physiological and psychological effects of noise namely hearing impairment, annoyance, speech interference and sleep disturbance of individuals when subjected to sound perceived more than tolerable levels. The concerns regarding the pervasive impact of sound and the change of attitudes of Barbadians to what is perceived as noise has also led to the launch of '*the Society for a Quieter Barbados*' (SQB) in December 2002. The organisation through asserted action is assisting with the crystallisation of the extent of environmental noise impacts and has provided an additional platform for public sensitisation on this emerging national issue.

¹ Alberto Behar, Marshall Chasin and Margaret Cheesman (2000) '*Noise Control A Primer*' Singular Publishing Group Thomson Learning.

5. Traditionally, the Environmental Protection Department (EPD) has investigated noise complaints on an average of 3-4 cases per year, but since the late 1990's the number of complaints has risen marginally, reaching a maximum of 13 in 2001. These figures do not reflect complaints made to the Royal Barbados Police Force (RBPF), Ministry of Public Works (MPW) or the Town and Country Development Planning Office (TCDPO).
6. Closer examination of the limited data set indicates that a higher incidence of complaints occurs in the parishes of St. Michael and Christ Church. (See Table 1). This pattern is expected since it reflects the present population density and the potential conflict between contrasting, and in some cases, incompatible activities. The complaints when categorised by type suggest that loud music from both residential and commercial activities is a growing problem. This is portrayed in Figure 1.

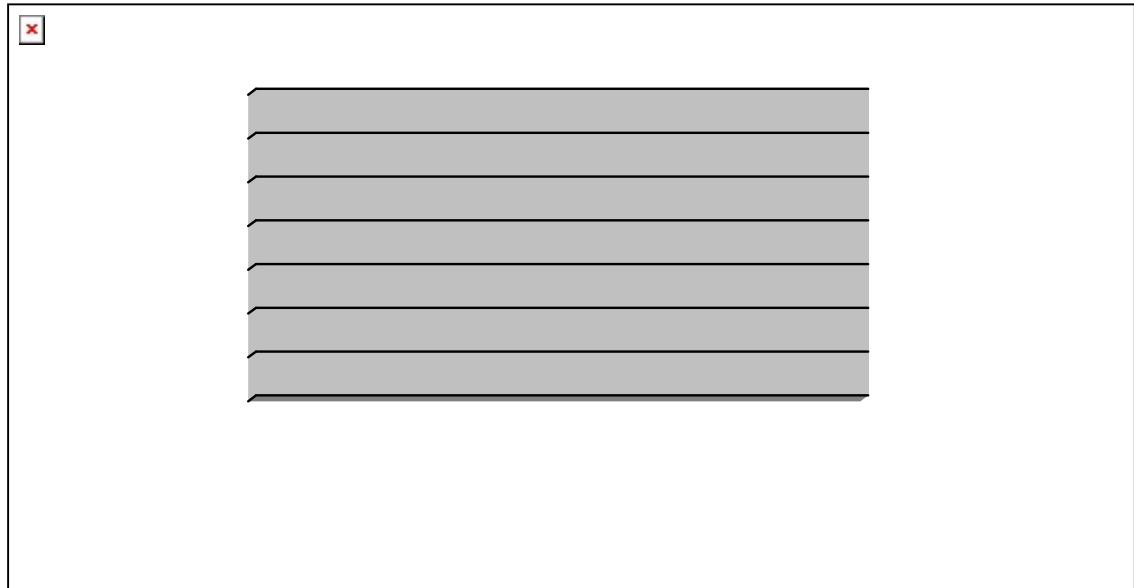
Table 1: Noise Complaints Recorded by the Environmental Protection Department

PARISH	Population Density ² per km ²	2001	2002	2003	2004
St. Lucy	285	0	0	1	0
St. Peter	368	0	2	0	0
St. James	714	2	1	0	0
St. Andrew	175	0	0	0	0
St. Thomas	390	0	0	1	0
St. George	423	1	0	0	0
St. John	270	0	0	0	0
St. Joseph	268	0	0	0	0
St. Philip	403	0	0	0	0
St. Michael	2395	5	0	4	2
Christ Church	868	5	4	1	3

Source: Environmental Protection Department Noise Complaints Database

² Population density figures are based on the results from the decennial Barbados Population Census 2000 by the Statistical Services Department.

Figure 1: Categories of Noise Complaints



7. The degree of individual noise exposure is unknown, but an analysis of the complaints suggests that health care and educational institutions, commuters on public service vehicles, and residents adjacent to nightclubs, churches, industrial complexes and rum shops are the persons most likely to be negatively impacted.
8. As a case in point, administrators at the Queen Elizabeth Hospital have complained of the adverse effects of road traffic noise on the recuperative potential of patients at that institution. Although this area is a quiet zone³, no restrictions were placed on vehicle volumes or types until 2004, thus allowing all vehicle classifications to traverse Martindales Road. In response, the Ministry of Public Works implemented a one-ton weight restriction on vehicles but, did not regulate vehicular volume. With no restriction on traffic volumes, a marked reduction in noise levels on this roadway is not anticipated.
9. Furthermore, the constant use of car horns⁴ combined with stagnant traffic has the potential to increase noise levels. It is believed that a similar situation may exist for other health-related institutions such as district hospitals, polyclinics, and geriatric homes.
10. The matter of potentially incompatible land uses has also become problematic. This is demonstrated by the court case between a hotel located in St. Lawrence Gap and a popular nightclub opposite the hotel (*EED File 2141/TI*). The entertainment establishment was ordered by the court to regulate outdoor

³ The Fourth Schedule of the Road Traffic Regulation provides a list of roads which are governed by PART IX Section 84 & 85 which restricts the use of horns and other noise making devices on those roads.

⁴ The use of car horns unnecessary on certain road violates the Road Traffic Act in silence zones. These roads are given in Appendix A.

performances and improve acoustic insulation of the structure to reduce, sound pressure levels. A similar complaint was lodged against a south coast hotel that abuts a residential development in Rockley, Christ Church. The hotel's entertainment package included outdoor music (mainly on weekends) which along with the associated food catering activities generated significantly high sound pressure levels. These examples demonstrate the growing potential for conflict among residential, commercial (entertainment) and tourism development activities.

11. Activities of the church are an integral element of the Barbadian society. However, the style of worship has changed and many churches now use sound amplification systems and live bands to attract younger attendees. Some churches also serve as venues for band and choir rehearsals may result in multiple weekly disruptions for adjacent residents.
12. The cultural changes observed at the community level include an increase in the number of individuals playing low-frequency bass music on powerful home entertainment systems. These practices have the potential to create serious public health and environmental nuisances as low-frequency bass music is more intrusive due to the energy associated with the sound wave when played at higher volumes.
13. In general, changes within society tend to evolve more rapidly than regulatory control mechanisms. Over time, the organisational and technical capacities of regulatory agencies mandated to protect and enforce public rights tend to lag in this dynamic process.
14. For instance, an individual whose property rights are violated by neighbours usually faces significant administrative and technical barriers. The situation can cause and is causing several individuals much discomfort with no apparent adequate short-term or long term solution from regulatory agencies.
15. On average, noise complaints are initially addressed by the RBPF. On investigation, the legitimacy of the complaint is determined. If the complaint is found to be justified, the RBPF would instruct the alleged offender to cease the activity. On occasion, offenders usually resume playing their home entertainment system at higher volumes after the departure of law enforcement officers.
16. In some ways, the Environmental Protection Department (EPD) finds itself in a similar situation to that of the RBPF. The main difference is that the EPD can provide a quantitative assessment of the sound levels. In most cases, individuals are forced to take legal action against the alleged offenders. Persons who cannot afford this option are restricted to making repeated complaints to the regulatory agencies.
17. The present regulatory system lacks the critical components of noise pollution control and abatement. Consequently, there is no legislation or regulatory

standards that would permit the EPD to effectively control and abate noise nuisances. These deficiencies must be corrected if noise pollution is to be better managed.

2.2 Noise Types, Sources and Classification

18. The classification of sound is determined by the characteristics (sound energy, sound pressure, wave amplitude and frequency) of the sound wave. These characteristics are determined by the energy source emitting the sound. In Barbados, the typical sources of sound are found in industrial, commercial, entertainment, transportation, domestic and miscellaneous activities.

2.2.1 Industrial Noise

19. Industrial noise may be characterised by impulsive, time-varying sound which may be of either high or low frequency, or may comprise a combination of all of these. The thermodynamic processes involved include heated gases flowing at high velocities which tend to produce high sound pressure levels, while mechanical systems produce impulsive sound with high or low frequency and time-varying characteristics. Zoning through planning controls is the strategy used to manage industrial noise at the design stage. This does not take post planning approval into consideration where operations may generate intense and intrusive sound pressure levels. Generally, EPD's research has shown that the predominant source of noise in this category is from back up power generators, cooling systems and light industrial noise (such as vehicle maintenance facilities) at the boundary of residential developments.

2.2.2 Commercial and Construction Noise

20. Commercial noise is characterised by low-frequency sound waves, time-varying in nature with intermittent impulsive characteristics. Commercial activity may be described as office, hotel, distribution, restaurant and entertainment activities. Ventilation and air conditioning for commercial structures are usually on the peripheral of properties and may result in annoyance to neighbours.
21. Construction noise is time-varying, impulsive and intrusive due to the open nature of construction sites, complemented by the type of equipment used to execute works. Since construction projects generally have set dates for completion these are, to some extent, viewed as tolerable provided operating hours are confined to the daytime.

2.2.3 Entertainment Noise

22. Noise arising from entertainment activities is similar to domestic noise as outlined in Section 2.2.5 with music being a major component in most events. Nuisance noise from private and public parties/fetes is increasing. Some

complaints are as a result of the *National Crop Over Festival or other events of national significance* and are mostly music related.

23. A marketing strategy used to promote sporting events is the use of amplified sound systems to play music during the staging of competitions. This practice is not limited to the larger venues such as the National Stadium and the Kensington Oval but has propagated to smaller grounds within densely populated communities.
24. An emerging component of entertainment noise is the impulse, high-pressure noise generated from recreational shooting. The classification of all entertainment activities are shown in Table 2.

Table 2: Classification of Entertainment Activities

Classification	Activity
Social events	crop over, karaoke, private parties, street fairs, concerts
Sports	cricket, racing, foot ball, volley ball, recreational shooting

2.2.4 Transportation Noise

2.2.4.1 Road Traffic noise

25. Transportation noise is mainly a result of economic activity at the ports and vehicular activity on approximately 1500km of the road network. The network was originally developed, in part, to serve the sugar cane industry, and transport goods from plantations to the Bridgetown Port.⁵ Seven numbered Highways radiate from Central Bridgetown and was increased over the years with the addition of the ABC, Spring Garden and Duncan O'Neal Highways.
26. Noise generated from road traffic is a function of engine sound, vehicle type, vehicle speed, vibration noise from the vehicle's body, atmospheric pressure changes during travel, the type of road surface and tyre noise due to frictional forces when the vehicle is in motion. For the factors mentioned, there is no local quantitative data on sound pressure levels to determine which factor contributes the largest percentage of sound.
27. The integrity of the road infrastructure is an important component to road traffic noise. Regarding Table 2 and 3, higher population and road densities are evident in the parishes of St. Michael and Christ Church. Current planning policy requires a set back of fifty, thirty-two and nineteen feet, for primary, secondary and tertiary roads respectively. Historical evolution of road construction has resulted in several residential properties being in breach of

⁵ Sourced from the National Transport Plan, Travers Morgan International (1996).

these planning criteria. This suggests that individuals in these densely populated areas may be exposed to sound pressure levels above the World Health Organisation (WHO) guidelines where traffic volumes are high. Table 3 shows the condition of the main road surfaces in 1996 where the International Roughness Index (IRI) indicates the quality of the road surface—the higher the value the poorer the condition.⁶

Table 3: Condition of Main Road Infra-structure

Classification Parish	Primary		Secondary		Local		Total
	Length	IRI	Length	IRI	Length	IRI	Length
St. Andrew	26.0	5.1	10.3	7.4	17.2	10.2	53.7
St. Peter	12.2	4.1	25.3	4.6	28.5	8.7	76.4
St. George	33.6	4.5	16.6	4.9	62.0	8.8	125.4
St. John	27.1	6.6	17.2	7.7	31.7	11.1	76.8
St. Lucy	18.3	5.0	21.0	7.3	32.4	8.4	76.5
St. Michael	92.1	3.1	40.9	4.6	192.1	6.5	373.3
St. Joseph	21.2	7.6	10.9	7.5	23.8	9.3	55.9
St. Philip	39.0	6.1	20.1	6.1	68.8	10.1	185.1
St. James	7.6	7.2	15.0	5.3	40.2	8.5	105.7
St. Thomas	18.8	3.2	8.6	10.1	37.4	9.2	79.5
Christ Church	61.5	4.5	24.8	5.5	74.2	6.3	284.5
Total	357.3	4.7	210.7	6.3	608.3	8.1	1176.2

Length in Kilometres

Source: National Transport Plan

28. This situation has changed quite dramatically with the implementation of the inner and outer Bridgetown by-pass roads to improve overall road surface conditions of roads in St. Michael.

29. Statistics for 2004 indicate that some 107250 vehicles are registered to utilise the roads up from 91,527 in 2001 (See Table 4). An analysis of vehicle classification shows that approximately 80 percent of registered vehicles are privately owned cars and approximately 13 percent are heavy good vehicles.

Table 4: Registered Vehicles and Vehicle Imports

Year	Registered Vehicles ⁷	Vehicle Imports ⁸
1992	49,933	974
1993	54,661	2534
1994	54,609	3689
1995	55,665	5203
1996	58,558	5627
1997	62,913	7834

⁶ Sourced from the National Transport Plan, Travers Morgan International (1996).

⁷ Sourced from the Licensing Authority, Ministry of Public Works and Transport

⁸ Sourced from the Statistical Department

1998	67,417	23,151
1999	70,723	11434
2000	ND	7139
2001	91,527	7842
2002	101,440	7171
2003 ⁹	104031	
2004	107250	
2005 ¹⁰	110168	
TOTAL	192,967	82,598

ND:- No data

30. Tables 5, 6 and 7 show the day with the highest traffic volumes along with the corresponding morning and evening peak traffic volumes for the major Highways. Estimates of the basic sound pressure levels for eighteen hour (18h)¹¹ and one hour (1h) peak AM and PM traffic flows are also presented. These estimates do not take into account the characteristics of the traffic flow, or road surface characteristics. The inclusion of such information would tend to increase the estimate of sound pressure levels.

Table 5: Peak Traffic Volume and Estimated Sound Pressure Levels¹²

Highways	Year	Day	Peak Day Traffic Counts	L _{eq} (18h) (dBA)
Highway 1: Black Rock Main Road Opposite J.E. Store	2002	Friday	14717	69.8
High Way 2: Jackson near Sharon Church	2001	Friday	8012	67.1
Highway 2A: Bagatelle near Prior Park	2000	Friday	18513	70.8
Highway 3: Hothersal Turning near Clarke Street	2002	Friday	17547	70.5
Highway 4: near Haggatt Hall	2002	Friday	17020	70.4
Highway 5: near Boarded Hall	2000	Thursday	4653	64.8
Highway 6: near Price Water House	2002	Friday	19003	70.9
Highway 7: Maxwell Main Road near Kenton House	1998	Friday	15195	69.9
ABC Highway: near Kendal Hill	1998	Monday	19289	71.0
ABC Highway: Opposite Life of Barbados near Rendezvous	2002	Thursday	40786	74.2
ABC Highway: polytechnic Wildey near Parkinson Field	2002	Friday	29958	72.9
Spring Garden Highway: Brandon's	2002	Wednesday	23725	71.9

⁹ Statistics up to June 30, 2003

¹⁰ Statistics August 6, 2005

¹¹ 68dBA is the maximum permissible level for traffic noise on the Highways based on the average sound pressure level over an eighteen hour period.

¹² The daily traffic counts were provided by the Traffic Management Section Ministry of Public Works and Transport.

Table 6: Estimated Sound Pressure Levels at Peak Hour AM Traffic

Highways	Year	Day	Time	Peak AM Traffic	L _{eq} (1h) (dBA)
Highway 1: Black Rock Main Road Opposite J.E. Store	2002	Friday	8:00	1035	71
High Way 2: Jackson near Sharon Church	2001	Friday	7:00	638	69
Highway 2A: Bagatelle near Prior Park	2000	Friday	7:00	1365	73
Highway 3: Hothersal Turning near Clarke Street	2002	Friday	8:00	1192	72
Highway 4: near Haggatt Hall	2002	Friday	8:00	1225	72
Highway 5: near Boarded Hall	2000	Thursday	11:00	332	66
Highway 6: near Price Water House	2002	Friday	11:00	1331	72
Highway 7: Maxwell Main Road near Kenton House	1998	Friday	7:00	979	71
ABC Highway: near Kendal Hill	1198	Monday	7:00	1648	73
ABC Highway: Opposite Life of Barbados near Rendezvous	2002	Thursday	11:00	2395	75
ABC Highway: polytechnic Wildey near Parkinson Field	2002	Friday	7:00	1860	74
Spring Garden Highway: Brandon's	2002	Wednesday	7:00	2021	74

Table 7: Estimated Sound Pressure Levels at Peak Hour PM Traffic

Highways	Year	Day	Time	Peak PM Traffic	L _{eq} (1h) (dBA)
Highway 1: Black Rock Main Road Opposite J.E. Store	2002	Friday	4:00	936	71
High Way 2: Jackson near Sharon Church	2001	Friday	3:00	613	69
Highway 2A: Bagatelle near Prior Park	2000	Friday	3:00	1299	72
Highway 3: Hothersal Turning near Clarke Street	2002	Friday	4:00	1189	72
Highway 4: near Haggatt Hall	2002	Friday	5:00	1255	72
Highway 5: near Boarded Hall	2000	Thursday	12:00	309	66
Highway 6: near Price Water House	2002	Friday	2:00	1288	72
Highway 7: Maxwell Main Road near Kenton House	1998	Friday	5:00	962	71
ABC Highway: near Kendal Hill	1198	Monday	3:00	1515	73
ABC Highway: Opposite Life of Barbados near Rendezvous	2002	Thursday	2:00	2614	75
ABC Highway: Polytechnic Wildey near Parkinson Field	2002	Friday	7:00	1767	74
Spring Garden Highway: Brandon's	2002	Wednesday	4:00	1069	71

31. An interesting but significant factor in traffic noise generation is driver behaviour. How drivers respond to situations of traffic congestions, their tolerance to other drivers or communication with other drivers and the speed at which they drive may dictate the level or intensity of sound at any junction. For instance, the use of the car horns, though defined under the Road Traffic Act (See Appendix A) as a nuisance if used incorrectly, has traditionally been

used as a communication tool to show appreciation, or acknowledge other drivers when driving.

32. A significant contributor to traffic noise is the modification of the vehicle exhaust system and engine capacity. These modifications tend to increase engine and exhaust system noise above the design specifications. This act also contravenes *Part IV use of Motor Vehicles, Section 34 (3) & (4)* of the Road Traffic Act.

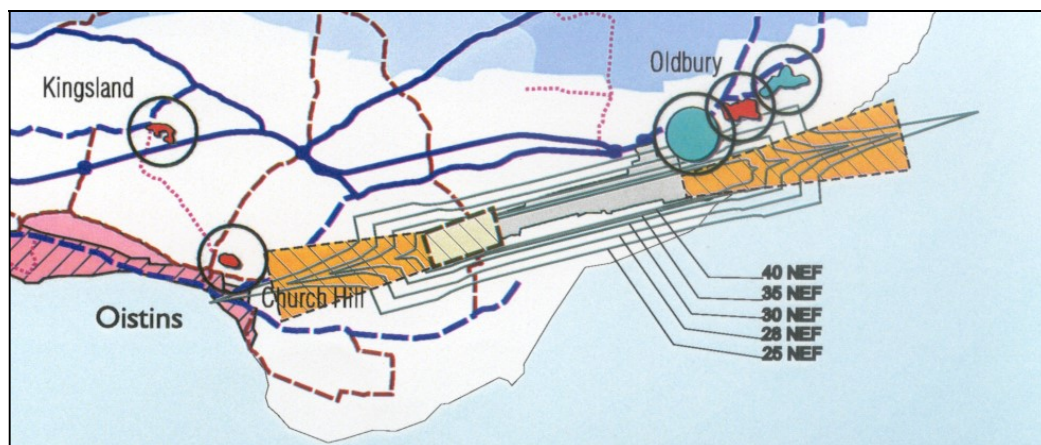
2.2.4.2 Air Traffic noise

33. Air traffic noise is a function of engine characteristics, the height of the aircraft and the trajectory of the plane. The greatest impacts occur during landing and take off. A substantial portion of aircraft noise is associated with turbulence (high sound pressure) from superheated air discharged from the exhaust system mixing with ambient air and tonal noise from turbo-fan engines.

34. The combined noise dose from aircraft activity is regulated through the use of an index which takes into account engine noise, height and trajectory factors at a location on the ground. The parameter is the *Noise Exposure Forecast* (NEF) with Figure 2 depicting the NEF contours for the Grantley Adams International Airport.¹³

35. The Town and Country Development Planning Office has established immission standards to control development within NEF 35, NEF 30 and NEF 25 contours respectively. These restrictions are no development (NEF 35), non-sensitive development (NEF 30), and no restrictions on development (NEF 25).

Figure 2: NEF Contours for Grantley Adams International Airport



¹³ Source the National Physical Development Plan (Amended 1998).

36. The Bridgetown heliport located at the mouth of the Careenage, adds to already high background noise from vehicular traffic in the city. The approach as recommended in the National Physical Development Plan for development within 200 metres of the site is to undertake noise impact studies and implement appropriate mitigation measures at the design stage of the development. This would certainly require the use of the appropriate acoustic dampening materials in the construction process.

2.2.5 Domestic and Miscellaneous Noise

37. Residential/domestic noise is generated by equipment (landscaping equipment, security alarms, vehicular alarms, lawnmowers, and vacuum cleaners), loud speaking, barking dogs and private parties. Strong cultural components to domestic noise are playing music and the occasional kite flying. Noise from educational institutions, child care facilities also contributes to the overall community noise levels. The underlying issue concerning residential noise complaints is erosion in social values and mutual respect for others. Also, limited land space has led to an inadequate separation between competing industrial, commercial and residential activities which may precipitate noise complaints. The overall effect of this may be an increase in day and night sound pressure levels above internationally advocated background sound pressure levels.

2.3 Health Effects

38. The typical health effects of noise are classified as physical (auditory) and psychological (non-auditory). An individual can experience two types of physical effects from exposure to excessive noise levels: temporary threshold or permanent threshold shifts. Non-auditory effects vary significantly and include adverse effects in the learning and cognitive performances in children, speech intelligibility, sleep disturbance, mental illness, cardiovascular effects such as an increase in blood pressure and serum cholesterol level and annoyance. Some studies also suggest an increased risk of noise induce damage to fetuses exposed to excessive sound.^{14,15}

2.4 Existing Legislation

39. A summary of the existing legislation which addresses environmental noise is presented in Table 8.

¹⁴ Alberto Behar, Marshall Chasin and Margaret Cheesman (2000) *Noise Control A Primer* Singular Publishing Group Thomson Learning.

¹⁵ Berglund, Birgitta; Thomas Lindvall; and Dietrich H. Schwela (2000). *Guidelines for Community Noise* Published by World Health Organisation; Cluster of Sustainable Development and Healthy Environment; Department of the Protection of Human Environment; and Occupational and Environmental Health.

Table 8: Relevant Acts and Regulations

Legislation	Relevant Section
Road Traffic Act 1981 CAP 295	<i>Part II Registration Section 5 (1)</i> – provides for the registration of all vehicles intended for use on public roads
Road Traffic Regulations 1984	<p><i>Part II Inspection of other Motor Vehicles Section 1</i> — provides for the issuing of an inspector's certificate.</p> <p><i>Part II Inspection of other Motor Vehicles Section 14</i> — provides for the annual inspection of public service vehicles and other vehicles and the provision of information required by the Ministry of Public Works.</p> <p><i>Part IV use of Motor Vehicles Section 34 (1) & (2)</i> — provisions to minimise nuisances, unnecessarily loud or harsh noise or music from vehicles on the public road where loud music is deemed as sound heard by a Police Officer within 10 meters of source.</p> <p><i>Part IV use of Motor Vehicles Section 34 (3) & (4)</i>—Exhaust gases from an internal combustion engine must first pass through the silencer, expansion chamber or other contrivance required by the regulations. No modification shall be made to the silencer to increase noise levels.</p> <p><i>Part V Public Service Vehicles and Conduct of Drivers and Conductors Section 42 (1)</i> — Driver and conductors of public service vehicles shall not make noise (speak, play music) to attract attention of possible passengers</p> <p><i>Part IX Restrictions as to the use of horns Section 84 (1)</i> — provides for the designation of silence zone and control of audible warning in silence zones. The Fourth Schedule identifies roads and time restrictions.</p> <p><i>Part IX Restrictions as to the use of horns Section 85 (1)</i> horns shall not be used so as to be a nuisance.</p> <p><i>Part IX Restrictions as to the use of horns Section 86 (1)</i> — provides for horn only to be used in class of vehicle for which it was approved by License Authority.</p> <p><i>Part X Speed Limits Section 87 (1)</i> — establishes maximum speed limits for vehicles and on roads:</p>

Legislation	Relevant Section
Highways Act, Chapter 289	tractors 30 km/hr; vehicle with gross weight of 3 tonnes 50km/hr; and other vehicles 60km/hr. <i>Part VIII, Section 37</i> — No playing of Loud musical Instruments, appearing masked, or taking part in marches or processions on highways without a permit. 'It Shall be unlawful for any person—to perform upon any loud musical instrument on or within twenty-five yards of any highway except within a dwelling-house or enclosure except in accordance with the terms of a permit granted by the Commissioner of Police.' <i>Part VIII, Section 38</i> — Application for a permit. Provides for issuing permits and stipulating conditions for the applicant to adhere in the permit. <i>Part VIII, Section 40</i> — Penalty for breaching section 37: Any person who contravenes any of the provisions of section 37 shall be liable to a fine of two hundred and forty dollars or to imprisonment for six months or to both such fine and imprisonment.
Public Order Act, Chapter 168A	<i>Part VI Miscellaneous Section 28 (1)</i> —Restriction on use of loud-speakers. <i>Part VI Miscellaneous Section 29 (1)</i> —Offence to use loud-speaker contrary to Section 28 or after 11:00pm except during election campaign.
Town and Country Planning Chapter 240	Provides for development plans and the rational use of land resources through development plans.

40. It is clear from the diversity of legislation that there are legal mechanisms for the management of nuisance noise and to a limited extent environmental noise. These mechanisms do not comprehensively address the issues nor do they provide enforcement officers with the required legal tools to adequately control emerging areas of concern.
41. The opportunity to oppose the implementation of certain entertainment events or even contribute to the permit approval process is not afforded in the applicable legislation - the Highways Act. The existing entertainment permitting process under the Highways Act requires streamlining through a review of the current approval methodology. This must encompass a new approach which allows those affected to participate in the permitting process and a mechanism to facilitate *administrative cost recovery* for the approving agency.
42. Under the Road Traffic Act, there are provisions for the control of nuisance noise from vehicles but there are no regulations that establish enforceable, comparative noise emission standards. Further to this, there is no provision to

tackle kerbside noise levels which from the assessment of St. Lawrence Gap could be above 68dBA.

43. Another failing of the legislation is the lack of compensation for those affected from the operation of entertainment centres or provisions to facilitate acoustic dampening of residential dwelling structures from intrusive traffic noise.
44. There needs to be a consolidation of the existing legalisation and the strengthening of enforcement powers of officers through the development and implementation of *comprehensive noise management legislation*.

2.5 Critical issues

45. The frequency and extent of exposure of the general public to levels of sound above index sound pressure levels identified as maximum permissible levels after which temporary or permanent damage or psychological effect would occur is unknown. Generally, there is inadequate quantitative information on noise emissions and noise exposure of the public.
46. A major concern is the growing nuisance of environmental noise particular at the community level. This stems from the operation of vehicle maintenance facilities, playing of cacophonous music and inadequate statutory mechanisms for control for such nuisances. Primarily, cultural attributes have changed with significant influence from international norms and the adoption of anti-social behaviour as an acceptable social activity.
47. Barbados adopts and utilises advanced technology to improve efficiency gains, enhance the quality of life, and provide entertainment for all sectors. However, there are no provisions in the statutes which set maximum permissible sound pressure levels for equipment used daily to support economic activity. Emission standards for vehicles, alarms, gardening equipment, and music systems are not enshrined in law. Comparative guidelines and standards are needed to empower enforcement authorities and provide legal mechanisms to control noise emissions from domestic, light industrial and industrial equipment.
48. The nature of sound necessitates investigators who possess a clear understanding of sound, its characteristics, environmental behaviour and mode of generation. To date, few individuals are equipped with the prerequisite knowledge and skills to purport mastery of the technical and social issues imposed by environmental noise. The technical capacity of enforcement institutions is weak and does not facilitate the easy resolution of environmental noise complaints.
49. The existing legislation provides the basic requirements to handle some environmental noise issues. In general, the legislation provides scope to establish emission standards for vehicles, establishing silence zones, and require permits from certain potentially noisy activities. However, there are

no provisions to reduce noise levels below a recommended levels, allow officers to confiscate equipment, and establish noise management plans. An essential feature of any noise legislation would be the establishment of codes of practices for certain activities and a revised permitting system with a revenue-generating mechanism for activities that surpass established permissible limits.

50. Notwithstanding the above, enforcement of provisions in existing statutes is a concern. Contraventions of the Health Services Act, 1969, Road Traffic Act and or the Public Order Act do occur but no enforcement action is taken against alleged offenders. Enforcement Agencies must discharge all aspects of their functions which includes mobilisation of necessary resources to take offenders before the law courts. However, an in-depth understanding of the obstacles to enforcement is required to ensure that implementation and enforcement of proposed legislation occurs.
51. The challenge for any future environmental noise control legislation is to functionally integrate control measures for vehicular noise, commercial noise, industrial noise and nuisance noise in a flexible system that recognises multi-stakeholder responsibilities.

3 Existing Organisational Framework

52. The responsibility for environmental noise pollution is distributed between the Environmental Protection Department (EPD) of the Ministry of Housing, Lands and the Environment, the Royal Barbados Police Force (RBPF) of the Attorney General's Office, the Licensing Authority (LA) of the Ministry of Public Works and Transport and the Factory Inspectorate (FI) of the Ministry of Labour.

3.1 Environmental Protection Department

53. The EPD developed its mandate for noise pollution control initially from an occupational safety and health perspective as propagated in the Health Services Act, 1969. These duties later diversified to encompass environmental nuisance noise and departed from general occupational health and safety in the workplace functions. Furthermore, due to the Division's role in the environmental planning process, noise impacts for several large establishments are also considered to reduce and or eliminate potential nuisance complaints. The Division's approach to community noise pollution complaints involves a combination of qualitative and quantitative assessments culminating with cross-referencing of collected data with internationally accepted noise criteria.
54. As an agency involved in the development review process, the Division advises the Chief Town Planner on the risk and potential impacts likely from

development activities as and when required by the Town and Country Development Planning Office.

3.2 Town and Country Development Planning Office

55. The primary purpose of the planning office is to ensure optimum economic and social utilisation of development lands. This is done through provisions in the Town and Country Planning Act, 1985. The establishment and imposition of planning controls by the Department on developments under the Act, assist in the rational use of land. Planning controls such as set back criteria, buffer zones and segregation of incompatible development types seek to ensure that among other objectives, noise pollution issues are eliminated or minimise at the design stage. One prominent element of the planning system is the Physical Development Plan which aids in the organisation and designation of land use.

3.3 Royal Barbados Police Force

56. The Royal Barbados Police Force (RBPF) is charged with enforcement of the Public Order Act, Highways Act and aspects of the Road Traffic Act concerning environmental noise. On most occasions and as noted previously, the RBPF is the first response agency to environmental noise complaints. The purpose of the response is to protect the individual property rights of citizens by responding to incidences categorised as disturbance of the peace. The response here however is qualitative and not supported by noise level determination by the Police.

57. The mandate further requires the issuing of permits to those persons intending to host public marches, open-air meetings or carry out certain commercial and entertainment activity.

3.4 Factory Inspectorate

58. The Factory Inspectorate (FI) has subsumed the duties of the EPD concerning occupational safety and health and consequently, those related to noise exposure in the work environment. These duties are generally risk assessment in nature aimed at protecting employees from noise generated in the workplace, which may be injurious to human physiological systems and psychological faculty. For the purposes of the paper, workplace noise is assumed to be handled by the Factories Act and the proposed Occupational Health and Safety in the Work Place Act and no further consideration will be given to occupational noise in this presentation.

3.5 Licensing Authority

59. The function of the Licensing Authority (LA) as it relates to noise pollution is centred on road traffic noise. The LA is, therefore, the body responsible for source control of noise from vehicular traffic through its vehicle registration

program as described in the Barbados Road Traffic Act, 1981. The LA and the Royal Barbados Police Force can exercise discretionary powers to order the driver of a vehicle that is in contravention of the Act to undergo an inspection at the LA. If the vehicle is found in contravention of the Act, then the owner is required to initiate corrective measures. In the case of public services vehicles, permits can be suspended until corrective action is taken. The Act specifies that vehicular noise should not be excessive and a silencer should be used to ensure no undue noise is generated whilst using the public roads.

60. The existing organisational structure represents a significant distribution of enforcement and management responsibilities with little or no central coordination of this area. This could explain some of the problems being experienced by citizens and administrators in the field.

4 Policy Framework

61. This policy statement outlines the Government's part of the strategy for achieving the objective of continuous improvements in the quality of life for all Barbadians. It hinges on the management of risk perceived as a function of a hazard, and the probability of the hazard occurring. Hazards, whether anthropogenic or natural in origin can only be adequately managed through an in-depth understanding of the issues and challenges. Therefore, information management shall form the basis of the framework for the holistic management of environmental pollution and consequently noise pollution management and control. The policy framework would generate consistency in the processing of complaints and the application of control measures. The fundamental concepts for this Policy are *Assessment, Regulation and Communication* (ARC).

4.1 Assessment

62. ***The policy objective shall be to offer a clear understanding of environmental noise issues and events through realistic monitoring and control of environmental noise pollution while seeking to ensure low noise exposure is attained and maintained and that environmental and human health is protected.***
63. The Ministry's approach to assessment shall embody the notion of monitoring noise exposure, determination of noise magnitude, noise frequency analysis, and duration determinations. Essentially, it aims at creating a foundation of knowledge to understand the effects of noise-generating sources (mobile and stationary), to continuously update this organic policy in response to a changing environment. The stage in the assessment strategy would be to:
 - a. encourage technical capacity building;
 - b. encourage scientific research

- c. prepare noise exposure and annoyance maps;
 - d. develop an environmental noise impact database/register;
 - e. review land-use planning and controls;
 - f. review feasibility of establishing special control zones;
 - g. review home construction techniques;
 - h. assess noise generating sources;
 - i. assess noise transmissions path; and
 - j. assess receiver controls.
64. The environmental noise impact of existing residential, commercial and industrial development shall be assessed for conformity with proposed environmental noise guidelines and standards through noise mapping. Where the development infringes on the biotic environment, mitigation measures would be recommended for execution within an appropriate timeframe. On the other hand, the assessment of potential environmental noise impacts from the proposed development would be evaluated at the environmental impact assessment stage during the application process.

4.2 Regulation

65. *The **policy objective** is to establish a practical regulatory mechanism to encourage swift enforcement action and control of environmental noise from residential, commercial and industrial sources.*

66. Willms and Shier (1998)¹⁶ recommended two options for noise control (1) prohibit the emission of noise, and (2) implement a permitting system whereby individuals will have to apply for permission to discharge contaminants (noise) to the environment. This is the approach generally adopted by developed countries such as the United States of America, Canada and the United Kingdom to ensure the protection of public health and individual property rights.

67. The preferred regulatory approach would encompass a combination of command and control techniques and market mechanism to affect the desired attitudinal change. To accomplish this, an augmentation of the existing legislation is necessary recognising that the Health Services Act, 1969 was designed to abate nuisances and there is no explicit mandate for noise pollution control and abatement. The philosophy of guidelines and standards, registration of polluters and pollutants as describe by the existing '*Marine Pollution Control Act, 1998*' would form the basis for the regulatory strategy for noise pollution control. It is perceived that the following would be employed:

- a. Adoption and or the development, implementation and review of guidelines and standards;
- b. surveillance of standards through scientific monitoring;

¹⁶ Willms and Shier; Berridge Lewinberg Green Dark Gabor Ltd.; Bird and Hale Limited and Halcrow Fox (1998). '*Revised Environmental Legislation for Barbados*'

- c. a permitting system for noise emissions;
 - d. clear articulated enforcement policy;
 - e. an administrative cost recovery mechanism; and
 - f. legal action as and when required.
68. The *Prevention, Polluter Pays and Precautionary Principles*¹⁷ are integral components of the overarching goals upon which regulatory decisions would be based taking into consideration the nature of noise. These international legal instruments are essential for the successful implementation of noise management objective.

4.3 Communication

69. *The **policy objective** is to facilitate two-way communication with the public and encourage public participation in the decision-making process. This will be facilitated through multimedia information dissemination to the full spectrum of the society with the view of advancing positive attitudinal change and respect building.*

70. The assessment process shall determine risk, provided information for the development of a national database on noise pollution sources, complaints and remedial action is taken. Through risk determination and proper information management, priority action areas would be established. However, a system of management is only effective where there is adequate communication, stakeholder participation in policy development and accountability to those the systems are designed to protect. The Ministry of Housing, Lands and the Environment would provide an annual statement of environmental noise pollution levels and control efforts through a variety of media formats: the Ministry's Web Page; and the Annual State of the Environment Reports. This effort would ensure easy and adequate access to relevant research information.

71. However, communication efforts must advance beyond mere rhetoric but shall encourage public dialogue to ensure feedback to complete the communication loop. To this end, public consultation sessions, and presentations at all educational levels are essential in promoting awareness of noise issues and advancing attitudinal change in society.

72. The utilisation of tertiary institution such as the community college and the University of the West Indies would prove beneficial in nurturing rudimentary knowledge of noise impacts and control measures in adolescence.

4.4 Proposed Administrative Framework and Distribution of Authority

¹⁷ The Prevention principle states that action should be taken where possible to reduce noise pollution at the source. The Polluter pays principle states that the full cost associated with noise pollution should be met by those responsible for the source of noise. The precautionary principle states that in all cases noise should be reduced to the lowest level achievable in a particular situation.

73. The proposed arrangement the management of Environmental noise is shown in Table 10.

Table 9: Proposed Responsibility of Competent Departments

Department/Ministry	Existing Responsibility	Recommended Responsibility
Environmental Protection Department, Ministry of Physical Development and Environment	<ol style="list-style-type: none"> 1. Review and advise the Chief Town Planner on noise-related issues arising from proposed developments. 2. Monitor nuisance noise from domestic, commercial and industrial sources. 	<ol style="list-style-type: none"> 1. prepare a draft policy on the management of environmental noise. 2. advise the Chief Town Planner on noise-related issues arising from proposed developments. 3. inform the Ministry of Public Works on traffic generated noise to shape traffic management policy. 4. monitor and regulate environmental noise from existing development. 5. develop national emission and immission standards for environmental noise. 6. issue permits for variance above sound pressure emission and immission standards.
Factory Inspectorate, Ministry of Labour	<ol style="list-style-type: none"> 1. Noise emission and immission standards in factories and factory settings for employees. 	<ol style="list-style-type: none"> 1. Responsible for emission and immission standards in the workplace.
Town and Country Planning, Ministry of Physical Development and Environment	<ol style="list-style-type: none"> 1. develop and instituting set back criteria for developments. 	<ol style="list-style-type: none"> 1. no change
Royal Barbados Police Force	<ol style="list-style-type: none"> 1. keeping the public peace. 2. regulating nuisance noise from vehicles. 3. issuing permits for entertainment, public meetings and marches activities. 	<ol style="list-style-type: none"> 1. keeping the public peace. 2. regulating nuisance noise from vehicles. 3. issuing permits for public meetings and marches activities.
Ministry of Public Works and Transport	<ol style="list-style-type: none"> 1. Inspection of vehicles 2. Enforcement of vehicle emission standards 3. Development of Traffic management plans 	<ol style="list-style-type: none"> 1. no change

5 Guideline for Local Legislation

74. The EPD solicited information on noise pollution management regimes in the United Kingdom and Trinidad and Tobago. These legislative instruments, along with legislation for Jamaica and Belize were reviewed with the hope of developing a suitable noise management framework that could address the unique cultural and technical issues in Barbados. A summary of the review is attached as Appendix B.
75. Based on our experience and review of selected legislative instruments the following sections are recommended as sections for proposed noise pollution control and abatement legislation, which follow a similar format to that of the Marine Pollution Control Act, 1998. *These sections are definitions; offence of pollution; management of the level of pollution; power to reduce noise levels; power to enter on premises to abate noise levels; enforcement responsibility and powers of the Director of the Environmental Protection Department, Commissioner of police; and orders by magistrate; appeal to judge against Directors order; power to make regulations; assaulting and obstructing of director; and penalties.*

5.1 Definitions

76. It is recommended that the definition section provide clarity for important terminology pertinent to the understanding of the technical aspect and interpretation of the legal instrument. Definitions on sound pressure levels, frequency, frequency weighting, equivalent continuous sound pressure level, background noise level, individual sound events, community noise, industrial noise, silence zone, designated noise zones, entertainment event, responsible agency and premises are those recommended for inclusion in the instrument as demonstrated in the Trinidad and Tobago Noise Rules, 2001. Some definitions are provided in the Glossary.

5.2 Offence of pollution

77. It is necessary to identify what is an offence and when an offence under the act has been committed. The legislative instrument reviewed (Trinidad and Tobago; United Kingdom; and Belize) indicated that contravention of the laws occurred when emission standards/limits are breached or define noise as a statutory nuisance (United Kingdom; and Jamaica) facilitating public health and property rights protection to individuals. This approach would ensure that noise emanating from private and public premises in addition to unreasonable human activity classified as nuisances comply with proposed environmental noise emission and immission standards.

78. Offences recommended are:

- a. breach in proposed environmental noise immission standards and nuisance noise criteria (New Legislation);
- b. breach in proposed emission standards from commercial and industrial facilities (New Legislation);
- c. breach in conditions of permits issued (New Legislation and an amendment to the Road Traffic Act and Highway Act);
- d. breach in proposed emission standards from vehicles (amendments to Road Traffic Act or Highways Act); and
- e. conducting an entertainment event without a permit (new legislation).

5.3 Management of Ambient Noise Levels

84. The legislative tools for Trinidad and Belize indicate that noise levels are managed through the establishment of national standards as defined numerically in both instruments. The methodology establishes day and night permissible noise levels or numerical limits on increases in noise level above the existing background level and in most situations a given criteria. The Trinidad Noise Rules further outlines procedures for the issuing of permits to emit noise above the permissible levels and speaks to the maintenance of a variance register and the concomitant recordkeeping requirements associated with such a system.

85. Though this framework should satisfy the requirement of Barbados, the systems should have a mandatory five year (5yr) review period for the recommended standards/permissible limits to ensure there is continued relevance in the application of the standards. The process essentially would be guided by an *environmental noise management plan* which could be implemented jointly by Town and Country Development Planning Office, Environmental Protection Department, Royal Barbados Police Force and the Ministry of Public Works.

86. The suggested noise management plan should address:

- a. goals and objectives of the environmental noise management plan;
- b. responsibility for the noise management plan;
- c. social and economic environment;
- d. characteristics of the noise management areas;
- e. identification of priorities;
- f. environmental noise policy statement;
- g. noise contour maps of the island;
- h. criteria for noise sensitive zones;
- i. noise sensitive zones;
- j. delineated residential, commercial and industrial zones;
- k. guidance for the management of noise sensitive zone;
- l. guidance by category (residential, commercial, industrial);

- m. regulatory procedures; and
- n. an implementation strategy.
87. Within the context of the plan, the system of issuing permits for certain activities that would normally result in variance from the accepted maximum permissible limits needs revisiting. It is recommended that any person desirous of holding entertainment activities, marches, fetes and residential parties would be required to publish the event soliciting any objection from the public. This would provide an opportunity for those who may be affected by the activity to voice their concerns which should be taken into consideration by the Environmental Protection Department and the Royal Barbados Police Force before a permit is issued.
88. It is advisable to have a *tribunal system* established to settle disputes when appeals against enforcement action taken on private properties or appeals against refusals to grant a permit for a variance by the competent authority.
89. The recently up-dated *Guidelines for Community Noise* in specific environments should be reviewed and possibly adopted in the proposed legislation to manage environmental noise. These are presented in Table 11.

Table 10: Guideline Values for Community Noise

Specific Environment	Critical Health Effects	L _{Aeq} [dB(A)]	Timebase [hours]	L _{Amax} fast [dB]
Outdoor living area	Serious annoyance, daytime and evening Moderate annoyance, daytime and evening	55 55	16 16	- -
Dwelling, indoors Inside bedrooms	Speech intelligibility & moderate annoyance, Sleep disturbance, night-time	35 30	16 8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60
School classrooms & pre-schools, indoors	Speech intelligibility, disturbance of information extraction, message communication	35	During class	-
Pre-school bedrooms, indoor	Sleep disturbance	30	Sleeping time	45
School, playground outdoor	Annoyance (external source)	55	During play	-
Hospital, wardrooms, indoors	Sleep disturbance, night-time Sleep disturbance, daytime and evenings	30 30	8 16	40 -
Hospital, treatment rooms, indoors	Interference with rest and recovery	#1		
Industrial, commercial shopping and traffic areas, indoors and outdoors	Hearing impairment	70	24	110
Ceremonies, festivals and entertainment events	Hearing impairment (patrons: <5 times/year)	100	4	110
Public addresses, indoors and outdoors	Hearing impairment	85	1	110
Music and other sounds through headphones/earphones	Hearing impairment (free-field value)	84 #4	1	110

Impulse sounds from toys, fireworks and Firearms	Hearing impairment (adults)	-	-	140 #2
	Hearing impairment (children)	-	-	120 #2
Outdoor in parkland and conservations areas	Disruption of tranquillity	#3		

#1: As low as possible

#2: Peak Sound pressure (not LAF, max) measured 100mm from the ear.

#3 Existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low.

#4 Under headphones adapted to free field values.

Adapted from Birgitta Berglund; Thomas Lindvall; and Dietrich H. Schwela (2000) "Guidelines for Community Noise"

90. The Environmental Protection Department should be the repository of noise information, that is, the maintainer of the noise complaints register and levels. It is however recognised that the Barbados Police Force addresses noise complaints and hence the legislation should have a mandatory reporting mechanism where the information collected by the Police Force is transferred promptly to the EPD.

5.3.1 Management of Road Traffic Noise

91. On the issue of discharge standards for vehicular traffic on the highways, amendments to the Road Traffic Act are appropriate. To implement achievable, appropriate and enforceable standards to control noise emissions from vehicles certain critical issues must be considered. The standards should initially consider the age of the vehicle fleet and should establish restrictions on all new vehicles entering the island. The age distribution has changed significantly with the importation of re-conditioned vehicles. It is anticipated that there is a shift in the distribution of age characteristic of the vehicles fleet to a larger percentage of vehicles in the 5 years to 10 years and the 10 years to 15 years age ranges.

92. The European Union has consistently lowered the noise emission criteria (Table 12) for new vehicles from 1972 to the most recent emission standards in 1995/96. Considering the age of the vehicular fleet, Barbados could adopt the 1988/90 EC noise emission standards for vehicles on the road and impose the 1995/95 emissions standards for all new vehicles.

93. This strategy could help in reducing the relatively high traffic noise on main highways as shown from the assessment of Highway 7 in the St. Lawrence Gap Noise Characterisation Study and the estimates given in Tables 5, 6 and 7.

Table 11: EC Noise Emission Limits

Vehicle Category	1972	1982	1988/90	1995/96
Passenger Car	82 dB(A)	80 dB(A)	77 dB(A)	74 dB(A)
Urban Bus	89 dB(A)	82 dB(A)	80 dB(A)	78 dB(A)

Heavy Lorry	91 dB(A)	88 dB(A)	84 dB(A)	80 dB(A)
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94. Further to the above, Government road construction projects must take into account their impacts on residential development. It is recommended that either through the Town Planning Act or new legislation, that any increase in sound pressure levels should not exceed 2 dBA above existing background sound pressure levels for new road construction or modifications to existing roads. In situations where this occurs, an appeal mechanism for home improvements should be established to provide the necessary financial relief to the homeowner to reduce noise levels to pre-construction sound pressure levels where appropriate.
95. Essentially, the Ministry of Public Works in the design and construction of roads should choose materials to limit noise exposure and also set the appropriate speed limits especially on concrete roads. Concrete roads because their physical characteristic allows for increase noise at high-speed limits (Professor Greg Watts 2001).¹⁸

5.3.2 Management of Entertainment Noise

96. Entertainment noise is a growing problem in the eyes of the general public. The Highways Act makes provision for a permit to be issued by the RBPF. As noted earlier, the public should have more influence on this process.
97. For temporary events, in addition to applying for a permit, the applicant should notify residents in the immediate environ of the plans for parties, rallies or events where sound amplification devices will be used and request submission of objection to the competent authority.
98. For permanent entertainment facilities, the permitting process shall be an annual one. These structures should be so designed to ensure acoustical control and minimum propagation of sound energy outside of the structure. A similar process of notifying the public of its intentions to operate an entertainment facility and requesting that written objections be submitted to the competent authority through the media is recommended.
99. All objections shall be taken into consideration when consideration is given for a permit to conduct an entertainment event.
100. Where appropriate, the applicant should also submit evidence in the form of an environmental noise impact assessment for new structures and an environmental audit for existing structures detailing the level of compliance with environmental noise emission and immission standards.

¹⁸ A presentation by Professor Gregg Watts, Transport Research Laboratory, United Kingdom September 2001.

101. Operators of entertainment venues should display signage of appropriate size lettering warning patrons of the potential damage that could result from exposure to excessive sound pressure levels. Further to this, *patron shall be informed that exposure to sound pressure levels over 100dBA over four hours for more than 5 events in 365 days could result in permanent hearing loss.*
102. All operators of permanent entertainment structures must establish a register of complaints detailing complaints received, date complaint received, date investigated and the action is taken.

5.4 Enforcement Powers of Public Officers and Power to Reduce Noise Levels

103. The Acts and Regulation reviewed provided authorised persons with the power to enter premises and abate noise levels. In the case of Jamaica, the Act provided a mechanism to reclaim monies for the cost of abatement work from the offender. Competent agencies namely the Environmental Protection Department and the Royal Barbados Police Force should have the power to enter and confiscate sound amplification equipment used to commit an offence. The recovery of cost incurred from abatement activity should be included in the new legislation.
104. For instances where facilities exist and are perceived to impact adversely, in the judgement of an inspecting officer, on adjacent properties, the Environmental Protection Department should be the power to serve an *information notice* requesting pertinent information on the operations of the business.
105. The legislation must be a practical tool giving officers a range of powers to ensure the necessary noise reduction and or abatement is executed in a timely but legal manner. As noted, officers may be required to enter, search and where necessary confiscate equipment which amplifies sound. This process should involve a sequence of events namely, verbal notification of the offence, followed by the issuing of an *enforcement notice* which would allow the operator a reasonable period to remedy the situation. The issuing of a ticket for a sum of \$500 where the actions of the accused are a clear violation of the emission standards should also be considered.
106. Finally, in a situation where scientific evidence is lacking or there is obvious environmental and human health damage, the inspection officer can serve a *prohibition notice wherein his professional judgement the situation is such that an offence is being committed.* This notice should take immediate effect, closing an operation until the offender can satisfy the Director before the tribunal or magistrate.
107. This is a characteristic demonstrated in legislation in Jamaica and the United Kingdom and is believed to be necessary in our situation. It is

recommended that this authority be distributed between the Director and the Commissioner of Police. However, this should be utilised in a cautious manner and follow explicit guidelines to promote reasonable and fair application of these powers. The existing enforcement powers for the control of mobile sources of noise pollution are adequate.

5.5 Appeal against orders from the Director and Commissioner of Police

108. Inevitably, situations would require arbitration when an individual perceives that those responsible for the noise pollution regulations and enforcement have abused their powers. In such circumstances, provision must be made for that individual to appeal the directive or orders given by either the Director and or the Commissioner of Police. This mechanism can either be an appeals tribunal or a magistrate in the court of law.
109. Either mechanism should provide the necessary protection to the public. However, the legislation should explicitly identify the range of qualifications the individuals on the appeals tribunal should possess.

5.6 Penalties

110. The proposed penalties should be reflective of the serious nature of the crime. Various levels of penalties are perceived as necessary to address, obstruction of Director or his representative and the Commissioner of Police or his representative from collecting information during an investigation. Depending on the seriousness of the crime, offenders should pay the court up to a maximum of BDS \$200,000.

6 The Way Forward

111. The development of policy to establish a framework for any environmental noise management must be articulated within the cultural context of a society. Yet, it must be flexible enough to outline a functional blueprint for future generations, and incorporate a mechanism for continuous improvement, public accountability and review of the policy.
112. The recommended policy framework as indicated is only a sub-component of environmental regulation noting that an integrated approach would be prudent. The piecemeal approach is not advised and noise management should evolve within a comprehensive environmental management framework to ensure that environmental law advances in a structured manner and not merely in response to perceived concerns.
113. To effectively implement the ARC concept, an organisational structure derived from a legislative basis should be established preferably through the environmental management act. This would clearly define the role,

responsibility of involved agencies and establish a focal point for coordinating environmental noise impact management efforts.

114. The proposed Environmental Protection Department is best poised to manage this noise pollution control initiative given its experience and central role in environmental protection. The Environmental Protection Department should form the nucleus of this initiative shouldering the responsibility for the development and implementation of the comprehensive noise management system. However, there is the urgent need to upgrade the technical capacity of the Department to perform this role authoritatively.
115. In keeping with the proposed concept, a pilot project is perceived as necessary to advance work in this area. This would include evaluation of the social response to noise issues and a determination of sound pressure levels.

7 Recommendations

116. The Ministry is therefore asked to:
- a. acknowledge and endorse the application of the Assessment, Regulation and Communication concept for the management of environmental noise.
 - b. recognise the Environmental Protection Department as the coordinating agency for environmental noise pollution control.
 - c. approve the development and implementation of a pilot project to determine national sound pressure levels and identify noise pollution issues and ascertain background sound levels.
 - d. approve the development and implementation of legislation to control environmental noise pollution.
 - e. approve the formulation and implementation of an information management system within the Ministry of Housing, Lands and the Environment.

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GLOSSARY

Noise	Noise is unwanted sound or <i>a sound, generally random in nature, the spectrum of which does not exhibit clearly defined frequency components</i>
Decibel (DB)	A unit for measuring sound that is not absolute but is a ratio between a measured quantity and an agreed reference level. The dB scale is logarithmic and uses the hearing threshold of 20µPa as the reference level
'A' Weighting	A frequency dependent correction which weights sound to correlate with the sensitivity of the human ear to sound at different frequencies
Sound Emission	The sound emanating from a source
Sound Immission	The sound received at a reception point
Sound pressure level	a measure of the air vibrations that make up sound
Frequency	the number of vibrations per second
Frequency weighting networks	Provide an approach for weighting the importance of different frequency components in one single numeric rating
A-Weighted Network	A network used to approximate the frequency response of the human ear
Equivalent continuous sound pressure level	Is the average energy equivalent level of the A-weighted sound over a period T
L ₁₀	Is the A-weighted sound pressure level exceeded 10% of the time
L ₉₀	Is the A-weighted sound pressure level exceeded 90% of the time
Background noise level	L ₉₀ sound pressure level
Individual sound events	Discrete sound events
Community noise	Sound generated from routine activity typical of a residential development.
Industrial noise	Sound generated from construction, manufacturing, thermal process and other similarly related activity.
Residential premises	Any premises or any part of premises used solely or primarily for the purposes of human habitation.
Low frequency	Sound that has a frequency below 150 hertz.

FOURTH SCHEDULE

(Regulations 84 and 130)

The Road Traffic Regulations, 1984

PART I

Restrictions as to the use of Horns

Name of Roads, Streets and Areas	Time of Restriction
1. On any street, road, lane and square bounded within the following area: Martindales Road, Constitution Road as far as the Eastern Gate of Queen Park, then in a straight line South of the Junction of River Road, King William Street and along River Road to its junction with Martindales Road	At any time
2. On any street, road, lane and square bounded within the following areas: Coleridge Street, Pinfold Street, from its junction with Coleridge Street to its junction with Magazine Lane, Magazine Lane from its junction with Pinfold Street, to its junction with Coleridge Street.	Between the hours of 09:00 hours and 17:00 hours
3. On any street, road, lane and square bounded within the following areas: South from the Gem Buildings by the Wharf and so to the Charles Duncan O'Neal Bridge, on the East from Bridge Street where it adjoins the Charles Duncan O'Neal Bridge, by Marhill Street and Palmetto Street on the North from the junction of Palmetto Street and Roebuck Street by Roebuck Street to Swan Street, on the West from the junction of Swan Street and High Street by High Street and then continuing across Trafalgar Square to the Gem Buildings and the Wharf thereby, and from the junction between Bridge Street and Marhill Street along St. Michael's Row Constitution Road to Constitution Bridge.	Between the hours of 09:00 hours and 17:00 and hours
4. On any street, road, lane and square bounded within the following area: Bay Street, from its junction with	Between the hours of 09:00 hours and 17:00 hours

Beckles Road to its junction with Burkes Alley and Beckles Road from its junction with Bay Street to its Junction with the 1 st Avenue Beckles Road.	
5. On any street, road, lane and square within the limits of the City of Bridgetown and Speightstown as defined in the <i>Seventh Schedule</i> .	Between the hours of 22:00 hours and 05:00 hours
6. On any street, road, lane and square bounded within the following area outside the limits of the City of Bridgetown from the junction of Jemmott's Lane and Bay Street along Highway 7 in an easterly direction to the junction of Rendezvous and Worthing Road, from Rendezvous Road to its junction with Sargeant Village Road, along Clapham Road, Wildey Road and Highgate Road to its junction with Pine Plantation Road, to its junction with Government Hill Road, Government Hill Road, Tweedside Road to its junction with Halls Road.	Between the hours of 22:00 hours and 05:00 hours

PART II

Lower Bay Street
 Beckwith Place
 Broad Street
 Trafalgar Square
 Trafalgar Street
 St. Michael's Row
 Crumpton Street
 Roebuck Street
 Chamberlain Bridge

Charles Duncan O'Neal Bridge

Magazine Lane
 Tudor Street
 High Street
 Palmetto Square
 Palmetto Street
 Rickett Street
 Marhill Street
 Bridge Street
 The Wharf

TWELFTH SCHEDULE

(Regulation 31(25))

The Road Traffic Regulations, 1984

*Roads on which certain Motor Vehicles carrying
Trailers and Containers are Permitted*

Codrington
Collymore Rock
Edey Village
Frere Pilgrim
Highway 2A via University Drive, Cave Hill
Highway 3
Highway 7
Hindsbury Road
President Kennedy Drive
Spooners Hill
Spring Garden Highway
Station Hill
Waterford Bottom

Appendix B: Review of Regional legislation and Legislation from the United Kingdom

Country	Act/Regulation	Purpose/Definitions	Areas Covered	Provisions	Who	Penalties
United Kingdom	1. Control of Pollution Act 1974	2. Public Health and Environmental Protection	1. Control of Construction sites 2. Noise in Streets 3. Designation of Zones 4. Register of noise levels 5. Reduction in noise levels 6. Noise from machinery	1. Prior consent for work at construction sites 2. Restriction on time loudspeakers can be used 21:00 to 08:00. 3. Define noise abatement zone 4. Collect data on noise levels 5. Serving noise abatement notice 6. Appeals provisions for abatement notices 7. Provisions for code of practice	1. Local Authority	1. a person found guilty of an offence is liable upon conviction to a fine not exceeding Level 5 on the standard scale with a further £50.00 for each day if the offence continues.

Country	Act/Regulation	Purpose/Definitions	Areas Covered	Provisions	Who
1. United Kingdom	1. Noise and Statutory Nuisance Act 1993 C. 40	1. Control of nuisances 2. Public Health and Environmental Protection	1. Street noise 2. Noise from premises	1. noise in a street to be a statutory nuisance; 2. consent to the operation of loudspeakers in a street and publication of consents 3. installation and operation audible intruder alarms; 4. preventing reoccurrence of statutory nuisances 5. entry to premises 6. Recovery of expenses from noise abatement 7. Protection from personal liability	1. Local Authority

National Noise Policy 2008

Country	Act/Regulation	Purpose/Definitions	Areas Covered	Provisions	Who
United Kingdom	1. Noise Act 1996 c. 37	1.	1. noise from dwelling at night	1. investigation of complaints of noise from dwellings at night 2. issuing warning notices 3. permitted levels of noise 4. approval of measuring devices 5. fixed penalty notices 6. powers of entry and seizures of equipment 7. securing of seized equipment 8. protection from personal liability 9. return of seized equipment	1. local authority

Country	Act/Regulation	Purpose/Definitions	Areas Covered	Provisions	Who
United Kingdom	1. Environmental Protection Act, 1990 Part III	1.	1. Statutory Nuisance and clean Air	1. Control and abatement of statutory nuisances 2. inspection of statutory nuisances	1. local authority

Country	Act/Regulation	Purpose/Definitions	Areas Covered	Provisions	Exception	Who	Penalties
1. Trinidad and Tobago	1. Environmental Management Act, 2000-The Noise Pollution Control Rules, 2001	1. to protect public health	1. places of public of entertainment 2. private premises 3.	1. establish a register of noise pollutants 2. defines noise zones 3. prescribes standards for the respective zones 4. require owners of public places to erect warning signs when sound pressure levels are above 100 dBA 5. require generator of noise above prescribed levels to apply for a variation. 6. provision for the payment of annual fees to exceed prescribed levels 7. define required information required for variation 8. public hearing prior to granting of variation 9. establishment of a noise advisory council 10. establish maximum sound level in a variation 11. transfer of a variation 12. establish a noise variation register outline required information 13. define standards and permissible levels	1. do not apply to sound generated by nature with our human intervention 2. religious events 3. sporting events 4. educational instruction 5. public march, meetings 6. alarms/emergency devices 7. sound associated with installation and repair of public utility 8. emergency work	1. Environmental Management Authority	1.

Country	Act/Regulation	Purpose/Definitions	Areas Covered	Provisions	Who	Penalties
Jamaica	1. Noise Abatement Act, 1997	1. Control noise caused by amplified sound and other specified equipment	<ol style="list-style-type: none"> 1. political meetings 2. public meetings 3. noise from premises 	<ol style="list-style-type: none"> 1. control of noise from private and public places 2. sets time restrictions on public and political meeting can occur 3. places liability on the owner of premises or equipment for annoying noise levels 4. requires operator to seek permission to operate specified equipment 5. established procedures for appeal of decision by the superintendent of police 6. powers to seize and detain specified equipment 	1. Commissioner of police	1. fines range from 15 000 to 50 000 or imprisonment range from 3 months to 6 months.

Country	Act/Regulation	Purpose/Definitions	Areas Covered	Provisions	Who	Penalties
1. Belize	1. Environmental Protection Act- Statutory Instrument No. 56 OF 1996: Pollution Regulations, 1996	1. Control and abatement of noise pollution	1. noise emitted from any premises 2. allows for the inspection, control of excessive noise from vehicles	1. Allow an authorized person to give direction on noise abatement 2. Enables an authorised person to enter premises to facilitate noise abatement	1. Department of Environment	1. fine of \$500.00 or imprisonment for a term not exceeding 6 months