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Commonwealth of Australia

NATIONAL ACOUSTICS
LABORATORY AND
ULTRASONICS INSTITUTE

Chatswood, N.S.W.

Parliamentary Standing Committee on
Public Works

(Third Report of 1978)

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EXTRACT FROM
THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES,
No. 25, DATED 8 MAY 1978

5 PUBLIC WORKS COMMITTEE—REFERENCE OF WORK—NATIONAL ACOUSTICS LABORATORY AND ULTRASONICS INSTITUTE, CHATSWOOD, N.S.W: Mr McLeay (Minister for Construction), pursuant to notice, moved—That, in accordance with the provisions of the *Public Works Committee Act 1969*, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for investigation and report: Construction of National Acoustics Laboratory and Ultrasonics Institute, Chatswood, N.S.W.

Mr McLeay presented plans in connection with the proposed work.

Debate ensued.

Question—put and passed.

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Parliamentary Standing Committee on Public Works

**NATIONAL ACOUSTICS LABORATORY AND ULTRASONICS
INSTITUTE, CHATSWOOD, N.S.W.**

REPORT

By resolution on 8 May 1978, the House of Representatives referred to the Parliamentary Standing Committee on Public Works for investigation and report to the Parliament the proposed construction of the National Acoustics Laboratory and Ultrasonics Institute at Chatswood, New South Wales.

The Committee has the honour to report as follows:

THE REFERENCE

1. The proposal referred to the Committee is for the construction of facilities to house the testing, research, administration and support activities of the National Acoustic Laboratories and Ultrasonics Institute of the Department of Health.

2. It is proposed that the laboratory complex will be built on vacant Commonwealth land in Greville Street, Chatswood, N.S.W., and will replace facilities presently located in unsatisfactory warehouse accommodation at Millers Point, Sydney. This accommodation is within the historic Rocks area which is undergoing major restoration by the Sydney Cove Redevelopment Authority. The existing buildings are classified by the National Trust and are included in the Register of the National Estate. They cannot be the subject of major alterations and the site cannot be redeveloped.

3. The acoustic performance of the complex will influence the scope and quality of testing and research activities performed. The proposed site is well suited for these purposes and the design will take advantage of the local topography to shield and isolate the complex from noise and vibration. The building will be designed to harmonise with the natural bushland surroundings.

4. The estimated cost of the proposal when referred to the Committee was \$12 million at April 1978 prices.

THE COMMITTEE'S INVESTIGATION

5. The Committee received written submissions and drawings from the Department of Health, Department of Administrative Services and the Department of Construction and took evidence from representatives of these departments at a public

hearing at Chatswood on 12-13 June 1978. The Committee also received written submissions and took evidence in support of the proposal from the Australian Deafness Council; the Federation for Junior Deaf Education; Professor A. Lawrence, Associate Professor, Faculty of Architecture, University of New South Wales; and Professor A. Delbridge, Professor of Linguistics, Macquarie University. Written submissions and evidence against the proposal were given by Mr J. R. Dowd, M.L.A., the Willoughby Municipal Council, the Chatswood Environmental Preservation and Improvement Association (C.E.P.I.A.), the Lane Cove River State Recreation Area Trust and a number of private citizens.

6. Prior to the public hearing, the Committee inspected the existing premises of the National Acoustic Laboratories and Ultrasonics Institute and the site for the proposed complex.

7. The Committee's proceedings will be printed as Minutes of Evidence.

BACKGROUND

8. The main acoustic research by the Commonwealth began in 1943 when a laboratory was established by the National Health and Medical Research Council to investigate military problems of noise and blasts, protection for the hearing of Service personnel and the efficiency of communications under conditions of noise. In 1947 the unit was transferred to the Department of Health, following extension of the Laboratories' functions into audiology in addition to research activities.

9. In 1963 the Central Laboratory moved to its present location at 5-7 Hickson Road, Millers Point, Sydney. The Laboratories' functions were formalised by the passing of the Acoustic Laboratories Act in 1948. Its main functions were stated as:

The Minister may establish, maintain and operate within the Commonwealth Acoustic Laboratories, for scientific investigation, including tests in respect of hearing aids and their application to the needs of individuals and in respect of problems associated with noise as it affects individuals.

10. In addition, Section 9A of the National Health Act authorises the Minister for Health to

arrange for the supply of hearing aids to certain people.

11. By an Order in Council of September 1972, the Department of Health was authorised under the National Health Act to provide research and advisory services in relation to the use of ultrasonic radiation in the diagnosis and treatment of disease.

12. On 1 July 1975 the Ultrasonics Section of the Laboratories was detached as a separate branch of the Department and now operates as the Ultrasonics Institute. It shares common administrative and some engineering support services with the National Acoustic Laboratories and this relationship will continue in the proposed new building.

13. *The National Acoustic Laboratories* The National Acoustic Laboratories operate Hearing Centres in all States, the A.C.T. and the N.T., which provide hearing services to persons under 21 years, eligible pensioners and Veterans Affairs Department clients. The services provided include the testing of patients' hearing, the fitting of hearing aids, where necessary, together with the repair of those aids and the supply of batteries. No charge is made for these services.

14. The Central Laboratory in Sydney undertakes the technical and professional oversight and staff training for the work of the Hearing Centres, as well as engineering and research support and supply of hearing aids and equipment. However, the Central Laboratory also performs or co-ordinates many other important functions. These are in the fields of engineering and audiology development and research and matters relating to noise and include:

- effects of noise on man;
- design and development of audiological equipment and hearing aids;
- audiological testing procedures;
- protection of hearing;
- measurement and assessment of noise;
- evaluation of methods of measure of noise;
- generation, propagation and reduction of sound;
- development of acoustical standards;
- audiology research.

15. Staff members of the National Acoustic Laboratories have made notable achievements in the fields of engineering and audiology as is evidenced by publications in international journals in these fields.

16. *The Ultrasonics Institute* In general terms the functions of the Institute are to provide research and advisory services in relation to the use of ultrasonic radiation in the diagnosis and treatment of disease. The work of the Institute is of high

international standing and a licensing agreement has been arranged in order to make the echoscope equipment developed by the Institute available for commercial purposes.

17. Its activities can be grouped into four specific areas:

- (a) echography—examination of various medical conditions and parts of the body and research into the formulation of diagnostic criteria;
- (b) engineering research—aimed at implementation of new technological advances;
- (c) advanced techniques—research on ultrasonic imaging, transmission and reflection of ultrasound in biological tissues and computer signal processing;
- (d) biology—investigations into the effects of ultrasound on human tissue.

THE NEED

18. The National Acoustic Laboratories and Ultrasonics Institute are located in parts of two adjoining historic Commonwealth-owned buildings at 5-7 Hickson Road, Millers Point, just northwest of Circular Quay. The buildings are in the well-known Rocks area and are listed for preservation and possible eventual incorporation into the overall restoration and redevelopment scheme for the area, subject to agreement between the Commonwealth and the State.

19. These buildings are most unsuitable for the specialised purposes and functions performed by both the National Acoustic Laboratories and the Ultrasonics Institute. They have been adapted over the years and certain special acoustic and research facilities have been incorporated. However, nothing more can be done in order to make any worthwhile improvements in the accommodation because the area external to the buildings is becoming increasingly noisy. Before being taken over by the Laboratories in 1963, the buildings were used for a variety of functions including office, storage and warehousing.

20. In recent years, noise and space limitations have imposed considerable technical restraints on established programs such as calibration procedures and critical research activities. Proper facilities are required for development and evaluation of noise measuring equipment; hearing testing and hearing aid construction; development of hearing aids and their acceptance testing; evaluation of ear protection equipment; development of hearing conservation programs and investigations into hearing and the effects of noise on man. Facilities of the correct standard are not available at the present location at Millers Point and cannot be provided there.

21. It has been assessed by the Department of Health, in consultation with the Department of Construction, that in order to provide appropriate laboratory facilities, the only satisfactory long-term solution is to erect a purpose-designed complex on a site which meets the most exacting criteria for noise and vibration isolation.

22. In summary, the present premises are quite unsuitable for the future needs of the Laboratories. They are old, overcrowded, lacking in facilities and services, and cannot be extended or adapted to meet increasing demands for more critical environmental conditions essential for present and future research.

23. *Committee's conclusion* There is a need for a purpose-designed complex for the National Acoustic Laboratories and the Ultrasonics Institute to replace existing premises which are overcrowded and cannot be expanded nor adapted to meet the technical standards required.

THE PROPOSAL

24. The highly specialised research and development work carried out by the National Acoustic Laboratories and the Ultrasonics Institute requires purpose-designed accommodation and facilities. To satisfy the high levels of insulation from both air-borne and structure-borne noise required by the Laboratories, the knowledge gained from examination of many overseas acoustical research institutes by staff of the Laboratories over many years and a special joint inspection with an architect of the Department of Construction in 1975 have been applied in the design of this proposal.

25. *Planning and design* The design of the proposed building provides for all the special sound testing facilities to be enclosed within a noise isolated structure, screened by the hillside to the south and general laboratories and offices to the north, east and west. The roof including adjacent surrounding lower areas is to be covered with earth.

26. The noise generating areas such as major plant, general administration offices, loading dock, canteen and ultrasonics Institute wing have been planned in the eastern end of the building to provide the maximum physical barrier to unwanted noise.

27. The Sound (noise isolated) Shell will be excavated 11 metres into rock. However, by planning the building along the edge of the gully, further deep rock excavation has been minimised. Single storey structures occupy the southern side with two and three storeys of offices and laboratories extending along the northern side and down

the slope. The bushland and natural rock features of the site have been taken into consideration in the design. The profile of the building has been maintained at almost natural ground level along most of the southern elevation with no portion being higher than an average single storey cottage.

28. *Sound Shell* The Sound (noise isolated) Shell is the major feature of the complex as the success of all research will depend on the quality of noise insulation achieved in its design and construction.

29. The special facilities contained within this area comprise:

- one large, two medium and one small anechoic rooms;
- three plane wave tubes;
- two diffuse field rooms;
- one high intensity noise room;
- one large and one small quiet room;
- eleven audiometric test booths.

30. To ensure sound insulation this feature has been designed with no structural connection with the remainder of the building. The roof constructed of 200 millimetres of concrete will be covered with 1 metre of earth. Adjacent roof areas will be covered with 300 millimetres of earth to ensure no penetration of air-borne noise. This method of construction provides an economical system of insulation which would be effected over the wide range of frequencies encountered.

31. By excavating into the hillside and screening the remaining walls with the supporting office/laboratories accommodation, the construction of very thick concrete walls has been avoided and economies of construction achieved.

32. The Shell is free of hydraulic services and mechanical plant. Air-conditioning ducts have flexible connections to isolate possible structure-borne noise from remotely located fans and compressors.

33. An acoustical consultant, successful in structural sound insulation in several Sydney city buildings and theatres affected by underground railways, was engaged to advise on structure-borne sound insulation and concurs with the proposal.

34. *Committee's conclusion* The proposed complex has been designed to meet the high levels of insulation from both air-borne and structure-borne noise required for acoustics research.

SITE CRITERIA

35. The main requirements for the site for the new buildings are quietness and low ground vibration levels, combined with good access to the city and inner suburban areas where most of the

associated hospitals, universities and industrial organisations are located. Also as some of the research involves diseases of rare aetiology, a large population of people is required. In Australian terms, this means within Sydney or Melbourne. Melbourne is not supported by the Department of Health mainly because the National Acoustic Laboratories and the Ultrasonics Institute have little contact with universities, hospitals etc. in that city. A near suburban site is most desirable as there has to be easy access to associated institutions. Chatswood is ideal as it is relatively close to the Royal North Shore Hospital, the C.S.I.R.O. Experimental Building Station and National Measurement Laboratory, Macquarie University, and to other organisations. Further, there is a National Experimental Laboratories' Hearing Centre located at the Chatswood Shopping Centre.

36. *Physical criteria* There are most stringent criteria laid down for the ultimate acoustic performance of the building and this, of course, greatly influenced the selection of the site. If these criteria cannot be met then functions must necessarily be restricted. In the new building, noise levels in special rooms such as anechoic, audiometric test and diffuse field must be below the threshold (limit) of hearing for the research and measurement requirements of the National Acoustic Laboratories. Consequently, selection of a suitable site has been dictated by the need to choose the most ideal site available, within the location parameters outlined above and in accordance with the following.

37. A site in a very quiet area with good access to the city is required on which a specialised building can be constructed. The site must have low

ground vibrations. These conditions are essential as many activities require a minimum noise and vibration environment. In addition, there should be sufficient area to ensure maintenance of a buffer zone from neighbours.

38. Specifically, the building must be isolated from quarries, heavy industrial or concentrated commercial activities by a minimum distance of 500 metres. The site must be outside the 30 noise exposure forecast (NEF) zone of the airline flight paths. A hillside, preferably earthy, on the site could be utilised for shielding the specialised acoustic facilities such as anechoic rooms for airborne noise. A location adjacent to park land and/or residential areas already fully developed and unlikely to be redeveloped would be ideal.

39. It is essential that site conditions be stable and as far as possible remain so over the effective life of the building as it will be designed to meet stringent specifications of noise and vibration isolation against known and projected site conditions. A site in a growth area or area likely to be rezoned for redevelopment is quite inappropriate as ground vibrations and noise introduced by building and industrial activities would nullify the advantages of special low noise facilities which are essential for many present and future programs.

40. A total of 20 sites in both Commonwealth and private ownership were considered. Of these, six were subject to detailed technical investigation and only the Greville Street site met all the necessary criteria, the others being rejected for a variety of reasons.

41. A computer search of property holdings by the Department of Administrative Services

COMPARATIVE NOISE LEVELS—FOR SIX SITES SUBJECT TO DETAILED INVESTIGATION
Decibels (dBA)

(as measured during morning—afternoon peak traffic periods)

<i>Site</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>
Chatswood	37.0	52.0	42.5
Dundas	42.5	61.0	50.0
Frenchs Forest (ex RAAF)	48.0	66.0	56.0
North Ryde	46.0	59.0	51.0
Pymble	40.0	53.5	45.0
St Leonards	50.0	66.0	55.0

revealed that there are some 60 Commonwealth-owned properties of 2 hectares or more within a 20 kilometre radius of Sydney. There was no available Commonwealth land other than the Chatswood site which met the requirements specified by the Department of Health.

42. *Committee's conclusion* An extensive investigation determined that the Greville Street, Chatswood, site met all the necessary criteria.

THE SITE

43. The site for the complex is situated in Greville Street, Chatswood, on the western side of the Willoughby Municipality close to Fullers

Road, 1.5 kilometres from Chatswood Railway Station and 12 kilometres from Sydney, and is readily accessible by road and public transport. Fullers Road is a principal road connecting northern Sydney beach suburbs with the western suburbs and provides ready access to Macquarie University, Royal North Shore Hospital, the National Measurement Laboratory and the Experimental Building Station at North Ryde.

44. The site is zoned 'Special Uses—Defence' in the Willoughby Planning Scheme and the surrounding areas are zoned 'Residential' around the eastern half and 'Open Space' in the western half.

45. The site is the remaining Commonwealth portion of an original holding of 45 hectares which was acquired by the Commonwealth for use as a rifle range under the compulsory acquisition powers of the *Lands Acquisition Act* 1906. Subsequent disposals and reallocations have reduced the area to the present site of 3.44 hectares. Some 12 hectares or approximately 29 per cent of the original holding has been gazetted as open space by the New South Wales Government.

46. The land is of uneven slope from east to west and falls away into a deep gully to the north.

47. The western half of the site was originally cleared when used as a rifle range, but large eucalyptus trees have now regenerated in the gully area. Ti-tree and lantana scrub have overrun large areas of the higher level of the western half where the complex will be located. The eastern portion is principally grass covered with several stands of large willows and silver poplars.

48. Several sandstone outcrops traverse the steeper slopes to the west and limited site investigations have revealed that sandstone extends over the site of the proposed building and this provides an ideal building foundation.

49. In September 1975 an Environmental Impact Statement was made available for public comment. Following considerable public interest and comments, an addendum was prepared summarising these comments and providing the supplementary information required. Particular concern was expressed that the proposal as outlined would not be the final development of the site. However, the Committee was assured that it is not intended to expand the building or to erect additional buildings on the site.

50. Following a review by the Minister for Environment, Housing and Community Development, it was decided that the proposal was environmentally acceptable, subject to control of blasting and noise during the construction period.

51. *Committee's conclusion* The site selected is suitable.

LOCAL OBJECTIONS

52. The local objections to the proposal can be broadly stated as follows:

- (1) The proposal was inappropriate for a zoned residential area.
- (2) It would alienate an area of open space (3.44 hectares) from community use.
- (3) There would be an injurious effect on surrounding residents from increased traffic movements and building activity. In addition, the proposed access was regarded as unsuitable and the parking space provided was seen as being deficient.

53. *Zoning* It was put to the Committee that as the areas surrounding the proposed site are zoned 'Residential A' and 'Open Space' that the development was not in accordance with the site zoning which is 'Special Uses—Defence'.

54. The Department of Administrative Services sought legal advice from the Commonwealth Crown Solicitor on two points:

—the rights of the Commonwealth to use the remainder of the said land for other than rifle range or defence purposes;

—the ability of the State Government or local Councils to zone Commonwealth-owned land and in particular the status of Commonwealth land said to be zoned 'Special Uses'.

55. The Crown Solicitor advised on the first point that as the original defence acquisition in 1915 and 1917 was a lawful acquisition for a public purpose, there does not appear to be any constitutional or legal reason why the Commonwealth should not use the land for any purpose within its competence under the Constitution.

56. On the question of zoning, the Crown Solicitor advised that the subject land remains unaffected by any provisions of any zoning scheme made pursuant to the Local Government Act, 1919 (N.S.W.) and, further, that it is not within the powers of the State to control the use by the Commonwealth of its land.

57. *Loss of open space* There has been no attempt by the Commonwealth to restrict public access to the site and naturally enough the land has come to be generally regarded as open space for public use. It was claimed by the Willoughby Municipal Council that the development will create a major intrusion into the adjacent open-space areas which have been consolidated by Willoughby Council and successive State Governments.

58. It was stated by both the Willoughby Municipal Council and C.E.P.I.A. that the Willoughby Municipality has a deficiency of open space, particularly active open space. Information provided

to the Committee by the Department of Administrative Services indicated that while the Municipality is well provided with open space, the active component is only two-thirds of the standard determined by the N.S.W. Planning and Environment Commission. In 1972 it ranked seventh in the Sydney region for the amount of open space per 1000 people.

59. The Committee believes that the Departments of Health and Administrative Services should enter into negotiations with the Willoughby Municipal Council and local residents on the question of continued public access to the site and to the surrounding bushland subject to appropriate arrangements being made regarding public liability risks etc. and the security of the complex.

60. *Traffic problems* It was claimed that the proposed development would cause a number of traffic related problems:

- heavy vehicles using Greville Street during construction phase;
- increased vehicle movements in Greville Street and the other nearby streets on the completion of the project;
- the proposed access from Greville Street is totally opposed by the local residents;
- it was also claimed that the on-site parking to be provided would be insufficient.

61. Local residents, particularly those with young children, are naturally concerned at the intrusion of heavy construction vehicles into Greville Street which is a narrow carriageway varying between 7.3 metres and 8.5 metres in width. Whilst the construction of this project is planned to take 48 months, the impact of heavy vehicles will be felt in the initial stages. The removal of spoil will occur in the first four months of the contract. Blasting may be necessary to remove rock from the site but will be carried out under strictly controlled conditions and will be light explosives only. The construction of the main building structure will occupy approximately 12-15 months during which concrete will be delivered. This will not occur on a daily basis but at intermittent periods throughout the contract. The Department of Construction has given an assurance to the Committee that stringent provisions will be included in the contract conditions to minimise inconvenience to local residents during the construction phase, particularly from heavy vehicles and blasting. The Department has also suggested to the Council that some parking restrictions in business hours during the construction period may also assist.

62. The Willoughby Municipal Council, C.E.P.I.A. and local residents are concerned that

Greville Street will be inadequate for the volume of traffic to be generated by the complex.

63. The Department of Health, following a staff survey, has determined that car parking should be provided for 124 staff plus 20 visitors. It was also estimated that an average of 15 other cars and a maximum of 10 commercial vehicles will visit the site each day. The N.S.W. Police Traffic Branch and the N.S.W. Department of Main Roads advised the Department of Construction that this number of vehicles would have an insignificant effect on the existing traffic flow.

64. Professor W. R. Blunden, Professor of Traffic Engineering, University of New South Wales, who undertook a study of the likely traffic problems for the Department of Construction, concluded that even with the additional traffic expected, the traffic level will remain below the threshold of any significant environmental consequence.

65. It has been suggested to the Willoughby Municipal Council by the Department of Construction that if the suggested parking restrictions satisfy traffic flow during the construction period, then a period of time for traffic flow of staff vehicles should be experienced to determine whether the widening of Greville Street is necessary.

66. The proposed access to the site from Greville Street was strongly criticised by the Willoughby Municipal Council and the local residents as they regard the Greville Street/Fullers Road intersection to be dangerous. The Department of Construction informed the Committee that it had investigated other possible means of access to the site but access from Greville Street was the only practical solution. The N.S.W. Department of Main Roads would not agree to access from Millwood Avenue to the west of the site, as it would create serious safety problems due to the road alignment and formation.

67. The suggestion by the Willoughby Municipal that an access road should be constructed from Lady Game Drive was also rejected by the Department of Main Roads on the grounds that it could interfere with planning for the proposed County Road which will pass through the valley below the site. The Department of Main Roads concluded that access to the development would be best provided at Greville Street.

68. The local residents stated that requests for traffic signals at the intersection of Greville Street and Fullers Road had been rejected by the Department of Main Roads on the grounds of inadequate sighting lines. However, the Department of Construction has been advised by the Department of Main Roads that whilst no plans exist for the provision of traffic signals, they could be provided

if the increase in traffic generated by the development warranted it. It was also indicated that some financial contribution could be required from the Commonwealth.

69. The Committee is concerned at an apparent conflict between the final Environmental Impact Statement which stated *inter alia*:

1. Provision has been made in the estimates of cost for this project, for the installation of traffic lights at the Millwood Avenue/Fullers Road intersection and/or the Greville Street/Fullers Road intersection.
2. Provision has also been made for the cost of widening Greville Street should the Willoughby Council agree that the street should be widened.

and evidence given at the public hearing by the Department of Construction to the effect that it had not been authorised by the Department of Finance to enter into any financial commitments relating to these matters. The Committee believes that this matter should be resolved as soon as possible.

70. *Committee's conclusions* The Commonwealth has the authority to use the proposed site for other than Defence purposes.

71. The Departments of Health and Administrative Services should discuss with the Willoughby Municipal Council and local residents the question of continued public access to the site and to the surrounding bushland.

72. The Committee recommends that the Department of Construction take all possible measures to minimise inconvenience to local residents during construction, particularly from heavy vehicles and blasting.

73. The Committee is satisfied that all practical alternative means of access to the site have been investigated and that access should be from Greville Street.

74. While some parking problems may occur in Greville Street, the additional traffic generated after the construction period should have an insignificant effect on the existing traffic flow.

75. Traffic signals may be provided by the N.S.W. Department of Main Roads at the intersection of Greville Street and Fullers Road if the additional traffic generated by the proposal proves to warrant it.

CONSTRUCTION

76. *Structure* The building will be supported on concrete pad and strip footings founded on sandstone.

77. The office/laboratory areas of the building will have reinforced concrete columns, floor and roof.

78. The Sound Shell area will have reinforced concrete walls and roof. The earth covering to the

roof, together with close control of vibration in the structure, have required the use of substantial steel trusses to support the concrete roof slab.

79. The two-level car park will be steel framed with a reinforced concrete suspended floor slab.

80. Due to the rugged terrain and heavy bush covering of the site where the building will be located only limited foundation testing has been carried out. Sandstone to a depth of 11 metres was found. The test results are considered representative of the foundation conditions. More extensive testing will be carried out during design development. Bulk excavation of the rock using heavy earth moving equipment is not expected to be possible and strictly controlled use of explosives will be necessary.

81. *External finishes* The building will be a concrete structure and exposed wall surfaces will be textured concrete presenting a darker grey finish to blend with the natural bush colouring. The special Sound Shell and essential screening areas of adjacent roofs will be covered with earth and planted with native shrubs, providing sound insulation and visual screening of the structure. The remainder of the building contains no special sound isolated areas and standard construction methods can be utilised.

82. Remaining roof areas such as the plant room, library and general administration and engineering workshops will have concrete framed glass south lights.

83. Particular attention will be given during design development to all problems associated with noise and vibration.

84. *Internal finishes* General office and laboratory partitions will be lightweight stud and plaster with painted finish. Limited panelling will be used in special areas. Masonry walls will enclose toilets, plant, ducts and noise insulated zones and will generally be rendered and painted. The underside of floor slabs will be ribbed as a feature of the structural design and will generally be exposed and painted.

85. Floors to offices, theatre, library and some passageways will be carpeted. Entrance foyer will be paved and wet areas, e.g. animal house, toilets, cafeteria kitchen will have ceramic tiles. Laboratories and most passageways will have impervious sheet material. Windows will be aluminium framed with dark finish and with grey tinted glass.

86. *Mechanical services* The whole of the building will be air-conditioned with the exception of the plant rooms, toilets, cafeteria wing and engineering test facility. Laminar flow clean rooms will be provided for the integrated circuit manufacture process within the Ultrasonics Institute wing.

87. The main plant room will house chillers and boilers to provide chilled and hot water for circulation to the various air handling plants remote from the central plant (e.g. air handling plants for the Sound Shell and the Ultrasonics wing). The main three zone air handling plant will supply conditioned air to the major laboratory/office and administration area nearby. Where appropriate, provision will be made for the use of all outside air 'economy cycle' when ambient conditions are suitable. Fan coil units will be used for air-conditioning areas adjacent to the special facilities and areas requiring individual environmental controls.

88. Noise and vibration will be minimised by equipment selection and their transmission will be controlled by means of suitable anti-vibration mountings and silencers.

89. Reticulated services, including domestic hot water supply, compressed air and medical gases will be provided to outlets where required. Chilled drinking water, cool room cafeteria equipment, fume cupboards, exhaust hoods and hoisting equipment will also be provided as required.

90. *Hydraulic services* The existing water mains serving the site are not of sufficient capacity to provide adequate supply for domestic and fire fighting services to the new facility. It will be necessary for the Water Supply Authority to upgrade the reticulation by the construction of a new water main from Fullers Road. New water mains and services leading off this new main are proposed within the site for domestic, laboratory and fire fighting supplies. A separate supply to serve the laboratories will be provided.

91. A Metropolitan Water, Sewerage and Drainage Board sewer runs through the site along the northern boundary clear of the proposed building. Sewerage reticulation within the site will comprise sanitary plumbing and sewer drainage serving domestic and laboratory fixtures in the proposed building, which will be connected to the existing sewer main within the site. All sewerage will be constructed in accordance with the local authority's by-laws and adequate treatment will be provided to laboratory wastes before they are discharged into the sewerage system

92. Blue Gum Creek traverses the site and all stormwater drainage from the building, roadways, car parks and the site generally will discharge into this creek by open drains or underground piped drainage system. Measures will be taken at points of discharge to prevent erosion and scouring of the creek. The proposed building and access roadways will be sited at such locations and levels as to be clear of floodwaters passing down the creek.

93. Subsoil drainage around the proposed building will be provided where necessary to divert seepage from the foundations. A system of piped subsoil drains will also be provided over the roof of the building to effectively drain away water from grassed and landscaped roof areas.

94. *Electrical services* Power supply for the building will be obtained from the Sydney County Council at 415 volts via an underground high voltage cable from Greville Street to a substation in the building adjacent to the main plant room. Distribution will be provided for all general purpose and special purpose light and power requirements through two rising mains and to the main air-conditioning switchboard for all A.C. and ventilation services. Other services included are emergency exit lights, anti-panic lights to appropriate areas (e.g. anechoic chambers), external street lighting to car parking and access footpaths.

95. A P.A.B.X. including an operator's console will be provided. Internal conduits and ducts will also be provided for telephone block wiring.

96. An electric passenger/goods lift will be provided serving three levels to be used particularly for elderly patients visiting the audiology test area and for the movement of heavy equipment to the level of the Sound Shell floor. A small service lift will serve the general office area and cafeteria.

97. *Fire protection* Fire protection provisions will include a wet pipe automatic sprinkler system, internal hose reels, portable extinguishers and external hydrants. All fire protection measures including the associated water supply will conform to the requirements of the relevant ordinances, codes and by-laws.

98. *Civil* A two vehicle width access road from Greville Street will extend to the main entrance of the laboratory terminating in a visitors' car park for 20 cars with a short extension to the loading dock. The road will be bitumen surfaced and fully kerbed and guttered.

99. In the north-east corner adjacent to Greville Street, a two-level staff car park accommodating 124 cars will be provided. By curving the structure to the shape of the hillside and excavating to a limited extent, the top level of the car park will be below the adjacent section of Greville Street. By providing surrounding earth banks and tree planting, the car park will be unobtrusive.

100. The two-level car park will enable the remainder of the eastern portion of the site fronting Greville Street to be landscaped and preserve the existing silver poplars, willow and bamboo stands. Surface level parking would cover most of this eastern area of the site leaving little scope for landscaping.

101. Security fencing will be provided to the southern and western boundaries to prevent public access to roof areas and special areas along the northern frontage.

102. *Landscaping* The eucalyptus trees in the western end of the site will be retained and will be supplemented by planting additional native flora. The earth covered areas of the roofs will also be planted with selected native flora, stabilising the earth and assisting the diffusion of sound. The existing water course, ponds and waterfall will be cleared and preserved as features of the site.

103. *Consultations and approvals* The N.S.W. Planning & Environment Commission and the Pollution Control Commission raised no objections to the proposal. The proposal will comply with the by-laws, ordinances etc. of the electricity, gas and water supply authorities.

104. *Committee's conclusion* The Committee recommends the construction of the work in this reference.

ESTIMATE OF COST

105. The estimated cost of the work when referred to the Committee was \$12 million at April 1978 prices, made up as follows:

	\$
Building works including structural	5 750 000
Acoustic testing units	1 400 000
Mechanical services	1 950 000
Electrical services	700 000
Lift service	70 000
Hydraulic services	900 000
Civil including car park	1 030 000
Landscaping and fencing	200 000
	12 000 000

PROGRAM

106. It is proposed that the work be implemented in two phases:

Contract 1—Site clearing, bulk excavation and construction of two-level car park;

Contract 2—Main building construction and associated works.

107. Documentation for Contract 1 is planned to take six months and Contract 2 a further 12 months from the time approval is given to proceed.

108. Construction of the building will require approximately 48 months from the letting of Contract No. 1.

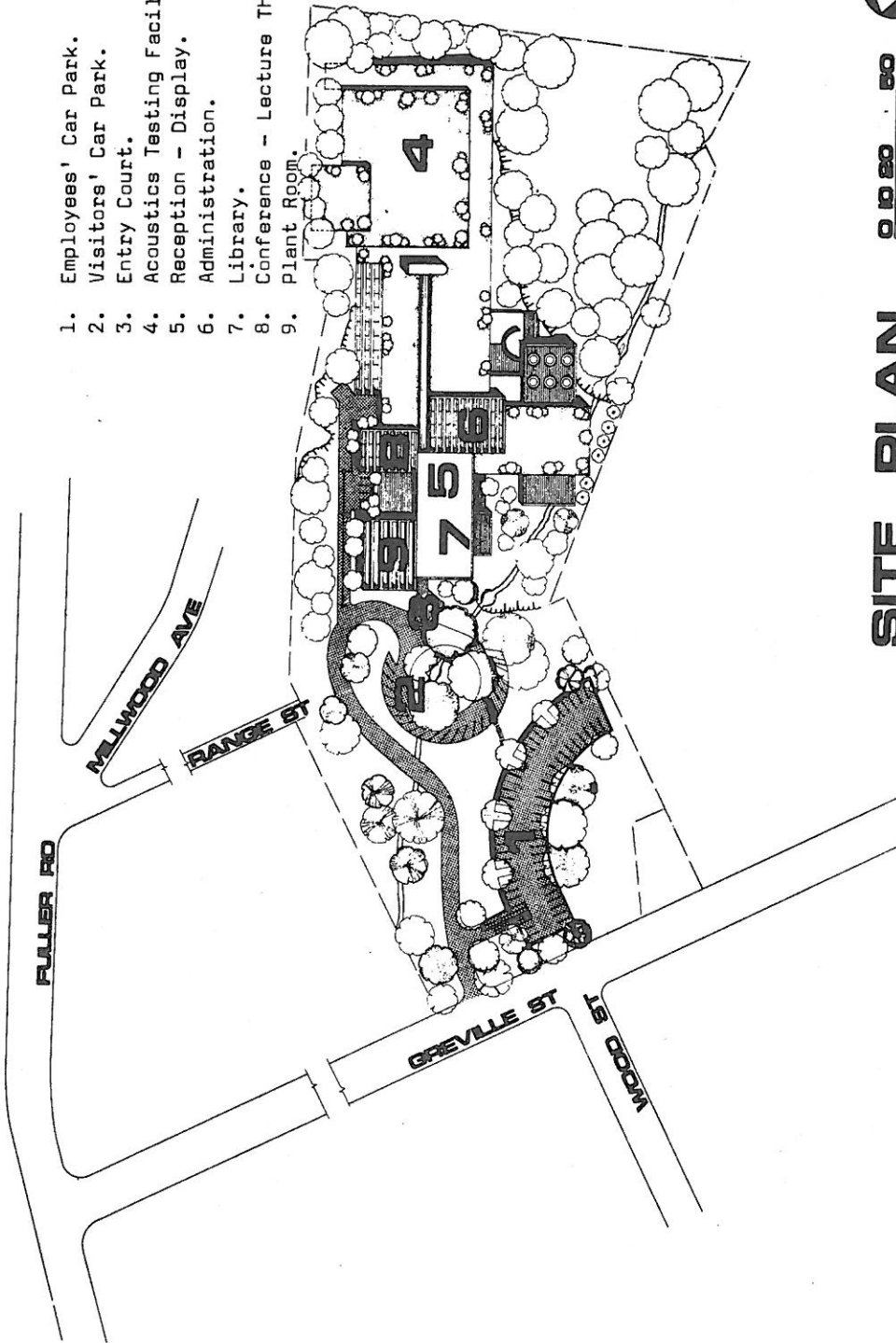
RECOMMENDATIONS AND CONCLUSIONS

109. The summary of recommendations and conclusions of the Committee is set out below. Alongside each is shown the paragraph in the report to which it refers.

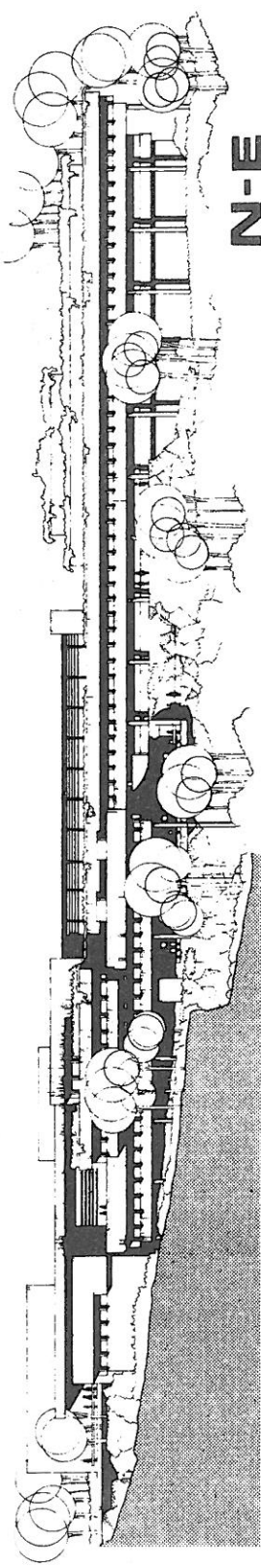
	<i>Paragraph</i>
1. There is a need for a purpose-designed complex for the National Acoustics Laboratory and the Ultrasonics Institute to replace existing premises which are overcrowded and cannot be expanded nor adapted to meet the technical standards required.	23
2. The proposed complex has been designed to meet the high levels of insulation from both air-borne and structure-borne noise required for acoustics research.	34
3. An extensive investigation determined that the Greville Street, Chatswood site, met all the necessary criteria.	42
4. The site selected is suitable.	51
5. The Commonwealth has the authority to use the proposed site for other than Defence purposes.	70
6. The Departments of Health and Administrative Services should discuss with the Willoughby Municipal Council and local residents the question of continued public access to the site and to the surrounding bushland.	71
7. The Committee recommends that the Department of Construction take all possible measures to minimise inconvenience to local residents during construction, particularly from heavy vehicles and blasting.	72
8. The Committee is satisfied that all practical alternative means of access to the site have been investigated and that access should be from Greville Street.	73
9. While some parking problems may occur in Greville Street, the additional traffic generated after the construction period should have an insignificant effect on the existing traffic flow.	74

- | | <i>Paragraph</i> | | <i>Paragraph</i> |
|--|------------------|--|---------------------------------|
| 10. Traffic signals may be provided by the N.S.W. Department of Main Roads at the intersection of Greville Street and Fullers Road if the additional traffic generated by the proposal proves to warrant it. | | 12. The estimated cost of the work when referred to the Committee was \$12 million at April 1978 prices. | 105 |
| | 75 | | M. H. BUNGEY
<i>Chairman</i> |
| 11. The Committee recommends the construction of the work in this reference. | | Parliamentary Standing Committee on Public Works
Parliament House
Canberra, A.C.T. | |
| | 104 | 22 August 1978 | |

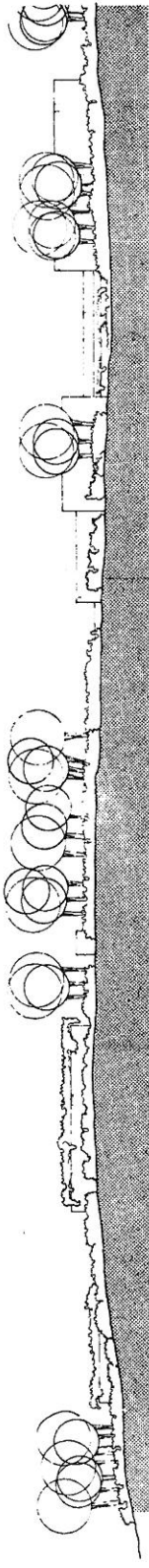
1. Employees' Car Park.
2. Visitors' Car Park.
3. Entry Court.
4. Acoustics Testing Facilities.
5. Reception - Display.
6. Administration.
7. Library.
8. Conference - Lecture Theatre.
9. Plant Room.



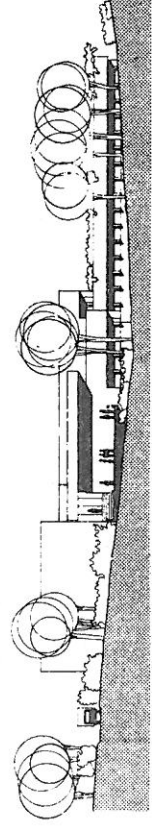
SITE PLAN



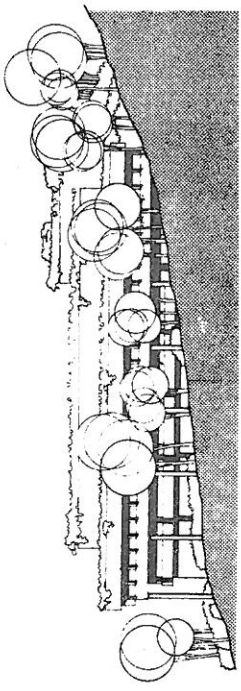
N-E



S-W



S-E



N-W
ELEVATIONS

(ii)