



THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

R E P O R T

relating to the proposed

SOUTHERN EXTENSION

of the

16/34 RUNWAY

at

SYDNEY, KINGSFORD SMITH AIRPORT

SYDNEY, NEW SOUTH WALES.

For Senator Anderson.

I present the Report of the Parliamentary
Standing Committee on Public Works, relating to the
following proposed work :-

Southern Extension of the 16/34 Runway at
Sydney, Kingsford Smith Airport.

²²
~~21~~ AUG 1963

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THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

SYDNEY KINGSFORD-SMITH AIRPORT
SOUTHERN EXTENSION OF 16/34 RUNWAY.

R E P O R T

On 7th March, 1963, His Excellency the Governor-General in Council, referred to the Parliamentary Standing Committee on Public Works for enquiry and report to the House of Representatives, the proposal to extend southwards, the 16/34 Runway at Sydney, Kingsford-Smith Airport. The Committee have the honour to report as follows :-

GENERAL

1. The Committee inspected the Sydney Kingsford-Smith Airport. Evidence was obtained from representatives of State and local government organizations, Commonwealth Departments, pilots, airline operators and other interested organizations and individuals.

SYDNEY KINGSFORD-SMITH AIRPORT

2. Progressive development of the Sydney airport since the early post war years has involved such major work as the diversion of Cooks River and present installations represent a very substructural public investment.

3. The airport is conveniently located in relation to the City of Sydney, but being in a built up area it imposes inconvenience to people who live nearby, arising from the noise generated particularly by jet aircraft flying low overhead.

4. A combination of close proximity of an airport to a city centre, with the absence of inconvenience to people in the neighbourhood becomes more remote as cities grow. This is a problem common to many cities throughout the world.

5. Sydney airport does not impose the handicap commonly found elsewhere of being incapable of further extension. So long as the community is prepared to pay the high cost of extensions by reclamation of Botany Bay, there is considerable scope for

development of the airport. As this occurs, the source of noise will become further removed from residential areas.

PRESENT AERODROME PAVEMENTS

6. There are two runways each 200 feet wide at Sydney airport and both have parallel taxiways to serve them.
7. Runway 07/25. With a length of 8,300 feet, the 07/25 runway is the longer of the two. It has 200 feet of overrun at the eastern end. To gain additional length on this runway would involve major work on either Cooks River and a sewer at the western end or General Holmes Drive and the railway line at the eastern end. Runway 07/25 is regarded as having reached its maximum length.
8. Runway 16/34. The 16/34 runway is 5,500 feet long. A short distance north of it is the Alexandra Canal and beyond there is the railway line to Bunnerong. Just beyond the southern end is the southern and south-western suburbs ocean out-fall sewer, General Holmes Drive and Botany Bay.
9. Taxiways. Existing parallel taxiways connect the aircraft parking position of domestic and international aircraft with the runways.
10. Condition and Strength of Pavements. Apart from 400 feet at the eastern end of the 07/25 runway, which is constructed of concrete 12 inches thick, existing runway pavements are constructed of approximately 1 inch of bituminous concrete over 10 inches of fine crushed rock over 6 to 12 inches of clinker ash. Below this is a considerable depth of compacted sand. Taxiways and hardstanding areas are either flexible pavements similar in construction to the runways or concrete pavements 12 inches thick over a base course of clinker ash or crushed stone over sand.
11. The pavements continue to give satisfactory service with a minimum of maintenance under aircraft of the DC6, Electra, Boeing 707 and DC 8 types. The only work of any consequence carried out on the pavements since they were constructed was a hot bitumen and fine precoated aggregate seal in 1961, to provide a more waterproof surface and to prevent unravelling of the bituminous concrete at the runway ends and at the points of rotation of jet aircraft.

12. Apart from further resealing and possibly a further course of bituminous concrete on parts at least of the existing pavements, no major reconstruction is considered likely for foreseeable aircraft loadings.

LIMITATIONS IMPOSED BY EXISTING RUNWAY LENGTHS.

13. It is only 10 years ago that the largest aircraft using Sydney airport was the Boeing Stratocruiser with an all up weight of 140,000 lbs. Today the Boeing 707 and the DC 8 with all up weights of over 300,000 are regular users.

14. Although the existing runway system has proved to be reasonably satisfactory for most operations, when certain weather conditions prevail, international flights can be seriously affected and the alternatives, which the airline operators are forced to adopt, are costly.

15. The Effect of Wind. Most landings of the larger aircraft take place on the 07/25 runway which is 8,300 feet long but when there is extreme crosswind on this runway it cannot be used. This leaves the 16/34 runway which is only 5,500 feet long. If the headwind on this runway is strong enough it can be used for landings but in the intermediate condition when the wind is too strong across the 07/25 runway, but not strong enough down the 16/34 runway, inward international flights have to be diverted, for example, to Brisbane.

16. Wind conditions also impose similar handicaps on take-offs. When crosswinds prevent the use of the 07/25 runway, the short 16/34 runway, even with the strong headwind resulting, is not long enough to permit international aircraft to take off with a heavy load. They therefore need to land at Brisbane for refuelling on the route to Darwin or Nandi and beyond. Long range services to Djakarta, Singapore and Manila are similarly affected.

17. Wet Runway Surfaces. Landing and take off performances are also lowered by a wet runway surface and this often occurs when winds are such that the 16/34 runway is in use. There have been several occasions when the lighter domestic aircraft have used the full runway length before coming to rest. Sewer mains and a road at one end and a canal at the other leave no room to spare.

18. Noise The problem of noise in the neighbourhood of the aerodrome cannot be eased with the existing runway lengths. The 07/25 runway which, because it is 2,800 feet longer than the other, is the most used and takes aircraft over residential areas close to the aerodrome. To help limit the effect, no jet aircraft are scheduled to arrive at or depart from Sydney airport between 6 p.m. and 10 a.m. This must create problems for international airline operators and it is unlikely that the arrangement will be able to continue as air traffic grows.

19. Maintenance. Although runway pavements are in good condition the time will come when re-surfacing will be necessary. If the 07/25 runway had to be closed for an extended period, international flights would be seriously curtailed and it would be necessary to terminate them at some other airport such as Brisbane. In these circumstances an international airline which could not get its aircraft to the home base for maintenance would soon cease to be able to operate.

THE NEED FOR RUNWAY EXTENSIONS

20. As the main terminal for overseas flights in Australia, Sydney compares unfavourably with other international airports. Of 20 overseas airports mentioned in evidence, 16 have main runways 10,000 feet or more long. The main runway lengths at the other four are 8,120 feet, 8,500 feet, 9,500 feet and 9,800 feet. The shortest is ^{at} Djakarta where, it is believed, an 11,000 foot runway is proposed. All but three have at least one additional runway of sufficient length for satisfactory operation of the airport if the primary runway were to be out of action.

21. Even when using the 07/25 runway, aircraft operating on the long distance flights to Djakarta, Singapore and Manila cannot take off with full load, although economical loads can be lifted. The runway is not long enough for the largest of the jets using Sydney to operate over these longer distances.

22. At the present time the limitations at Sydney Airport apply mainly to international aircraft but with the introduction of jet aircraft to domestic services in 1965, the limitations will become more pronounced.

23. Wind strength and direction, wet runway surfaces and the possible need for runway maintenance can all be factors determining the runway to be used. As faster and heavier aircraft are introduced these influences will have the effect of concentrating more aircraft traffic on the 07/25 runway if the 16/34 runway remains 5,500 feet long.

24. Although late night and early morning flights by the domestic operators will be rare, the frequency of jet aircraft flights in and out of Sydney will increase considerably in 1965, and without a satisfactory alternative to the 07/25 runway people living under the flight path for it will be more continuously disturbed by noise. We believe this should be avoided.

25. There are nine international airlines operating into Sydney Airport now and the number can be expected to increase. Although the development of Tullamarine will draw some traffic away from Sydney, annual international passenger movements are expected to increase from 228,000 in 1962 to 250,000 by 1970.

26. The development of a new airport at Tullamarine is not expected to alter the role of Sydney Airport which is the main maintenance and overhaul base for international operations.

27. Little more can be done to reduce the noise in the vicinity of the airport while the 16/34 runway remains shorter than the 07/25 runway. All the limiting features will be accentuated with the introduction of jet aircraft on domestic flights in 1965.

28. In order to remove these limitations and to make the Sydney airport runway system more flexible, the 16/34 runway should be extended.

THE WORK INVOLVED IN EXTENDING THE 16/34 RUNWAY

29. By comparison with the cost of constructing runways under normal conditions, extension southward of the 16/34 runway at Sydney airport will be expensive because of the necessity to cross a main sewer out-fall and General Holmes Drive which is a main traffic artery leading southwards from Sydney and to reclaim portion of Botany Bay.

30. Southern and South-Western Ocean Outfall Sewers. Two large mains comprising the southern and south western ocean out-fall sewers are located immediately adjacent to the southern end of the 16/34 runway.

They carry sewage from an area of Sydney containing a population of 600,000 people.

31. The existing structure is above ground and is not designed to carry the weight of an aircraft.

32. It is proposed to construct a new sewer immediately north of the existing one, designed so that the sewer cover will be part of the pavement over which aircraft will move. Outside the runway and taxiway pavements, but within the landing strip and taxiway flanks, the sewer structure will be capable of carrying the load of an aircraft without damage either to the sewer or the aircraft should it run off the runway or taxiway. It will be designed so that any maintenance required on sections under the pavement will be done from inside the sewer thus overcoming the need to close the runway on this account. The levels of the existing runway were so determined that it could be extended readily by the method proposed.

33. The new sewer will consist of a triple cell box with transitions at either end. As with the existing structure it will be of sufficient capacity for a catchment involving a future population of 1,200,000.

34. Two other alternatives were considered but both would be more costly than the method proposed. One was to lower the sewer, necessitating the construction of a pumping station and the other was to construct a protective structure over the existing sewers. This latter alternative would create serious problems on the grade of the runway.

35. The Metropolitan Water, Sewerage and Drainage Board is in agreement with the proposed adjustment of the sewers and will undertake the work. The cost to the Commonwealth will be of the order of £450,000.

36. General Holmes Drive. General Holmes Drive crosses the proposed extension of the 16/34 runway approximately 500 feet from the end of the existing pavement. At present there are three westbound and two eastbound lanes. It is a busy road and, with the widening of the Cooks River Bridge, the Department of Main Roads is expected to construct a third eastbound lane. It is proposed to construct a tunnel to take the road under the extension of the runway and taxiway.

37. The alternative to this would be to build the road around the edge of the reclaimed area. The estimated cost of this method is \$1,500,000 for a six lane road around the reclamation required for a runway 10,000 feet long, but if the curves were of a larger radius in order to maintain the present speed value of the road the estimated cost would be greater. There is also the immeasurable increased operating cost of vehicles having to travel the additional distance involved.

38. A further factor not to be overlooked is the possibility that the 16/34 runway will ultimately be extended to 10,000 feet. If General Holmes Drive goes under the runway no road work would be involved in any future runway extensions. The only satisfactory way of dealing with General Holmes Drive is to take it through a tunnel under the runway.

39. The tunnel is to be located south of the existing road and clear of it. This will avoid expensive road deviations and minimize disruption to traffic. It will also enable the tunnel to be extended on the same alignment a further 1,000 feet to the east should the need arise in the future, to widen the strip.

40. The tunnel will provide three lanes in each direction and emergency breakdown lanes on the northern and southern sides. The southern breakdown lane will also be used as a walkway.

41. Provision has been made for tunnel lighting, ventilation, carbon dioxide detection and warning lights, fire protection and a fire alarm system.

42. The tunnel will be waterproofed by applying an external bituminous membrane to the floor and walls. Automatic pumps will be installed to control the water table level adjacent to the structure and to clear any water from the tunnel.

43. The top of the tunnel will form part of the runway pavement and will be capable of carrying aircraft of weights up to 600,000 lbs. While the extensions proposed have been designed for aircraft up to 500,000 lbs. it is sensible to give added strength to the tunnel as it would be impracticable to strengthen it after construction.

44. Tunnel walls will be covered with white, glazed ceramic tiles, and the soffits of ceiling beams will have a reflective surface finish

such as epoxy resin concrete paint. This will reduce the amount of artificial lighting required and will permit the employment of mechanical cleaning devices. The concrete roadway will be surfaced with bituminous concrete.

45. Discussions have been held with the Department of Main Roads and general agreement has been reached about the tunnel design. The estimated cost of the tunnel and associated road work is of the order of £1,750,000.

46. Reclamation of Botany Bay. In order to extend the 16/34 runway it is necessary to construct a strip by reclamation into Botany Bay.

47. The sand fill of the reclamation, which will be dredged from Botany Bay, will be protected against wave damage by heavy rock walls. In designing the filled area permissible grade changes on the runway and the possibility of further extension in the future have been taken into consideration. The edge levels have been fixed in relation to the maximum permissible crossfalls, and the need to have the edge of the fill above wave height to avoid damage to the reclamation during storms.

48. In order to accommodate the runway, taxiway and perimeter road, and conform with International Civil Aviation Organization recommendations it is proposed to construct the strip 1238 feet wide.

49. The average depth of water in the area of the reclamation is approximately 17 feet and the bed of the bay consists of a deep layer of sand over a stable clay.

50. The Commonwealth has contributed half the estimated cost of £20,000 required for investigations to assess what effect the reclamation and other work proposed by the State Government in other parts of the Botany Bay will have on sand movement.

51. The Wallingford Hydraulic Research Laboratories have been consulted by the Maritime Services Board of New South Wales. The advice of the Wallingford Laboratories is that, based on their present knowledge and information, there would be no objection to reclamation which would extend the length of the strip to 9,500 feet.

52. To enable equipment for the instrument landing system to be installed the reclamation will need to be 1,500 feet further into

Botany Bay than the end of the runway proper. The antenna needs to be located 1,400 feet from the runway end and the monitor needs to be 1,000 feet from the antenna on the runway side. The 400 feet between the monitor and the runway end will be overrun.

53. To get correct propagation to give direction to incoming aircraft it is necessary to have a clear smooth area of land in front of the antenna and localiser. For this reason the equipment cannot be installed on platforms in the bay.

54. The Botany Municipal Council fears that reclamation for the runway may cause such accretion on the foreshores of Botany Bay adjacent to the Municipality of Botany that drainage lines which discharge in the area may become inoperative.

55. The Council supports the proposed work but considers that if drainage is affected, the responsibility for relieving the condition and extending the drainage works should rest with the Commonwealth. Evidence was given that the Commonwealth has agreed, in principle, to contribute, if necessary to the cost of remedying any adverse effects on the bay and foreshores arising from the reclamation for the airport.

56. The Committee have concluded that the correct way to proceed with the extension of the 16/34 runway at Sydney Airport is to bridge the sewer and general Holmes Drive by the methods proposed ^{and} to reclaim the area required in Botany Bay by sand fill with rock wall protection and we recommend that the extension be provided by these means. Consultation has taken place with the authorities concerned and adequate precautions have been taken and assurances given to protect the interests of those involved.

57. Aerodrome Pavements. Flexible pavements are proposed for the runway extensions and associated taxiways. They will consist of approximately 2 inches of bituminous concrete over 10 inches of fine crushed rock over a crushed stone base course.

58. The runway shoulders will consist of approximately one inch of bituminous concrete over 7 inches of fine crushed rock over a crushed stone base course.

59. The pavements will be designed to carry aircraft with an all up weight of 500,000 lbs. having tyre pressures of 200 lbs. per

square inch. The runway shoulders will be strong enough for heavy road vehicles and would be suitable for emergency use by aircraft.

60. The existing runways are 200 feet wide and the extension is intended to be 150 feet wide with 25 feet shoulders on each side. Runway lighting on the existing part of the runway will be replaced so that the rows of lights will be 150 feet wide over the whole length of the runway.

61. There was objection to this narrower runway on the grounds that the extra width eases the pilot's task in lining up on the runway, particularly after breaking cloud at a very low altitude in conditions of poor visibility.

62. The trend overseas is to construct narrower runways, particularly since the International Civil Aviation Organization has reduced its recommended minimum width to 150 feet. We feel that this decision would not be taken lightly and we believe that the Department of Civil Aviation should continue to be guided by the conclusion of the international body. We therefore agree that a runway width of 150 feet will be adequate.

63. The estimated cost of the pavements proposed, including associated drainage and the construction of a perimeter road is £300,000.

64. Taxiway System. The 16/34 runway is served by a taxiway on the eastern side. At present it provides access to the terminal area in the north east corner of the aerodrome.

65. Proposed development of the airport involves relocation of the terminal area on the north western side of the airport and it is hoped to have the new international terminal in this area by 1968. Development of the airfield will precede this by some 12 to 18 months. Domestic operators are expected to be willing to transfer their activities to the new area by about 1970.

66. The value of taxiways lies in fact that they provide the means for aircraft to vacate runways quickly. If they are not as long as the runways they serve there will be occasions when aircraft will need to taxi on them either after landing or before

taking off. The three consequences of this are that other aircraft could be delayed in landing, a turning circle may be needed at the runway end and additional taxiing time, and therefore cost could be involved.

67. Aircraft having to turn and taxi back along the runway to a taxiway turn off would occupy the runway longer than aircraft with shorter landing distances which would be able to move directly from the runway to the taxiway. The differing times of runway occupancy would impose an additional burden on air traffic controllers whose responsibility it is to clear aircraft for movement to the various holding positions with a high degree of precision.

68. The location of a taxiway is also significant. If aircraft at Sydney Airport were obliged to continue to use the taxiway on the eastern side of the 16/34 runway when the new terminal area comes into operation aircraft would be involved in longer taxiing distances and it would be necessary for them to cross the runway in use to get to the new terminal area.

69. We are satisfied, from evidence tendered, that a new taxiway, which will ultimately connect the new terminal area with the southern end of the 16/34 runway, and on the western side of it, should be constructed.

THE RUNWAY LENGTH PROPOSED

70. Having outlined the major work which is a pre-requisite to the construction of the runway and taxiway and the placing of installations, it is necessary to discuss the runway length required.

71. The work proposed in the reference to the Committee is for the extension of the 16/34 runway from 5,500 feet to 7,500 feet with 400 feet of over-run in addition. The runway and over-run together will give 7,900 feet and this is termed the effective operational length. As such, the extended runway would be 600 feet shorter in effective operational length than the 07/25 runway.

72. For various reasons a number of witnesses urged extension of the runway beyond the length proposed. The suggested length was 8,000 feet and 500 feet of overrun. The representative of the Department of Civil Aviation did not disagree that the runway should be extended to this length but suggested that it might be achieved with less expense by gaining the extra 500 to 600 at the northern end.

73. As already outlined, the reasons for extending the 16/34 runway are to provide a satisfactory alternative to the 07/25 runway when the latter is out of use due to weather conditions or while maintenance is being carried out on it. Extension is also necessary to lower the frequency with which people in the neighbourhood of the airport are subject to the noise generated by aircraft passing overhead.

74. What impressed us most among the arguments used to support extension of the 16/34 runway beyond the effective operational length of 7,900 feet proposed, was the fact that after going to the expense of overcoming the obstacles imposed by the sewer and General Holmes Drive on extending the runway and placing some 4,500,000 cubic yards of fill, the result would be a runway 600 feet shorter than the one for which it is to be the alternative. As such it would not be the preferred runway, would not provide a substitute in all conditions of weather and would not reduce the hardship created by noise to the extent that might be expected.

75. There is general agreement that extension of the 16/34 runway to an effective operational length of 8,500 feet will be necessary. The difference of opinion is whether the additional length should be obtained now by further extension into Botany Bay or whether it can be obtained by diverting or piping the Alexandra Canal and extending to the north.

76. Further extension southwards to give 8,500 feet is estimated to cost an additional £500,000. The cost of extension at the northern end has not been determined and those who favoured

deferment of a recommendation by the Committee at this stage preferred to await the result of investigations to determine the estimated cost.

77. On the other hand those who believed that extension southwards to 8,500 should be recommended laid stress on the fact that, while extension to the north would give additional runway length for take-off into, or landings from, the south, it would be of no benefit for landings from, or take-offs into, the north. This is because obstructions in the approach path to the north prevent the touch down point being moved any further in that direction. With most landings on the 16/34 runway being from the north they took the view that there would be insufficient gain from northern extension of the runway. They were also conscious of objection to the possible encroachment onto land intended for a future metropolitan park.

78. It was moved by Senator Anderson, seconded by Mr. Brimblecombe - that the Committee recommend extension south of the 16/34 runway at Sydney Kingsford Smith Airport but that 500 feet of runway and 100 feet of overrun be added at the southern end at an estimated additional cost of £500,000 to give an effective operational length of 8,500 feet, the taxiway to be extended to serve the additional length.

Debate ensued.

The Committee divided -

Ayes (7)	Noes (2)
Senator Anderson	Mr. Buchanan
Senator Ormonde	Mr. Dean
Senator Prowse	
Mr. Brimblecombe	
Mr. Griffiths	
Mr. McIvor	
Mr. O'Connor	

and so it was resolved in the affirmative.

CONSTRUCTION TIMETABLE

79 Provided work at the Sydney Airport commences before the end of 1963, it should be possible for the runway and taxiway to be in operation by 1967.

ESTIMATES OF COST

90. The estimated cost of the proposed work as referred to the Committee is £4,500,000 made up as follows:-

Aerodrome pavements including perimeter road and drainage	£ 300,000
Crossing of outfall sewer	450,000
Crossing of General Holmes Drive	1,750,000
Reclamation in Botany Bay	<u>2,000,000</u>
	<u>4,500,000</u>

81. The recommendation of the Committee to increase the effective operational length of the 16/34 runway to 8,500 feet instead of 7,900 feet would involve a further £500,000.

82. Whilst the estimated cost is a considered estimate, the cost of dredging is, to a significant degree, dependent on the availability of suitable equipment at the time. With this uncertainty, and the fact that considerable detail has still to be clarified with the State authorities concerned with the sewer and the road tunnel, the final cost could increase by £500,000.

SUMMARY OF RECOMMENDATIONS AND CONCLUSIONS

83. The recommendations and conclusions of the Committee arrived at after studying the evidence submitted are set out below and alongside each is shown the number of the paragraph to which it refers :-

	<u>Paragraph</u>
(1) Increase disturbance to people living in the neighbourhood of the aerodrome due to noise generated by aircraft should be avoided	24
(2) In order to remove limitations on aircraft operations at Sydney airport and to give the runway system more flexibility, the 16/34 runway should be extended	28
(3) Extension of the runway by bridging the sewer and General Holmes Drive and reclaiming the area required in Botany Bay is recommended	56

	<u>Paragraph</u>
(4) A runway width of 150 feet will be adequate	62
(5) The taxiway as proposed on the western side of the 16/34 runway from the south end of it to the new terminal area should be constructed	69
(6) Southern extension of the 16/34 runway, additional to the length proposed, to give 8,000 feet of pave- ment and 500 feet of overrun at an additional estimated cost of £500,000 is recommended	78
(7) The estimated cost of the work as referred to the Committee is £4,500,000	80
(8) The estimated cost of the work recommended by the Committee is £5,000,000	81
(9) The final cost could be £500,000 above the estimate	82

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R. L. Dean.
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Chairman

15 AUG 1963