

1925.



THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

Brought up by Senator Reid

Pursuant to Statute

By Command

In return to Order of

PARLIAMENTARY STANDING COMMITTEE ON
PUBLIC WORKS.

W. Reid
12th June, 1925.

REPORT

TOGETHER WITH

MINUTES OF EVIDENCE

IN RELATION TO THE PROPOSED

ESTABLISHMENT OF ROYAL AUSTRALIAN
AIR FORCE STATION (No. 2),
AT RICHMOND, NEW SOUTH WALES.

Presented pursuant to Statute; ordered to be printed,

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MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

(Fourth Committee.)

The Honorable HENRY GREGORY, M.P., Chairman.

Senate.

Senator John Barnes.†
 Senator Hazel Spencer Foll.†
 Senator Patrick Joseph Lynch.†
 Senator John Newland.†
 Senator William Plain.*
 Senator Matthew Reid.†

House of Representatives.

Arthur Blakely, Esquire, M.P.†
 Robert Cook, Esquire, M.P.†
 David Sydney Jackson, Esquire, M.P.
 George Hugh Mackay, Esquire, M.P.
 James Mathews, Esquire, M.P.

* Ceased to be a Member of the Senate, 30th June, 1923.

† Appointed, 6th July, 1923.

‡ Resigned, 28th June, 1923.

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No. 123, DATED 1ST OCTOBER, 1924.

3. PUBLIC WORKS COMMITTEE—REFERENCE OF WORK—AIR FORCE STATION (No. 2), RICHMOND (N.S.W.).—Mr. Hill (Minister for Works and Railways) moved, pursuant to notice, that, in accordance with the *Commonwealth Public Works Committee Act 1913-1921*, the following work be referred to the Parliamentary Standing Committee on Public Works, for its investigation and report thereon, viz.:—Establishment of the Royal Australian Air Force Station (No. 2) at Richmond, New South Wales.

Mr. Hill having laid on the Table plans, &c., in connexion with the proposed work—

Question—put and passed.

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ESTABLISHMENT OF ROYAL AUSTRALIAN AIR FORCE
STATION AT RICHMOND, NEW SOUTH WALES.

REPORT.

The Parliamentary Standing Committee on Public Works, to which the House of Representatives referred for investigation and report the question of the establishment of Royal Australian Air Force Station (No. 2) at Richmond, New South Wales, has the honour to report as follows:—

INTRODUCTION.

1. The scheme prepared by the Air Board for the aerial defence of Australia includes the establishment of an Air Force Station in the vicinity of Sydney. Richmond has been chosen as the most suitable locality for such a station, which in time of war would be a base for the operation of air units defending the important commercial and strategic centres of the Sydney and Newcastle areas. It is claimed that the advantage of this particular site, apart from its accessibility and suitability for flying purposes, is that, whilst in effective working range of Sydney and within striking distance of Newcastle, it is immune from naval bombardment, and consequent disorganization. It is also within convenient distance of Sydney for the raising and training of personnel in peace time.

PRESENT PROPOSAL.

2. The proposal submitted to the Committee for consideration provides for the establishment over a period of five years of a nucleus of units comprising squadrons for fighting, single seaters for light bombing and for co-operation with military forces, together with a flight for training purposes. The buildings proposed to be proceeded with include wing head-quarters, hangars, stores buildings, cottages, barracks, messing and recreation accommodation for the permanent officers, non-commissioned officers, and men, and hutting, &c., for the Citizen Force trainees. The type of construction suggested is wooden framing and walls, with iron roofs, with the exception of the stores, hangars, and guard-room, which it is asked should be of brick. It is proposed that the existing hangar and workshop shall be repaired and improved, and the officers and caretaker's quarters now occupying another site in the vicinity taken over from the State, removed and re-erected to conform with the general scheme.

ESTIMATED COST.

3. The total estimated cost of the scheme as submitted to the Committee including accessory engineering services, but excluding the cost of acquisition of the property, was set down at £177,400.

COMMITTEE'S INVESTIGATIONS.

4. The Committee is familiar with the lay-out of the Air Force establishment at Point Cook, and has recently made investigations in regard to the proposed establishment of an aircraft depot at Laverton, and consequently is to some extent acquainted with Air Force requirements. An inspection was made of the site at Richmond, and evidence obtained from the Chief of the Air Staff and representative officers of the Royal Australian Air Force, also from the Chief of the General Staff, Australian Military Forces; the Director of Works, Department of Defence; the Chief Architect and the Chief Civil Engineer, Department of Works and Railways; the Works Director for New South Wales; a representative of the Metropolitan Board of Water Supply and Sewerage, Sydney; the Town Clerk, Richmond, and others.

Site.

5. The proposed site is close to the Clarendon Railway Station on the Richmond line, about 40 miles inland from Sydney. The area comprising about 175 acres was originally used by the New South Wales Government for a flying training school, and together with existing hangar, store, workshop, &c., was acquired by the Commonwealth in 1923 at a cost of £9,318.

6. The position of the site, well within effective working range of the area to be defended in case of war, is sufficiently far from the coast to be removed from the possibility of bombardment from the sea. The surrounding country, devoted mainly to agriculture, is reported to be good for flying purposes, and there is plenty of room for expansion in time of war. The rail and road communications are excellent, and it is also within working range of the military training area at Liverpool.

7. On the actual landing ground there are gravel pits and one low-lying portion which will necessitate the expenditure of approximately £1,000 for earthworks. When this is attended to, the Richmond site will provide the only Class I. (800 yards by 800 yards) landing ground in the possession of the Royal Australian Air Force, and will, it is claimed, possess all the attributes that could be desired.

Personnel.

8. It was stated in evidence that the present scheme has in contemplation a personnel of 94 officers, 45 sergeants, flight sergeants, and warrant officers, and 388 corporals and airmen, and that accommodation is to be provided for 42 machines in commission and 21 in reserve. Roughly, one-third of the personnel will be permanent officers and two-thirds members of the Citizen Forces. The permanent accommodation will be for 32 officers, 33 non-commissioned officers, and 160 men. Buildings of a temporary nature will be provided for the Citizen Force personnel, who will be required to complete an annual training period of 25 days, of which 18 days will constitute the continuous training period. Various units of the Citizen Forces will be in residence at different times, and the accommodation to be provided is calculated on the largest number likely to be in residence at any one time.

Buildings.

9. A large number of buildings is required for the Air Force Station, and designs for these have been prepared by the Department of Works and Railways, working in close collaboration with the responsible Defence officers. It was explained in evidence that since the original estimate was submitted the various items had been subject to further scrutiny by officers with local knowledge, and in some cases the estimates had been revised. The description and estimate of cost of each of the buildings proposed are as follow:—

No. 1.—Wing Head-Quarters.

A building 72 feet long by 32 feet wide, timber frame and weatherboard, with wooden floor, corrugated iron roof, 10 feet ceilings, and a 9 ft. 6 in. verandah extending over portion of the front. It will contain rooms for the Wing Commander and his Adjutant, an inquiry room, and rooms for the equipment officer, gunnery officer, and wireless officer, and two rooms for the clerical staff. Estimated cost, £1,850.

No. 2.—Guard-room and Quartermaster's Store.

A brick building, 71 ft. 6 in. long by 34 feet wide. Accommodation includes two detention cells, two rooms for medical officers, telephone and inquiry rooms, and space for fire car, lavatory, &c. The external walls will be 11 inches thick, with reinforced concrete partitions to the cells, but with single board partitions elsewhere. The roof will be of tiles, floor of concrete, and ceilings 10 feet high, with the exception of the ceiling of the guard-room, which will be 13 feet high. Estimated cost, £2,150.

No. 3.—Coal Store.

An unroofed enclosure 50 feet long by 25 feet wide, with concrete floor, reinforced concrete walls, 9 feet high, and three strands of barbed wire on top. Estimated cost, £577.

No. 4.—Garage.

A wooden building 79 feet long by 62 feet wide. The walls and roof will be covered externally with galvanized iron. It will have a concrete floor, and concrete washing areas in front. Estimated cost, £2,300.

No. 5.—General Stores Building.

200 feet long by 120 feet wide, with 11-in. brick external walls, 18-in. brick piers under the roof principals, steel stranchions and beams supporting steel saw-tooth roof trusses, with provision for continuous light. It will have a galvanized corrugated iron roof on wood purlins, and internal partitions of wrought iron piping covered with wire netting, and will contain 24,000 square feet of floor space. Estimated cost, £16,000.

No. 6.

Is an existing hangar taken over with the property from the New South Wales Government. It is proposed to effect certain repairs to this building at an estimated cost of: roof, £98; roof trusses, £432; new roller doors, £776; total, £1,306.

Nos. 7, 8, and 9.

Additional hangars 100 feet by 80 feet, with doors capable of being opened for the full length of 100 feet. They are to be the latest type of hangar, with steel roof trusses, corrugated iron roofs, and brick walls. The floors will be of concrete 6 inches thick. Estimated cost, three at £5,175 each = £15,525.

Nos. 10, 11, 12, and 13.—Huts for Citizen Forces.

101 feet long by 26 feet wide. They are to be of timber and weatherboard construction, galvanized iron roofs, and inside walls and ceilings lined. It is proposed to have one large dormitory 70 feet by 25 feet with a living room and verandah at one end, and lavatory and shower accommodation at the other end. Estimated cost, four at £1,450 each = £5,800.

No. 14.—Permanent Officers' Quarters.

It is proposed to erect this building in two sections, the centre and the right wing now, and the left wing at some future time. The first portion will consist of 14 bedrooms, with billiard room, reading room, and dining room in the main building. The dining room will seat 60. The kitchen will be connected with a covered way. The future left wing will contain an additional 14 bedrooms. Each bedroom is to be a single room 12 feet by 10 feet. The dining room and reading room are to be 24 feet by 20 feet. The building will be of timber and weatherboard construction, with a galvanized corrugated iron roof, and inside walls and ceilings lined. The quartermaster's messroom and messroom for cooks, &c., will be erected as separate buildings on each side of the kitchen block. Estimated cost, £7,700.

No. 15.—Temporary Officers' Quarters.

These are timber frame buildings with fibrous cement slabs, and are now situated on portion of the town common held under permissive occupancy, and will be removed and re-erected. Estimated cost of removing and making good, £1,850.

No. 16.—Batmen's Quarters.

A weatherboard building, 78 feet long by 28 feet wide, with a galvanized iron roof. It is proposed to have these bedrooms 12 ft. 6 in. by 10 feet capable of accommodating two men in each, and to have a front verandah, and lavatory accommodation at each end. Estimated cost, £1,150.

Nos. 17 and 18.

These are latrines to be removed and re-erected at an estimated cost of £175.

Nos. 19, 20, 21, 22.—Quarters for Airmen or Single Mechanics.

These are proposed to be two-storied buildings of timber construction, designed to provide accommodation for 40 men in each building in single rooms 12 feet by 8 feet. Good verandah accommodation and suitable lavatory accommodation on each floor are provided. Estimated cost, four at £4,780 = £19,120.

Nos. 23, 24, 25, 26, 27, and 28.

Are buildings of similar plan whose positions are now indicated, but which it is not proposed to erect until some future time.

No. 29.—Gymnasium.

A timber and weatherboard building 84 feet by 35 feet, with wood floor and galvanized iron roof. The gymnasium hall itself will be 57 feet by 34 ft. 6 in. There will be a stage and dressing room at one end and a cloak room at the other end, with a cinema room overhead. The inside walls and ceiling will be lined. The ceiling will be 14 feet high, the roof being open to the ridges, which will be 23 feet from the ground. Estimated cost, £2,475.

No. 30.—*Recreation Hall.*

Of timber and weatherboard construction, 82 feet by 46 feet, with walls and ceiling lined, and with a galvanized iron roof. There will be a lounge room 40 feet by 25 feet, with billiard room 45 feet by 20 feet at one end, and reading room, library, barber shop, and lavatory at the other end. There will also be a verandah and canteen store, and cloak-rooms on both sides of the lounge room. Estimated cost, £2,850.

No. 31.—*Airmen's Messroom and Kitchen.*

This is proposed to be a single-storied building 76 feet long and 42 feet wide, with two 10 ft. 6 in. verandahs, and is designed to accommodate 256 men. It will be of hard-wood timber construction and galvanized corrugated iron roof. The kitchen will be 65 feet by 40 feet. sculleries, pantry, cooks' lavatories, &c., being provided. Estimated cost, £5,250.

No. 32.—*Sergeants' Mess and Recreation Room.*

Will consist of a main building 33 feet by 25 feet, with a wing on each side 26 ft. 6 in. by 25 feet. Two bedrooms are also provided. Estimated cost, £2,130.

Nos. 33 to 38.—*Married Officers' Quarters.*

These are single-storied timber buildings with galvanized iron roofs and 10 feet ceilings. The accommodation provided consists of one living room, four bedrooms verandah, kitchen, bathroom, lavatory, and wash house. Estimated cost, six at £1,245 = £7,470.

Nos. 39 and 40.—*Quarters for Wing Commander and Station Commander.*

Two single-storied timber residences with galvanized iron roofs and 11 feet ceilings. The accommodation proposed consists of drawing room, dining room, four bedrooms, verandah, kitchen, bathroom, lavatory, wash house, and sleep-out. Estimated cost, two at £1,490 = £2,980.

Nos. 41 to 50.—*Married Non-commissioned Officers' Quarters.*

Ten single-storied timber residences with galvanized iron roofs and 10 feet ceilings. The accommodation proposed consists of one living room, three bedrooms, verandah, bathroom, lavatory, and wash house. Estimated cost, ten at £1,093 = £10,930.

No. 51.—*Oil Store.*

A one-story brick building 17 feet by 12 feet, with 10 ft. 6 in. ceiling and galvanized iron roof. It will have a concrete floor and walls lined with fibrous cement up to the ceiling. Estimated cost, £300.

No. 52.—*Petrol Store.*

A building of two chambers each 20 feet by 12 feet by 10 ft. 6 in. high, with brick walls and iron roof. Estimated cost, £600.

No. 53.—*Bomb Store.*

Size 20 feet by 12 feet, with a gritless concrete floor, brick walls, and double roof. The external roof will be galvanized iron on boarding, and the internal roof of timber lined on the under side with fibrous cement on boarding, and on the upper side with bituminous material. The bituminous roof will be flat and the outer roof pitched. The windows will have steel shutters. Estimated cost, £350.

No. 54.—*Pyrotechnic Store.*

Size 12 feet by 12 feet with a concrete floor, brick walls, and a galvanized iron roof. Estimated cost, £250.

Total Estimated Cost £111,200

10. The Committee, after carefully examining the plans and obtaining the views of the Air Force officers and of the officials of the Department of Works and Railways, is satisfied that an effort has been made to design the required buildings in the most economical way, even to the extent in some instances of sacrificing appearance and comfort. While agreeing generally with the type of plans submitted, the Committee, however, is not favorable to the erection of timber residences in a station of this sort, and strongly recommends that tenders be invited which will enable offers to be submitted in Konka (a composition of pumice and cement made in sheets), or other similar material which, while adding to the appearance, would lessen the cost of maintenance.

11. The Committee is also unanimously of opinion that the two-story barrack buildings proposed should be of brick, with partitions of wood or lath and plaster.

12. In regard to the pyrotechnic and bomb stores, the Committee recommends that these buildings be adequately protected by mounding or otherwise to minimize any possible danger from explosion in these stores.

13. During the course of the inquiry, representations were made on behalf of the Richmond Council that the residential quarters be not established in the position proposed, but to the west of the Commonwealth property and nearer to the town of Richmond. It was pointed out that this site would be about 1 mile 10 chains from the hangar, it would be more conveniently situated as regards water supply and electric light services, would be nearer the school, and would also tend to consolidate the town of Richmond.

14. While admitting that the situation closer to Richmond would provide better social and shopping facilities and in the event of a fire or explosion would involve less risk to the dwellings, representatives of the Air Force argued that the disadvantages of such a location would be considerable. A roadway would have to be constructed to connect the residential site with the aerodrome; it would necessitate additional sewage treatment, and would mean the duplication of water mains, surface drainage, and electric light and power supply. The fire risk would be increased, because the men would be further away from the hangars which at night-time are guarded by four men. In the day-time, only a few cooks and women would be left at the living quarters, so that in the event of a fire there the men would have to be rushed from the aerodrome to the living quarters.

15. Furthermore, the men would have to march between their living quarters and the hangars, a distance of 1 mile 10 chains, four times a day, which would involve some hardship, especially in bad weather, and lead to considerable loss in time.

16. Under these circumstances, the Committee cannot agree with the suggestion made that the location of the residential block be altered.

Engineering Services.

17. In addition to the buildings to be provided, it was ascertained in evidence that a number of engineering services are required. These are:—

Water Supply	£16,400
Sewerage	4,500
Stormwater disposal	2,400
Roads and Footpaths	20,000
Grading, &c.	1,000
Contingencies	700
Electric transmission line, substation and equipment	1,265
Low tension distribution and interior wiring	3,150
Hot water supply to gymnasium, airmen's and sergeants' dining rooms; officers' messrooms and quarters	1,730
Steam cooking plant	1,250
Petrol tank and meter	250
Ice making plant	550
Sprinkler installation	3,460
Additional machinery	450
Total	£57,105

Water Supply.

18. There is only one source from which the Air Force can hope to obtain a satisfactory supply at the present time, and that is the Hawkesbury River. Three schemes have been considered by the Department of Works and Railways for supplying water, viz. :—

- Establishment of independent pumping plant on the Hawkesbury River;
- Tapping into the Hawkesbury Agricultural College supply;
- Extending the Richmond local supply.

The first scheme would be expensive to install, and be a continual charge for maintenance.

The second scheme, it is stated, is not regarded as satisfactory by the College authorities, who will in the near future have to carry out considerable alterations to it, or join the Richmond Council scheme.

The third scheme is said to offer the best solution of the difficulty. The town of Richmond obtains its supply by pumping from the Hawkesbury to a 250,000 gallon reservoir built at a height of 200 feet on a hill on the left bank of the river. From there, a 6-in. pipe main runs into the

town. The supply is not good, however, and the Metropolitan Board of Water Supply and Sewerage recently decided to erect on the border of the town an overhead tank about 70 feet high and of a capacity of 110,000 gallons. Although this would provide sufficient for town requirements, it is not considered that it would be of any benefit to the Air Force Station.

19. It is represented that the best supply for the station would be obtained by enlarging the pipes of the local supply, and the State authorities have agreed to do this if the Commonwealth will contribute to the cost. The proposal under that scheme is to replace the local 6-in. main by an 8-in. main from the reservoir to the town, a distance of approximately 2 miles, and convey the water thence by an exclusive 6-in. pipe for another two miles to the Air Force Station.

Under this scheme, it is claimed that the pressure of water at the buildings will suffice for all domestic and fire purposes. The estimated cost is £16,000.

20. While the question of water supply was being inquired into by the Committee, a proposal was made by the Hawkesbury Agricultural College that they should join in with the Richmond town supply and improve it to the extent that both the College and the Air Force Station could draw off from it. If that were done, it would not make any difference as far as the domestic supply at the Air Force Station is concerned, but in case of fire there would be twice the quantity of water to draw from. This arrangement would make no difference to the cost. The College would have its own independent 6-in. main, and there would be no draw off other than for Air Force Station purposes from their own 6-in. pipe, but it would necessitate the enlargement of the Richmond town main to 10 or 12 inches.

21. After giving the matter careful consideration, the Committee is of opinion that an effort should be made to complete this suggested arrangement, and that a 10 or 12 inch main should be laid for the Richmond town supply from which a 6-in. pipe could be drawn to supply the Air Force Station.

Sewerage.

22. The towns of Richmond and Windsor are under a system of pans and a sewerage scheme does not exist. It is considered, however, that in an establishment such as is contemplated, where men are closely housed, a scheme of sewerage is essential. In this case, the land falls from the building area in a northerly direction towards the Hawkesbury River about 1½ miles away. It is proposed to acquire an additional 5 acres of land across the road from the northern boundary of the site and treat the sewage in a sedimentation tank, and then over aeration beds, and to run the resultant effluent over land which has been ploughed.

23. After hearing the evidence of the Commonwealth engineers, the Acting Chief Engineer of the Water Supply and Sewerage Board, of the Town Clerk, Richmond, and of the local medical officer, the Committee is satisfied that if an additional 5 acres of land be acquired the sewage treatment works as proposed would be satisfactory and unlikely to give any offence or cause any pollution of the Hawkesbury River.

Disposal of Storm-water.

24. The estimate of £2,400 for the disposal of storm-water appears high, but the station has a large area, and there is scarcely any fall in that area.

There is a small ridge running east and west through the site of the buildings, and it is proposed to take all the water on the southern side down to the south towards Windsor-road. The water on the northern side would be taken to the gully which runs across the land towards the river. The storm-water carried to the Windsor-road will run into the culvert across the road on to flat ground, which is Crown land.

In the opinion of the Committee, this will prove a satisfactory arrangement, and is concurred with.

Roads and Footpaths.

25. The amount proposed to be spent on roads and footpaths is high, but experience gained at No. 1 Station has shown that internal roads should be composed of the best material. If of light material, they quickly deteriorate, are a constant source of expense, and during the process of repair lorries become bogged on the deviation, and a considerable number of man-hours are lost before they are again serviceable.

The Committee agrees that provision of suitable well-made roads is true economy.

Electric Power.

26. There is a large electric power plant at Hawkesbury Agricultural College, and it is proposed to obtain power supplies from that source. To avoid the expense of the erection of an independent direct supply line, arrangements are being made with the Windsor Council to take a line off its main in the Windsor-road just below the Commonwealth property.

For this privilege, it is proposed that the Commonwealth shall pay half cost of the interest and sinking fund now paid by the Council for that portion of its main, plus an agreed upon amount to cover leakage.

The arrangement with the Agricultural College is that it will supply current at a flat rate of 3½d. per unit.

These arrangements are considered by the Committee to be satisfactory, and are concurred with.

Fire-fighting Appliances.

27. A system of hydrants is proposed at various points in accordance with a scheme drawn up after consultation with the Chief Officer, Metropolitan Fire Brigades Board, Melbourne.

With the addition of an extra hydrant near the main stores building, this scheme is considered satisfactory, and is agreed to.

28. It is also proposed to install sprinklers in the hangars, work-shops, and the big store at an estimated cost of £3,460. These sprinklers were recommended by the Chief Officer of the Fire Brigades Board, Melbourne, as being in accordance with English practice.

29. It was stated in evidence that unless an improved water supply as projected for Richmond be effected, the water pressure available at the Air Force Station would not be satisfactory for dealing with a large outbreak of fire. The Committee is therefore of opinion that, failing the installation of the larger main proposed, consideration should be given to the necessity for the provision of an overhead tank or booster pump for fire-fighting purposes.

Time for Completion.

30. It was stated in evidence that, assuming funds can be made available, the establishment of the Air Force Station should be completed in three years. At the rate at which funds are being made available, however, the fear was expressed that it would be possibly six years before the works under consideration could be completed.

After hearing all the evidence, the Committee is impressed with the necessity of making early provision for the adequate air defence of the Commonwealth, and is unanimously of opinion that funds should be provided at such a rate as to make it possible to complete this station within three years of date of approval.

SUMMARY OF RECOMMENDATIONS.

31. Briefly summarized, the recommendations of the Committee are as follow.

- (a) That in lieu of stipulating for the erection of timber buildings, tenders should be invited which will enable offers to be submitted in Konka or some similar material (paragraph 10).
- (b) That the two-story barrack buildings proposed should be of brick, with partitions of wood or lath and plaster (paragraph 11).
- (c) That the pyrotechnic and bomb stores should be adequately protected by mounding or otherwise (paragraph 12).
- (d) That an effort should be made to complete the suggested arrangement for the laying of a 10 inch or 12 inch water main to Richmond, from which an exclusive 6-in. pipe could be drawn to supply the Air Force Station (paragraph 21).
- (e) That an additional area of 5 acres be acquired for the purpose of installing sewage treatment works (paragraph 23).
- (f) That an additional fire hydrant should be installed near the main stores building (paragraph 27).
- (g) That failing the installation of the larger water main proposed, consideration should be given to the provision of an overhead tank or booster pump for fire-fighting purposes (paragraph 29).
- (h) That funds should be provided in sufficient sums to enable this station to be completed in three years from date of approval (paragraph 30).

H. GREGORY,
Chairman.

Office of the Parliamentary Standing Committee on Public Works,
Federal Parliament House, Melbourne,
30th March, 1925.

MINUTES OF EVIDENCE.

(Taken at Melbourne.)

THURSDAY, 2ND OCTOBER, 1924.

Present:

Mr. GREGORY, Chairman;

Senator Barnes

Mr. Mackay

Senator Reid

Mr. Mathews.

Mr. Cook

Colonel Thomas Murdoch, Director of Works, Department of Defence, sworn and examined.

1. *To the Chairman.*—In conjunction with the officers of the Air Force I am concerned in the initiation of the scheme for an aircraft dépôt at Richmond; but my responsibility will be chiefly in connexion with the location and character of the buildings. I shall have no responsibility for the general development of the aerodrome. I am carrying out the building designs of the officers of the Air Force. The scheme is in furtherance of the plans to provide for the air defence of the Commonwealth. At present all the units of the Air Force are located in Victoria. It is now proposed to provide accommodation for units in New South Wales. It is essential that such units should be located in the vicinity of Sydney. I do not know what led up to the selection of the Richmond site. Wing-Commander Goble will give evidence regarding that. The site is required to be outside of long-range shell fire from the sea, and also easily accessible to Sydney. The reason for accessibility to Sydney is that the personnel for manning the aerodrome will be mainly members of Citizen Force units recruited from Sydney. The site was used during the war for the purpose of training persons to become air pilots. There is at present a hangar 162 feet by 124 feet, and several other buildings, on the property. The site is eminently suitable for flying operations, and 175 acres, together with buildings thereon, have been acquired for £9,318. The property is 40 miles from Sydney and about 30 miles from Liverpool. It is an advantage to have the aerodrome fairly close to the general training quarters, but not particularly close. A plane could easily cover the distance of 30 miles in half an hour. It was not possible to secure a suitable location nearer Sydney, for the intervening country is very broken. No suitable site is available at Liverpool according to the report of the officers who were sent to make an inspection. The present scheme has in contemplation a personnel of 94 officers, 45 sergeants, and 383 other airmen. Accommodation is to be provided for 42 machines in commission and 21 in reserve. Roughly, one-third of the personnel will be permanent officers and two-thirds members of the Citizen Forces. The site is between Richmond and Windsor, slightly closer to Richmond, and near the railway siding known as the Hawkesbury Racing Club's siding. It is north-west of Sydney and about 30 miles from the sea. The Hawkesbury River runs within half a mile of the property. The existing hangar will require certain improvements. It has very large doors, which will need some attention, but generally speaking it is in fair condition. The erection of three additional hangars, a general store, head-quarters, and accommodation for the permanent personnel on the lines of that provided at Point Cook and Laverton is proposed. It is also proposed to erect sufficient accom-

modation for the largest Citizen Force unit which will need to be housed at the dépôt. Not all the Citizen Force units associated with the dépôt will need to be accommodated at the same time, so the requirements will be met if provision is made for the largest unit. The officers' mess will be accommodated in a building which was erected on land that was originally a common, and outside of the area which we have acquired. The building will be removed to a suitable position on our property. Quarters will be provided for a certain number of married men and a few small buildings will be necessary for the storage of ammunition and dangerous material such as fares. Eventually we shall have to construct a road from the south-eastern corner of the space reserved for buildings to the main Richmond-Windsor road, to replace the present dirt track. The railway line runs just inside of the Windsor road. It is not proposed to construct a siding on the property. The nearest available siding is on the south-east corner of the land, about half a mile from the buildings. It is proposed that the main roads of the dépôt shall be constructed of concrete and the other roads of bitumen. Personally, I consider that all the roads should be of bitumen, for the roads from Sydney to the property are bitumen. The water supply will be provided from the Hawkesbury River, which runs within half a mile of the property, on the north side. Richmond and Windsor both draw their water supply from the river; but, unfortunately, their pressure is not sufficient for our purposes. At any rate, if we availed ourselves of their supply we should have to install some booster pumps for fire protection. The water supply investigations are not yet complete. An officer of the Works and Railways Department is now visiting Richmond to make inquiries as to whether, by putting a pump on the river, we can provide for our needs by pumping to an elevated reservoir which would permit the water to gravitate to the aerodrome, or whether we shall have to provide an elevated tank at the aerodrome and a booster pump for fire protection. No watershed has been reserved, but as Richmond (which is above the aerodrome) and Windsor (which is below it) both draw their supplies from the Hawkesbury, there is apparently nothing objectionable in this source of supply. It is a very old settled district, and settlement is not likely to increase very much, so that there should be no danger of contamination, although it may be necessary at a later period to install filter beds. Windsor and Richmond must have a satisfactory water supply, and if in the future it is necessary to provide that supply by means of a pipe line from the Sydney supply, we shall be able to draw upon that service. The pipe line must pass the aerodrome. Drainage from the aerodrome can be easily provided for across low ground to the north. There will be no possibility of the drainage affecting our water supply. A septic tank system will be installed. The effluent will be innocuous on leaving the tank, and it will have to go a considerable distance before it reaches the river. The hangars will be built of brick, with galvanized iron roofs, steel trusses, and concrete floors. The store and garage will be of the same class of construction. The other buildings will be of wood. They will be exactly similar to the buildings at Point Cook and Laverton. Provision will be made for 42 machines in commission and 21 in reserve.

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Portion of the big hangar already on the ground will be used as workshops. It will take at least two years to complete the first section from the time of commencing operations. The site comprises 176 acres, and together with the buildings I have mentioned, was acquired from the State at a cost of £9,318. The Works and Railways Department will call for tenders and supervise the work of construction. The site is rather far out from Sydney, but otherwise it has no disadvantages. The railway is handy, and good roads are available; but as the journey from Sydney takes two hours, the Citizen Force officers will be obliged to attend short week-end camps instead of half-day parades. A survey of the country has been made, and this was found to be the only suitable site. It will be handy to both Sydney and Newcastle. In all probability other stations will be required. An electric power main from the Hawkesbury Agricultural College, which passes the south-east corner of the area, will provide us with all the power we require. We do not need a gas supply.

2. *To Senator Reid.*—The buildings already on the site are in good order except the doors. Most of the machines will come from Spotswood, where they are now stored. They are portion of the British Government's gift. Accommodation for seaplanes will be provided at Rushcutters Bay. A site on the Hawkesbury, near Richmond, would not be convenient for seaplanes. It is proposed to pump water from the Hawkesbury to a cliff 200 feet high, on the other side of the river, and then gravitate it to the aerodrome with sufficient head, for fire protection. We may find it necessary to acquire a drainage easement over some private property to the north. Some of the buildings will be two-story, as at Laverton.

3. *To Senator Barnes.*—The 388 men to be provided for at the dépôt will be mostly mechanics. Of this number 161 will be permanently stationed at the aerodrome. The balance of 227 will be Citizen Force men. A flying corps is different from an infantry corps. An officer of an infantry corps will supervise many men, but in a flying corps all the pilots are officers. That is why there will be 90 officers and 45 sergeants to 388 men at the aerodrome. Some of the officers are not pilots—they are quartermasters or ordnance officers. The mechanics are not expected to fly machines, but they may accompany officers or pilots during flights.

4. *To Mr. Mackay.*—The area acquired will be sufficient for our purposes. It is larger than the area at Laverton. The latter comprises 160 acres. Farm land surrounds the area at Richmond except on the south-east corner, where the Hawkesbury race-course is situated. The ground to the south is rather swampy, while to the north it is undulating and somewhat uneven. Very few race meetings are held on the race-course, and as there are no training tracks there, no objection can arise from that direction. The ground is now fenced except on the west. The soil is dry red loam, almost sandy. It will not be expensive to construct roads except around the store buildings and workshop. Hard roads covered with bitumen will be quite good enough for our requirements. A permanent staff will comprise 32 officers, 33 sergeants, and 161 men. The Citizen Force units will not be all in camp at the aerodrome at once. They will come in by sections. Some of the men permanently employed look after the stores.

5. *To the Chairman.*—I am satisfied that no question will arise in a few years' time as to the suitability of the site, but I am not satisfied that a very complete examination has been made to find a more suitable site. A distance of ten miles is neither here nor there from an air force point of view. It is only a matter of a few minutes by an aeroplane. I am satisfied that there is no more suitable site within any appreciable distance nearer Sydney. There are no heavy storms peculiar to that district.

(Taken at Melbourne.)

MONDAY, 6th OCTOBER, 1924.

Present:

Mr. GEORGE, Chairman;

Senator Barnes Mr. Mackay
Senator Reid Mr. Mathews.
Mr. Jackson

Wing-Commander Stanley James Goble, O.B.E., D.S.O., D.S.C., Chief of Air Staff, sworn and examined.

6. *To the Chairman.*—The scheme for the establishment of an Air Force station in New South Wales was originally drafted by Wing-Commander Williams, who is now in England. For the proposal now before the Committee I am responsible. It has been approved by the Air Council, of which the Chief of the Naval Staff and the Chief of the General Staff are members. The usual procedure is for a proposal that has been approved by the Air Council to pass through the Council of Defence to the Minister for Defence. I cannot say of my own knowledge that this project has been approved in detail by the Council of Defence, but as that body has agreed to the allocation of money for the Air Force, including the proposed units in New South Wales, and as the Richmond site was purchased twelve months ago with the approval of Cabinet, it is obvious that the general principles of the scheme have received the necessary approval. The rôle of the Air Force in time of war may be considered as follows:—(1) Defence against aerial attack; (2) defence against overseas invasion and the protection of maritime commerce and coastal defence; and (3) the auxiliary task of co-operating with the Naval and Military Forces. The latter named is one of its most important functions. Sydney, as the commercial and probably most important strategic centre of the Commonwealth, must necessarily be defended. Efficient defence depends on the combined efforts of the Naval, Military, and Air Forces. We must now carry out the duties referred to in the preceding paragraph with reference to the defence of Sydney. Considering the primary rôle of the Air Force in war, the surest defence against aerial attack is an active aerial offensive, and, as Sydney will in time of war be subject to aerial attack, we must have the means of meeting that attack. To do that it is necessary to establish an Air Force station within effective working range of Sydney, and from which the requisite fighting aircraft necessary for obtaining aerial supremacy can operate. Thus, fighting aircraft which will seek out and destroy the enemy's aircraft and a base from which these aircraft can operate are essential. In the case of an island country like Australia, attack must come from the sea, and will be directed against that area where attack will result in the greatest amount of danger and dislocation to the national life of the country, i.e., against the commercial centre of the Commonwealth, which is Sydney. Aerial defence against attack and invasion from the sea is twofold. The Air Forces may be required to assist the other services in coast defence, or they may be called upon for independent action. The power of the aerial bomb and torpedo against lightly protected or unprotected vessels should, if suitably applied, enable the Air Force to provide considerable protection from sea-borne invasion. In the case of disembarking troops, machine-gun fire from the air constitutes an additional weapon. However, in order that aircraft can carry out this work, a suitable base within effective range of the operations is essential. In the protection of maritime commerce also the Air Force can play a considerable part. Although hoists, landplanes can, nevertheless, render a considerable amount of protection to shipping in a coastal area by attacking enemy vessels, surface and submarine, that

attempt to interfere with our shipping. The vicinity of Sydney, the commercial centre of the Commonwealth, is the most important focal area of the continent, and to carry out the protective duties indicated it is necessary to establish a suitable base within effective working range of the area of operations, i.e., the focal area near Sydney. We have still to consider the auxiliary task of co-operating with the Naval and Military Forces, the first of which does not concern the matter at present under consideration. Air Force co-operation with the Military Forces may be considered in relation to coast defences and in relation to the field army. At present, the coast defences of the Commonwealth, comprising certain defended ports, depend mainly on long-range guns, which, to be effective, require aircraft to observe the fall of shot and for range finding. Sydney is one of the defended ports, and, therefore, requires within effective working range an Air Force base from which co-operating aircraft can work in war, and from which they can carry out co-operative exercises in peace time. Intimate aerial co-operation is an essential need in the operations and in the training of any Military Force. Co-operating Air Forces are essential to the Military Forces for observation and reconnaissance work, and for assistance in actual battle. A large portion of the Commonwealth Military Forces will, in time of war, be allocated for the defence of the Sydney district. This makes it necessary to establish an Air Force base and Air Force units in a locality where, in time of war, they can operate in co-operation with these Military Forces, and, in time of peace, carry out exercises with them when undergoing annual training in their training camps in the Liverpool area. Due consideration of the rôle of the Air Force in time of war and the nature of its work as outlined above has led to the selection of a site at Richmond which, while being within effective working range of the area to be defended, is also sufficiently far from the sea coast to be removed from the possibility of bombardment from the sea and the subsequent disorganization resulting therefrom. The Richmond site also has the advantages that the ground and surrounding country are excellent from a flying point of view, that there is plenty of room for expansion in time of war, that the rail and road communications are excellent, and that it is within working range of the military training area at Liverpool. A still further advantage of this site is that it is within effective striking distance of the Newcastle area, which is a commercial and strategic centre, second in importance only to Sydney. Thus it is a suitable base from which striking aircraft can operate to a certain extent in the defence of the Newcastle area until such time as it is possible to establish an Air Force station in that district for its defence. Following on the selection of a suitable site it is necessary to decide on the units which should be established there. Consideration of the primary rôle of the Air Force in war makes necessary the provision of the single-seater fighter squadrons, while the secondary and auxiliary tasks make necessary the provision of bombing squadrons and army co-operation squadrons respectively. The Air Board has prepared a scheme for the air defence of the Commonwealth, and the formation of the various units in this scheme is spread over a period of seven years.—(Details explained to Committee by witness.)—Limitation of funds, however, makes it unlikely that this scheme will be carried into effect for some considerable time, and so the Air Board has further considered the matter, and prepared a second scheme, based on a period of five years, which will form a foundation upon which to build, and yet provide a proportion of all the types of units already shown to be necessary for effective air defence.—(Details explained to Committee by witness.)—The necessity for the formation of Air Force units for the air defence of Sydney and the surrounding district has been realized by the Air Board since its formation in November, 1920, but lack

of funds has made it impossible to form any new units. At the time of the formation of the Air Board there existed only a Flying Training School, situated at Point Cook, in Victoria, and no units have been formed since. Thus the whole of the Air Force—a training unit—is at present situated in Victoria. The defence policy of the Commonwealth involves the raising and training of Citizen Forces, comprising personnel obtained by voluntary enlistment and personnel subject to training under Part XII. of the Defence Act. This policy applies to the Air Force, and all the Air Force units mentioned above will consist of a permanent nucleus equal to about one-third of the total strength, the remaining two-thirds being Citizen Force personnel. Therefore, for the purpose of training the Citizen Force personnel in time of peace it is necessary that these units should be located on a station, which, like Richmond, is easy of access from Sydney, from which district will come the majority of the necessary personnel. Citizen Force personnel will be required to complete an annual training period of 25 days, of which eighteen days will constitute a continuous training period. In addition, arrangements will be made for them to further their training by voluntary work, and it is estimated that the majority of the Citizen Force personnel will avail themselves of this opportunity to a considerable extent. The Citizen Force Units will also provide the means whereby reserve personnel consisting of ex-members of the Australian Flying Corps and the Royal Air Force may be given such training as will keep them in touch with Air Force service conditions and training. The Citizen Force and reserve training indicated above should be considered as a commencement only. From the results achieved in the first year it will be possible to draw up a scheme whereby the maximum output may be obtained from the units employing Citizen Force personnel. The total personnel will be 94 officers, 45 sergeants, flight sergeants, and warrant officers, and 388 corporals and airmen. From a flying point of view, the site is excellent. We regard Richmond as one of the best aerodrome areas in Australia. It is a little far from Sydney, but there is no other place nearer Sydney that would do any use. We might have considered Liverpool but for the heavy expenditure that would have been involved in clearing the ground of trees, and the cost of building there. At Richmond we take over from the New South Wales Government one good hangar, as well as huts and cottages for the men, and the ground is in excellent condition. Citizen Force trainees will be obliged to travel to Richmond by train, a journey of 14 hours, but the train service will be quite satisfactory. The only other place suitable for an aerodrome near Sydney is at Mascot, on the shores of Botany Bay, but that is a factory area and not at all suitable for training purposes. In addition, there would be danger of bombardment by a hostile fleet. There is little probability of trouble at Richmond from cyclonic disturbances. The civil engineering services will probably cost £45,000. The water supply is not suitable, the pressure being insufficient to provide a safe margin for fire prevention. The only possible objection to the site is its distance from Sydney, but there is no other suitable area available. Electric light and power will be obtained from the Hawkesbury College. We have a contract with the Vacuum Oil Company for the supply of petrol in bulk from Sydney. All our aircraft supplies and accessories are at Laverton, but we shall stock spare parts at Richmond. Laverton will be the main store. In the lay-out we have allowed for the development of an aircraft dépôt in the event of hostilities necessitating an extension. The proposal is to build three hangars and a guard-room in brick, the coal house in concrete, and the rest of the buildings in wood. We hope to have the necessary accommodation for the army co-operation squadron available by the end of the present

financial year, for the light bombing squadron at the close of the next financial year, and for a single-seater fighter squadron at the end of the third financial year. Much will depend upon progress made by the Works and Railways Department. Assuming that funds are made available, the scheme should be completed within three years. I understand that it has been decided to erect certain of the buildings in wood because brick construction is too costly. That has been our experience at Point Cook. The scheme is estimated to cost £182,376, made up as follows:—Buildings, £125,267; civil engineering services, £45,000; electrical services, £9,959; mechanical engineering services, £6,150. We have most of the necessary plant already, but may have to obtain a certain amount of machinery and furniture costing probably another £5,000. At the most, the scheme should not cost more than £200,000. Plans for the various buildings have been prepared.

7. *To Mr. Mathews.*—We do not anticipate any difficulty in obtaining trainees from the Citizen Forces. As a matter of fact, we are inundated with applications, and do not expect it will be necessary to apply the compulsory provisions of the Defence Act to the Air Force in order to secure trainees.

8. *To Mr. Mackay.* The permanent accommodation will be for 32 officers, 33 N.C.O.'s, and 160 men. The Citizen Force trainees will be housed in buildings of a temporary nature. They will put in eighteen days' continuous training, and, owing to the distance from Sydney, seven full-day parades instead of half-day parades. There will be ample opportunity for attending further voluntary parades if they wish to do so. Those who come from Sydney will leave by the 5.55 a.m. train, arriving at Richmond at 10.35. On the return journey they will leave at 4.20 p.m., and reach Sydney at 6.10 p.m.

9. *To Mr. Mathews.*—The township of Richmond is only 1 mile distant from the aerodrome site, and Clarendon, a smaller place, is about a quarter of a mile away. We shall use the Richmond station for goods traffic, and Clarendon for the personnel.

10. *To Senator Reid.*—Richmond is only about twenty minutes by air from Sydney. It is probable that the majority of the Citizen Force trainees will come from Sydney. All classes of trainees will be required—pilots, observers, wireless operators, gunnery officers, mechanics, &c. We shall engage as fitters men who were in the Australian flying corps during the war. They are up to date technically. We would employ also younger men who are serving, or have just completed, their apprenticeship, and are eligible under this scheme. The 25 days of training annually will not make the Citizen Forces as efficient as the permanent men, but they will receive a good grounding and attain a big potential value. In fact, they will have the same value when required for active service as have the Citizen Military Forces. I remind you that of the 500 men who form the establishment at Richmond, only about 80 will fly. The majority of the others will be ground staff, engaged in attending to the engines and machines, barracks, stores, &c.; some of them may occasionally fly as passengers only. There are no engineering difficulties in the Richmond site, but the necessity for providing our own water supply will substantially increase the cost. Laverton will continue to be the warehouse of the Air Force, and Richmond will carry just sufficient stores to supply its current requirements, although eventually, if a big force is established at Richmond, it will be necessary to install a depot there. A complete scheme for the air defence of Australia has been drawn up, and a secret report on the subject was approved by the Air Council in 1920, and submitted to the Minister for Defence. The Government agreed that the scheme was necessary, but said

that it could not be carried out owing to the lack of funds. For the time being, therefore, attention is being concentrated on Sydney, which is the strategic and commercial centre of the Commonwealth, and on Melbourne, which is the main training area.

11. *To the Chairman.*—Stores of aviation material will be essential at Richmond. We must have special racks for storing the engines and planes. Certain classes of stores will be obtained through the ordnance branch of the Defence Department. The accommodation required for their storage at Richmond will be very small. The compulsory provisions of the Defence Act apply to the Air Force as they do to the Army. I do not think that we would ever have any difficulty in getting sufficient volunteers of suitable type for the air service, but, of course, if voluntary enlistments did not meet requirements we should have to apply compulsion. The Richmond area is unsuitable for seaplanes, but we hope to proceed shortly with the establishment at Rushcutters Bay, Sydney, of one hangar to accommodate six seaplanes. That is the most suitable site for a seaplane flight in the Sydney area.

12. *To Mr. Mathews.* The railway service from Sydney to Richmond is quite adequate for our purposes. The journey occupies one and three-quarter hours, and there are six trains daily each way on week days, and eight on Saturdays.

(Taken at Melbourne.)

TUESDAY, 7th OCTOBER, 1924.

Present:

Mr. GRAYSON, Chairman;

Senator Barnes	Mr. Jackson
Senator Reid	Mr. Mackay
Mr. Cook	Mr. Mathews.

Lieutenant-General Sir Henry Geo. Chauvel, G.C.M.G., K.C.B., Chief of General Staff, Australian Military Forces, Melbourne, sworn and examined.

13. *To the Chairman.*—I understand the committee is considering the establishment of an Air Force station at Richmond, in New South Wales, for defence purposes, and is anxious to ascertain the procedure adopted by the Defence Department in connexion with such proposals, particularly as to whether this is part of a scheme for the general defence of Australia. In each branch of the defence service a programme has been prepared to cover a period of years, and it has been decided in a general way by the Council of Defence the various stages to be reached within five years. A part of the programme of the Air Force is the establishment of an aircraft station at Richmond, in New South Wales. Before a new proposal affecting the Air Service is submitted to Parliament it is first considered by the Air Council, and then by the Council of Defence. This consideration does not descend to details, but the general expenditure to be incurred in each branch is reviewed, having in view the amount to be allotted, and also the stage of development which it is intended to reach. I have no recollection of the total amount involved in connexion with the construction of an aerodrome at Richmond coming before the Council of Defence, although in making recommendations it should have in mind the approximate cost of any proposed work. The Council of Defence was aware of the amount to be allotted to the Air Force over a period of five years, and considered its programme and the estimated amount to be available each year for the three branches of the service. Upon this information a defence programme has been formulated, but it is

not known whether a similar amount will be available each year. I understand the estimated cost of the work in this instance is £182,300. Approximate estimates of the cost of the proposals submitted to the Council of Defence have been considered in dealing with a five years' programme. For instance, the military department suggested that it should have £500,000 upon which to build up its programme, but it received only £300,000. An amount, which I cannot at the moment remember, was also allotted to the Air Force. The Council of Defence approved of the five years' programme of the Air Force on the figures submitted, but the estimates were later reduced. The approval still holds, but the Air Force will have to prepare a new programme. We still intend to adhere to our programme as a guide, but everything depends upon the amount of money allotted by Parliament. The proposal has been approved of by the Council of Defence. I am not acquainted with the details, for I leave them to the Air Board. From the point of view of the defence of Australia, the proposal meets with my approval. The sooner the work is proceeded with the better. I have not been in Richmond for about twenty years, but I know the strategic location of the site, and regard it as entirely satisfactory. It fits in with our defence requirements, except that sooner or later we must have a subsidiary base nearer to Newcastle. Richmond is satisfactory for the defence of Sydney, or for any activities near Sydney, but it is a trifle too far away from Newcastle. I am perfectly satisfied that it is the place we can get for the purpose of defending Sydney and, at a pinch, Newcastle. It is very difficult to say whether the defence of Sydney or of Newcastle is the more important. As a soldier, I should say that Newcastle is more vulnerable than Sydney. If an enemy got to Newcastle, it would dislocate all our industries, and the effect would be about as bad as an enemy getting to Sydney. The two arguments on both sides of this question. Richmond is about 40 miles from Sydney, and approximately 80 miles from Newcastle. It is near enough to Newcastle to admit of the fairly efficient protection of that city. I should not prefer an establishment nearer to the sea. It is unsound to have what will be our main aircraft depot in New South Wales within easy bombing distance of the sea. One of the reasons why we selected Richmond was that it is a reasonable distance from the sea. The distance will not interfere with the training of cadets. I have seen the railway time-table, and the trains seem to fit in very well for the citizen personnel training at Richmond. I can find no disadvantage in the location of the site, except that it is a little too far from Newcastle. I should not think that within a few years' time the site will be said to be unsuitable. I cannot think of a better site for the protection of both Sydney and Newcastle. I cannot say, without inspecting the site, whether it will admit of the development necessary to complete the defence scheme; but from information I have gathered, I am satisfied that there is room for considerable expansion. My position in relation to the Air Force is somewhat difficult. Apart from being a member of the Air Council, I have no control over the Air Force. I have never inspected any of their sites or works, except by courteous invitation. I have not pushed myself forward in that matter. I have no authority over them. The Navy, the Military, and the Air Force are three distinct organizations. That, in my opinion, is not a wise arrangement. The Air Force should be attached either to the Navy or the Military. A certain number of seaplanes will always be required with the Navy, but that could easily be adjusted. It was quite easily arranged during the war. A certain number of personnel was allotted for duty with the Navy, and during the war arrangements worked out efficiently. In Great Britain the Air Force is a separate force. I am not quite certain about France, but I think the Air Force there is still under the control of the military. Under the present rules, the Air Force in Australia would be distinct from the military, even in war time. I assume that a certain number of squad-

rons would be allotted to the Army, and a certain number to the Navy, and that they would work under the commander of the forces to which they were attached. This would permit of effective co-operation in war time. In peace time the Military and the Air Force are quite independent, and the military commanders have not much opportunity of knowing the state of efficiency of the Air Force. I am somewhat hampered in answering these questions by a knowledge that my statements will be published in the public press. We have a three years' programme, and during that time it is not proposed to extend the Air Force establishment beyond the two states of New South Wales and Victoria. The five years' programme has been entailed because it involved too much expenditure; only three years' expenditure is now shown. There will, of course, be expansion to the other states later. It is not probable that in the near future an auxiliary air station will be recommended near Newcastle. The general officer in charge of troops operating for the defence of Newcastle would be, as a matter of expediency, rather far away from an aerodrome at Richmond, but a temporary landing ground not far from Newcastle could easily be arranged. The aerodrome will be equipped with wireless. I have recollections of operating with an air force where the squadron location was some distance away, and although a distance of 80 miles sounds all right in theory, in practice it is necessary to have a temporary landing ground where instructions can be given to the airman. When I say that Richmond is a little too far away, I do not wish the committee to think that I am recommending further extension to Newcastle. All that is necessary at Newcastle can be improvised at the time. I do not know what equipment already exists at Richmond.

14. *To Mr. Cook.*—Representatives of the Navy, the Military, and the Air Force confer together on the Air Council. The First Naval Member and the Chief of the General Staff are members of the Air Council. Thus a conference happens in the Air Council, and later on in the Council of Defence. Matters relating to the location of sites, the construction of buildings, and activities generally are discussed in conference. Although there are three distinct arms of defence, representatives of them come together when questions involving large expenditure have to be considered. The Air Council will approve of such an important thing as a site for an aerodrome or an aircraft depot. Originally the Air Board recommended the site, and the Air Council, and I think also the Council of Defence, approved of it. It will be necessary to have a railway siding at the depot. Provision for the defence of Australia is not proceeding rapidly enough, and it should be speeded up. We are very far behind. My opinion in this regard is shared generally by the defence authorities. Speeding up would involve more expenditure.

15. *To Senator Reid.*—There are two naval representatives on the Council of Defence, which also includes two members of the Air Council. The Council of Defence reviews generally the defence of the Commonwealth. It has to do with the estimates of expenditure for each year. It receives estimates from the Council of Defence, and the Air Force, and is cognizant of the requirements of each of them. We are never sure of the amount of money that will be provided each year for defence. That is a very unsatisfactory feature, and it makes it impossible for us to construct a workable programme. All three branches of the service suffer equally in this respect. The meetings of the Council of Defence are secret. The main aircraft depot must be at Laverton, where up to the present next to nothing has been done. Proposals for expenditure on air defence are limited at the moment to Point Cook, Laverton, and Richmond. There is no general scheme for extending air defence to other states; funds will not permit of that.

16. *To the Chairman.*—The recommendations of the Air Council are submitted to the Minister for Defence.

The Minister is President of the Council. There is not at the moment any proposal for the defence of Western Australia. If money enough is available for the works at Laverton and Richmond to proceed concurrently, so much the better, but it is essential that the Laverton dépot should be established.

THURSDAY 9th OCTOBER, 1924.

Present:

Mr. GREGORY, Chairman;

Senator Barnes	Mr. Jackson
Senator Reid	Mr. Mackay.
Mr. Cook	

Squadron-Leader Percival Alexander McEain, Director of Equipment, Royal Australian Air Force, sworn and examined.

17. To the Chairman.—I am responsible for the equipping and the supply of stores to the units of the Royal Australian Air Force when formed. In connexion with the building of an air station it is necessary for me to see that provision is made for workshops and stores buildings. The control of the workshops is within my purview. I was associated with the equipment of the aircraft dépot at Point Cook. The establishment of an air station at Richmond, New South Wales, necessitates arrangements being made for the supply of initial, mobilization, and maintenance equipment for the units. The proposal before the committee at present deals with buildings for three squadrons—a wing head-quarters, stores park, and training flight—but it is anticipated that in the future, and more particularly in time of war, a larger number of units will be located at Richmond than those provided for in the proposal now under consideration. The arrangements for the supply of equipment have, therefore, been provided under three headings—

(a) Immediate programme—

- (1) Initial equipment.
- (2) Maintenance equipment.

(b) Ultimate programme.

(c) Mobilization equipment.

(a) Immediate Programme.

(1) Initial Equipment.—Sufficient aircraft, aero engines, and mechanical transport is now available from Royal Australian Air Force stocks to provide the initial equipment of the first unit that will be formed at Richmond, i.e., Army Co-operation Squadron. The aircraft will be reconditioned by commercial firms during this financial year (tenders have already been invited), and will be available for the initial equipment of the unit at Richmond when the buildings are ready for occupation. Many items of spare parts and smaller items of equipment will be required to be purchased, but these will not involve any large expenditure, and will be purchased in the normal way of replenishment of Royal Australian Air Force stocks. The establishment of aircraft for the initial equipment of this unit is twice machines.

(2) Maintenance Equipment.—The stores for the maintenance of the aircraft and other equipment required for this unit will be issued from Royal Australian Air Force stocks where supply cannot be effected by local purchase in New South Wales. Where purchase in New South Wales can be effected, the stores in question will be purchased through the Defence Contracts Board. An officer of the Royal Australian Air Force will be a member of the District Contracts Board. No large amount of money is required for these purchases, as the unit will only exist for a portion of the present financial year.

(b) Ultimate Programme.

In drawing up the programme of development it is essential that consideration be given to what may be considered to be the ultimate programme to be reached on the site. Richmond, by virtue of its location, its distance from the sea, and proximity to the railway, make it a suitable place for the provision of an Air Force stores and repair dépot, which will supply the requirements of all the units in New South Wales. Provision has, therefore, been made for such possible expansion in New South Wales, and the provision of an aircraft dépot capable of dealing with the supply and repair of equipment.

(c) Mobilization Equipment.

It is essential that all units of the Royal Australian Air Force be self-contained and capable of immediate mobilization. It is desirable, therefore, that provision be made for the storage of the mobilization equipment of the unit. In this proposal no special mobilization stores are provided. Owing to the nature of stores held by the Royal Australian Air Force and the fact that they should be continually "turned over" to avoid depreciation, it is considered that until units become numerous, mobilization stores should be held with the unit. Provision has, therefore, been made for a large store building, which will hold a reserve of equipment and stores over and above the initial issue provided in (a) for the immediate equipment of the unit. Until the units in New South Wales reach at least six units, it is not considered desirable to separate mobilization stores from the units; but should the number of units be increased to over six, it is considered desirable that a mobilization store be provided in a suitable place to deal with mobilization equipment only. This mobilization store may be eventually located at the aircraft dépot, provision for which is made in the expansion programme of the ultimate programme referred to in this memorandum under paragraph (b).

2. Repairs, Overhauls, &c.—Normally only minor repairs and overhauls are carried out by Air Force squadrons, but owing to the fact that an aircraft dépot or aircraft park does not at present exist in New South Wales, it will be necessary for the units located at Richmond to carry out, within limits, their own repairs and overhauls. It is laid down as a principle that all complete overhauls of aircraft, aero engines, &c., be carried out by an aircraft dépot or aircraft park, but it is proposed to adopt the following procedure in the case of the units situated at Richmond:—

(i) All repairs, overhauls, &c., other than time overhauls and rebuilding of crashed machines (which involve complete stripping of all parts) will be carried out by unit workshops situated at Richmond.

(ii) All time overhauls and rebuilding of crashed machines will be carried out either by—

(a) Commercial firms, or

(b) No. 1, Aircraft Dépot, in Victoria.

Sufficient machinery will, therefore, be necessary at Richmond to allow of normal repairs and overhauls being effected. When the ultimate programme is reached, and an aircraft park or aircraft dépot in New South Wales is in existence, all such repairs and overhauls, including time overhauls and rebuilding of crashed machines, will be carried out by the aircraft dépot or aircraft park in question.

3. In the ultimate programme referred to in paragraph 1 above, the aircraft dépot was referred to. This will be essential to carry out the major repairs and overhauls and the rebuilding of crashed machines, and also to effect the supply to units of the various items of maintenance equipment, and, further, if considered desirable, to house the mobilization equipment for units. The experimental section at Randwick, the proposed seaplane unit at Russhatters Bay, and the proposed Army co-operation squadron at Richmond will provide sufficient work for the nucleus of an aircraft

dépot. It is, therefore, proposed to provide in the beginning an aircraft park, which in fact is really a small aircraft dépot, provision to be made for expansion in time of war. The aircraft dépot which is being built at Laverton, Victoria, will be sufficient to provide for the requirements of units situated in Victoria and the establishment of units in New South Wales in peace time, and the possible provision of units in New South Wales in time of war, makes it essential that a large organization, capable of dealing with large repairs and overhauls, be available within that state. The requirements of an aircraft dépot were placed before your committee when the proposal to establish an aircraft dépot at Laverton, Victoria, was considered. It is essential to have stores at Richmond to supply requirements for repairs; and it will not be economical to have stores at the Defence Department Ordnance Store in Sydney, with the exception of items such as barrack furniture, &c. R.A.A.F. stores could not be stored at Sydney unless the ordnance stores there were extended, as I understand the Leichhardt Ordnance Stores in New South Wales are fully taxed. The Army does not carry stocks of food in New South Wales. The buildings at Richmond will be occupied practically all the year round by different sections of Citizen Forces. With the exception of a few items, we shall be unable to work on Army stocks. At least 90 per cent. of the stores we require are totally different from Army stores. R.A.A.F. stores are more or less technical—quite different from Army stores. Likewise, naval stores are different from those of the R.A.A.F. We could not use naval stores except those that are common to both departments. The size of the store-room suggested for Richmond is 200 feet by 120 feet. The height to the eaves is 16 feet. That is the main technical store for Richmond. Then there is a small quartermaster's store near the barracks for the issue of such items as bedding, which is occasionally being taken over. That store is 50 feet by 20 feet. The third store is the explosive store. The main store will hold the immediate reserve on the station. During the early part of the war the New South Wales Government carried out training apart from the activities of the Commonwealth Government, and a limited number of pupils was trained. There is at present one hangar at Richmond, which was bought from the New South Wales Government. We propose in the initial stage to have an army co-operation squadron, consisting of twelve machines in use and six machines in immediate reserve. It is necessary, when sending equipment to New South Wales, to send sufficient to warrant the freight. It is no use sending small parcels or consignments. Therefore, we shall have to keep in New South Wales sufficient equipment to maintain that unit for some time. That is the object of having a store 200 feet by 120 feet. We must have a reasonably sized store to house aircraft, aero plane engines, mechanical transport, machine tools, machine guns, bombs, wireless stores, photographic stores, timber, metals, and a host of other things. It is necessary to have a decent lay-out, because it is more economical in the end. The lay-out provides for future expansion of barracks and workshops. It may be necessary to extend the Richmond dépot to the extent of the Laverton dépot, but that would only be in time of war, or in case a large number of units were formed in peace time. There is an experimental section at Randwick, and I hope that the committee will inspect it to see what is involved in manufacturing and repairing aircraft. I have been to Richmond several times. It has the most suitable landing ground or aerodrome that can be obtained for hundreds of miles around. The New South Wales Government apparently had the same opinion when it selected the site in 1914, and erected its own aerodrome thereon. It was a magnificent selection, and I am perfectly satisfied with the site. It would have been better if nearer to Sydney, but suitable landing grounds

nearer Sydney are not obtainable, unless at Mascot, on the coast of Botany Bay, and from a strategic point of view that site would not be suitable. The Richmond site is quite suitable from a strategic point of view and for the defence of Sydney. The defence of Newcastle has to be taken into consideration. This site is not a great distance from there. In the future provision will be made for flying boat, or seaplane units stationed on the coast of New South Wales. The Richmond site is suitable for development conditionally on obtaining a certain area of land which is now held under permissive occupancy. It is an area of 120 acres, and its purchase should be considered in the early stages of this scheme. That area is nearer the town, and erected on it are some quarters which were taken over from the State Government. The land belongs to the Richmond Council, but the buildings belong to the Commonwealth.

18. To Mr. Mackay.—In the early stages of the war the New South Wales Government tried to assist the Commonwealth as much as possible by training pilots, and to that end it selected a suitable instructor, acquired the necessary land, built a hangar upon it, and carried out training. Quite a number of pilots trained there were sent away on active service. The Laverton dépot is different from the one proposed at Richmond. We have in Victoria Point Cook station, which is purely a flying training school. Laverton, in Victoria, will be the warehouse of the Air Force. Until the units in New South Wales become numerous Laverton will be the warehouse for certain items of equipment that cannot be purchased in New South Wales. The unit to be established at Richmond is different from that in Victoria. It is an army co-operation squadron, which will be used for co-operating with the Army on matters such as spotting for big guns and assisting troops. That squadron has no bearing on the dépot at Laverton or the Central Flying School. Laverton will be the head-quarters for Victoria, just as Richmond will be the head-quarters for New South Wales. We are not reconditioning the whole of the equipment at Spotswood. At present two contracts have been let, one for five machines to the Larkin Aircraft Company, and another for five machines to Pratt Brothers, at Geelong. Those contracts were let last week. Further contracts will come forward during the next month, and will increase the number of machines to about 23 or 24. We consider that that number is all that we can deal with this year on account of the limited funds. All the machines and equipment required at Richmond will come from Spotswood. They will be reconditioned by commercial firms where necessary, and will be housed in the permanent hangar at Richmond until such time as other buildings are ready. There is no equipment actually stored at the experimental section at Randwick, but there is a large amount of machinery in use there. I hope that the committee will visit Randwick to see what is actually being done. The estimate for reconditioning machines at Spotswood is £400 each, less 5 per cent., which is £387. Originally those machines cost over £1,000. When obsolete, or of no use, those machines will be replaced by a newer type. They will answer for army co-operation purposes, but will not be so effective as would the Bristol fighter, which is the machine now being used in Great Britain. These reconditioned machines would not be of much use opposed to the latest type, but we have not the money to provide the latest type, and, therefore, we have to do the best we can. A considerable amount of money would be required to purchase Bristol fighters. If these buildings were erected at Richmond, they would always be useful. I am perfectly satisfied with the plans and the lay-out of the buildings. They will be quite sufficient for our purposes. There is one suggestion I wish to make to the committee. We might spend thousands of pounds in providing recreation rooms, but that expenditure would be useless unless the material required for recreation were installed. There is provision for a

billiard room, but it will be of no use unless a billiard table is provided. I suggest to the committee that it should consider that point. We have had difficulty in this respect in the past.

19. *To Mr. Jackson.*—If it is not proposed to supply a billiard table, the billiard room should not be built.

20. *To Mr. Cook.*—When I dealt with the aircraft depot at Laverton some months ago, I submitted a statement showing that that depot was planned on the lines of the British design. Likewise, in the case of the Richmond depot we have followed the Royal Air Force practice. The recreation room, the sergeant's mess, the officers' mess, and the married quarters are all designed on the same lines as the aircraft depot at Laverton. There are a few minor alterations which effect improvements. I personally inspected the four Royal Air Force depots in Great Britain during the year 1919, and since then plans have been obtained of the lay-out of the whole of the English depots. During the last six or eight years there has been a material alteration in the lay-out of British depots, and certain improvements shown on the British plans are identical with those in the proposed lay-out for Richmond.

21. *To Mr. Cook.*—I personally inspected the depots for these improvements before the English plans arrived. There is no possibility of the buildings at Richmond becoming obsolete, with the exception of perhaps the hangar, the doors of which may not be wide enough to admit the span of future types of aeroplanes. Last year the Royal Australian Air Force did not import any new aeroplanes. Since 1920 only seven new machines have been imported into Australia. Unfortunately, no firm is at present manufacturing aircraft in Australia. That is a matter which has caused us a good deal of serious consideration. We have endeavoured to interest firms and to maintain firms in the aircraft business. In 1922 we let a contract for six new machines with the Australian Aircraft and Engineering Company, in Sydney. That company has since gone into liquidation. It produced six training machines for the Royal Australian Air Force. At the present time we have two companies reconditioning machines which will eventually go to Richmond. Our object in getting those firms to recondition machines is to try to maintain them in the business, so that eventually they will undertake manufacture. If Australia cannot manufacture its own machines, it will be in a serious plight in time of war. The sooner that is realized the better. It is the unanimous opinion of every officer of the Royal Australian Air Force, and I think of the Defence Department and the civil aviation authorities, that Australia should at the earliest possible moment produce its own aircraft. We have considered the question of establishing workshops, and we are of opinion that commercial firms should be encouraged in every possible way. Private enterprise will build the aircraft in time of war. That was done in Great Britain during the late war. At present private firms are doing certain work for us in a small way, but we want to see them producing the complete machines, even though the Government has to negotiate with the manufacturer in Great Britain for royalty rights to enable the machines to be manufactured in Australia. We shall have to keep our machines to certain types. A committee is now preparing a report dealing with the whole matter. Mr. Leighton, Director-General of Munitions Supply, has recently returned from Great Britain. We have held up our report to obtain his opinion upon what he saw in Great Britain during the last few months. The report should reach the Minister of Defence in a very few weeks.

21. *To Senator Reid.*—Provided the best material is used and that the workmanship and inspection are 100 per cent. efficient, a machine turned out by a private firm in Australia should be equal to anything produced either in our own workshops or by British manufacturers. The machines which the Australian Aircraft and Engineering Company produced in 1922, were perfectly satisfactory. They are now being used at Point Cook for training purposes. The locally manufactured

machine is quite equal to that manufactured in Great Britain. Australian timbers were used in the production of these machines, and from our experience to date they are quite satisfactory. They are not quite so light as the American spruce, but they answer the purpose for certain classes of machines. The weather will affect any machine if it is allowed to remain in an exposed place, no matter what time it takes in its construction. I should not go so far as to say that the Australian timber is superior to imported timber, but I do say that it is quite the equal of the imported timber. Until there is a big work-shop in New South Wales we could not expect a squadron to deal with large repairs and overhauls, because they would not have the necessary men to do it. After a machine has flown a certain number of hours it must have what we call a time overhaul. Such a machine will be flown from New South Wales to Victoria on duty. It will be left there for a complete overhaul, and another machine will be sent back to New South Wales. When we have a workshop of a sufficient size in New South Wales, those overhauls will be undertaken there. On the other hand, if there are in New South Wales firms that are capable of dealing with these overhauls, we may allow them to do the work. A stores park is really an organization apart from the unit organization. It is a central store. For instance, we have an experimental section at Randwick, we will have a seaplane unit at Rushcutters Bay, and a unit at Richmond. Each of these does not want to keep a large quantity of stores, because that would mean duplication in purchases and in storage space. We must have some central organization in New South Wales to purchase and issue all the stores to those units. We can thus buy on a better footing. "Park" is a technical term used in the Royal Australian Air Force. I consider that it is absolutely necessary to have our own stores. Steel is used in the Navy, the Army and the Air Force. But the steel that we use is totally different from that which is used by the Navy or the Army. Therefore we have to store our own steel. It would cost more to store our goods with those of the other arms of the service. We would need to have our own storekeepers to look after our stores, and that would mean duplication of the staff.

22. *To Mr. Jackson.*—We have a good staff of mechanics at Point Cook. At present we have there a flying training school that deals with approximately twelve pupils a year. The number of machines used in that unit is approximately 24. Our mechanics are divided amongst 26 different trades, and although it may appear that we have a large number it must be remembered that 50 per cent. are in the aircraft depot, which deals with repairs and overhaul of equipment. One of their jobs is the reconditioning of the machines. We let contracts only for work that cannot be done by our own staff. If a machine crashes in New South Wales, the repair work could be effected there. We have made provision in the lay out for a workshop in New South Wales, but it is not proposed to go ahead with it at present. I am aware that Siam has its own aircraft factory, run by coloured labour. We have full information on that point. Other Eastern nations are taking similar action, probably to a greater extent, than Siam. I stress again the point that Australia must be self-contained in its production of aircraft and aircraft materials.

23. *To Senator Barnes.*—Our mechanics are equal to any that you could get outside the service. At the experimental section at Randwick, the committee can see a flying boat being built, such as has never been built by any commercial firm in Australia. When the committee sees that it will be impressed by the fact that we have exceptionally good mechanics and officers engaged on that class of work. I was referring to the actual manufacture of aircraft when I mentioned work that should be done by private firms. There are many different aspects to be considered, including the manufacture of the machine itself and the reconditioning of machines. We think that the manufacture of the machine could well be undertaken by

outside firms or by our own staff. Any experimental machines that have to be built for the purpose of testing whether they are satisfactory can be built at our experimental section at Randwick. The report that will be furnished to the Minister by a special committee that has investigated the matter will deal with the whole question of the manufacture of aircraft, from the point of view of government factories, subsidized factories and commercial enterprise. It is a matter of government policy whether the machines should be built in government workshops or by private firms.

24. *To Mr. Mackay.*—Subsequent air stations in New South Wales will not, I think, be built on as large a scale as that proposed for Richmond. They will be a different type of station. We will have a float seaplane station probably somewhere on the coast. That will be a very small unit compared with Richmond.

25. *To Senator Reid.*—The flying boat which I referred to was designed by an Australian, Squadron Leader Wackett, of the Royal Australian Air Force, and it is now being built at the government workshops

(Taken at Sydney.)

MONDAY, 3rd NOVEMBER, 1924

Present:

Mr. GRIGORY, Chairman;

Senator Reid

Mr. Blakeley

Mr. Cook

Mr. Jackson

Mr. Mathews.

Allan Hepburn, Flight-Lieutenant, Royal Australian Air Force, sworn and examined.

26. *To the Chairman.*—I am aware of the reference submitted to the Committee respecting the establishment of an aerodrome at Richmond. I am the officer in charge of Air Force works and buildings, and in connexion with this proposal, I collaborated with the Works and Railways Department. The proposed lay-out was arranged by myself, but the work will be carried out by the Works and Railways Department. There has been collaboration on every detail, including sewerage, water supply, engineering, and essential services. Full attention has been given to the various details. I have prepared for the Committee the following statement:—In 1920 it was hoped to commence the establishment of Royal Australian Air Force units in the vicinity of Sydney. An inspection of the locality was made by officers of this Department, and a summary of the various sites was in favour of Richmond, where a certain amount of flying had already taken place. The distance from Sydney is, approximately, 38 miles, which distance from the coast is considered ideal from a war point of view. There is a railway station—Clarendon—within three minutes of the site. The surrounding open country, devoted mainly to agriculture, is considered good for flying purposes. The actual landing ground has all the attributes that could be desired, but, owing to gravel pits and one low-lying portion, requires an amount of, approximately, £1,000 for earthworks. An area at Mascot was considered, but found to be too close to the coast and surrounded by a large, populated area. It would be ideal for a service landing ground in time of war. A report concerning Liverpool vicinity is also unfavorable. The Richmond aerodrome was originally organized by the New South Wales Government as a flying training school, and constituted landing ground, hangar, with workshops and stores, and living quarters. Negotiations for the purchase of the aerodrome were commenced in 1921, after the following valuation had been made by the Works Director, New South Wales.

Ilangar, store building, workshop and machinery	£10,135
Petrol store	250
Students' quarters	1,782
Officers' quarters & lecture hall	2,089
Mechanics' quarters	1,112
Septic tank & drainings	610
Air gas plant	150
Fencing	71
	£16,299

Deducting for depreciation, the value of the property on the 27th July, 1921, was estimated at £12,075. Additional to this was the price of the necessary land, valued by the Home and Territories Department at £15 per acre. One hundred and seventy-five acres were desired, bringing the land value to a total of £2,025, and making a grand total of £14,300. No additional depreciation can be allowed after 1921, as repairs were made by the State Government last year. The New South Wales Government desired to sell the property, and offered it to the Commonwealth Government for £12,075. The purchase was recommended by the Air Board and Air Council, but the then Minister for Defence did not wish to proceed with the business, and the matter lapsed. The State Government then removed all the machinery, valued by the Air Force at £582, to its various technical schools in the vicinity of Sydney. Negotiations were again opened in 1923, which resulted in the property—land and buildings—being gazetted to the Commonwealth in *Gazette* No. 45 of 28th June, 1923, at a cost of £9,315. The buildings require repairs to the value of £1,350. The property thus transferred to our control comprises:—

- (1) Land—175 acres.
- (2) Buildings, &c., as under:—

SINGLE OFFICERS' LIVING QUARTERS.	
Dimensions as per plan attached.	
Building—Hardwood frame with fibrocement sheets; internal lining F.C. sheats.	
Roof—T.G. lining boards covered with malthoid.	
External Fittings—	
G.C. iron tanks, 400 gallons	4
Internal Fittings—	
Lit rack, 2 books	1
Window blinds, 15 in. x 4 ft. 6 in.	25
Sink, C.I. enamel	2
Bench, light, 9 feet x 1 ft. 6 in.	1
Bath, G.I. enamel	1
Shower, spray	2
Wash basin, enamel, 12 in.	2

GAS PLANT.

Generator house, 6 feet x 6 feet, hardwood frame and fibro-cement sheets, unlined "Light of Australia" safety air gas generator, No. 1979	1
Steel frame tower, complete with balance weights, steel ropes and pulleys	1
SINGLE MEN'S QUARTERS.	
Water tank, 400 gallons	6
Sink, C.I. enamel	1
Draining boards for above	2
Crockery drying stand	1
Shelf in pantry, 15 feet x 1 foot	1
Wash basin, enamel	4
Bench, wash	4
Shower, spray	2

LAVATORIES (AT LIVING QUARTERS).

Hardwood frame, F.C. sheet lining, 6 feet x 16 feet, with wind shield of same design.

Pans 1

HANGAR SECTION.

Office—

10 feet x 14 feet hardwood frame, with F.C. sheet lining, requires repairs to F.C. sheets.

0 feet x 9 feet hardwood frame, with F.C. sheet lining.

SHED.

5 feet x 6 feet hardwood frame, T.G. and V. jointed lining.

LAVATORY.

Hardwood frame, F.C. sheet lining, 5 feet x 6 feet.

Pans 2

Seats 2

Urinals, 5 feet 4

HANGAR.

Water tanks, 600 gallons 12

Blacksmith's bench, hardwood, 2 feet x 7 feet 1

Timber rack, 8 feet x 4 feet x 6 feet high 1

Bench, carpenter's, 14 feet x 4 feet 1

Bench, carpenter's, 12 feet x 3 feet 1

Bench, carpenter's, 8 feet x 3 feet 1

Box telephone 1

Notice board, 4 feet x 3 feet 1

Two rooms, each 15 feet x 10 feet, fitted with shelves and pigeon holes for tool storage.

MARRIED QUARTERS.

Two attached quarters, each of 4 rooms and 2 verandahs.

Hardwood frame, with external and internal lining of F.C. sheets.

Stove, "T. Ward" 2

Copper, washing 2

Troughs, washing, G.L., double 2

Baths, 6 feet 2

Showers, spray 2

The existing living quarters are not situated on our property, but upon an area held under permissive occupancy from the New South Wales Government.

No date has been set as to the termination of the occupancy, but about twelve months from the present date was suggested. An extension of time could, no doubt, be obtained. Under the terms of the purchase of the land we must provide a 1-chain access road between our property and the refuge paddock, leading into the common. The general lay-out has necessarily been fixed by the existing hangar, but fortunately contains the salient features of the latest typical R.A.F. design.

For aeroplane landing, the best area is to the south-west of the hangar. The north-west section will be good when the gravel pits have been filled. To the south, a low area exists, which is unsuitable for buildings, and requires grading for the use of aeroplanes.

The situation of the proposed living quarters is at the highest part of the land in the rear of the existing hangar. The general scheme then resolves itself into a right angle containing the possible stores sections and the living quarters, the large "L" shape being reserved for a landing ground. This makes the only Class I. (800 yards x 800 yards) landing ground in the possession of the Royal Australian Air Force. The minimum area for a Class I landing ground, as laid down by the Royal Air Force, is 800 yards clear.

The hangars proposed are the same as for Laverton, and are of brick. It is intended to use the row running north and south for service and training squadrons, and the east-west row for erecting hangars attached to the stores park. The existing hangar contained a store section on one side and a workshop on the other. The centre is the most commodious building for aeroplanes in Australia, and capable of housing the largest landplanes yet built. This, with two others, at No. 1 Station, Point Cook, are the only ones capable of accommodating the latest twin-engined bombers. The main doors of this hangar are of the roller blind lath type, and when in good order are quite serviceable, but are subject to an easy disarrangement, and become very difficult to work as at present. The design is defective in that the trusses are all of the same dimensions, and the front one carrying the great weight of the doors is the same as those carrying only a roof load. The fact of having to cross the aeroplane section when proceeding from the store to the workshops makes this design inconvenient. The area reserved for new store buildings is considerable, but has been thought desirable in view of war expansion. For the present, the only building proposed is the store shown in full lines on the plan. It has been sited with a view to linking up in a logical manner with any additions that may go up in the future. These additions are not anticipated in peace time. The existing quarters for a temperate climate have now been brought to a standard design, and the same two-story building and dining-room, as at No. 1 Station and No. 1 Dépôt, Laverton, are proposed. They are considered suitable for any latitude below 32 degrees south, but if any are erected north of this line in the future, consideration will have to be given to more liberal capacity. The sergeants' mess, at No. 1 Station, Point Cook, is not up to the required standard, and a new design has been prepared for this site. A dining-room, sitting-room, and cubicle for warrant officers is desirable in this mess. Gymnasium and recreation buildings are of similar design to those at No. 1 Dépôt, Laverton. The married quarters are similar to those placed before the Committee for No. 1 Dépôt, Laverton. They are suitable as regards convenience, but do not, by any means, meet with what is thought to be a correct standard, and have been included, in agreement with the Works and Railways Department, only because they are of low initial cost. It is suggested that senior officers, officers, N.C.O.s, and men should be housed in a manner suitable to family and standing. It is desired to draw your attention to the magnificent quarters erected at Crib Point, Duntroon, and Jervis Bay. We do not desire such places, owing to the inability of the personnel to maintain them, but would state that the following standard is essential:—

SENIOR OFFICERS' MARRIED QUARTERS.

Drawing-room 1

Dining-room 1

Bed-rooms 4

Kitchen, bathroom, lavatories, wash-house, and sleep-out.

OFFICERS' MARRIED QUARTERS.

Living-room 1

Bed-rooms 4

Kitchen, bathroom, lavatory, wash-house, and, if possible, a sleep-out.

OTHER RANKS.

Living-room 1

Bed-rooms 3

Kitchen, bathroom, lavatory, and wash-house.

All the officers who own their own houses in Melbourne have built on a much more ambitious scheme than these, but the firm's quarters are quite suitable to the rate of pay. These quarters are placed in a position in the general lay-out to give the greatest possible privacy, but are at a disadvantage as regards proximity to railway, shopping, and school, in respect of Richmond. Wing head-quarters is allowed for, but may not be built if arrangements are made to obtain rooms in Victoria Barracks, Sydney. The officers' mess has been kept down to a minimum as regards accommodation and convenience, and allowance for permanent forces only is made. Citizen Force officers will be housed in the existing huts, removed to suitable positions. If funds were available, we would desire greater area in the common room. The design is similar to that approved for No. 1 Dépôt, Laverton. The men's cook-house is similar to that now occupied at No. 1 Station, Point Cook, and with some slight alterations is considered satisfactory. A composite building containing guard-room and cells, quartermaster's room, medical officer (non-resident), and inquiry office, is included in the lay-out. The medical room may, at some future date, give way to a hospital on similar lines to that at No. 1 Station. Arrangements have been made to store a limited amount of petrol, oil, bombs, pyrotechnic, &c. The bulk supply of the two latter items will be at Liverpool, or like alternative magazine. The saw-toothed stores building will be used to form this stores park, and on the same lines as a small DEPÔT. The building is designed as a shell having movable internal partitions to suit the quantity of stores in each group. It will have automatic sprinklers. Huts for occupation by the Citizen Force, other ranks, are required. For the limited amount of training which they undergo it is not thought that anything more substantial is required.

Roads.—Experience at No. 1 Station has shown that the internal roads should be composed of the best material. If of light macadam they quickly deteriorate and embarrass the Department with regard to funds, and during the process of repair, lorries become bogged on the deviation, and a considerable amount of man-hours are lost before they are again serviceable. We advocate concrete roads.

The excellent drainage of the site as compared with Point Cook, gives the footpaths a better chance of consolidation, but a good path is money well spent when maintenance is remembered.

Water Supply.—Three schemes have been considered by the Works and Railways Department for supplying water:—

1. Establishing our own pumping plant on the Hawkesbury River.
2. Tapping into the Agricultural College supply.
3. Extending Richmond local supply.

Scheme No. 1 would be expensive to install, and be a continuous maintenance. The Agricultural plan is causing a considerable amount of trouble, and the college authorities will, in the near future, have to carry out considerable alterations to it, or join the Richmond Council scheme.

It is impossible to carry out Scheme No. 3 at present, as the people of Richmond are getting barely sufficient for themselves. The best supply would be obtained by enlarging the pipes of the local supply, and the State authorities have agreed to this if the Department will contribute towards the cost. The proposal is then to increase the local 6-inch main to 8 inches from the reservoir to the town, a distance of approximately 2 miles, thence by our own private 6-inch pipe for another 2 miles to the aerodrome. The pressure of water at the buildings will suffice for all domestic and fire purposes. The estimate of the Works and Railways Department for the water supply is £16,000.

Sewerage.—The towns of Richmond and Windsor are under a system of pans, and a sewerage scheme does not exist. In a place like the proposed No. 3 Station, where men are closely housed, a scheme for sewerage must be arranged, even if not immediately carried out. In this case the land falls from the building area in a northerly direction towards the Hawkesbury River. It is about 12 miles from the river. It is proposed to purchase another 5 acres of land across the road from the northern boundary, upon which filter beds and tanks can be built. The land would be ploughed, and the effluent thus sink into it. The proposed site for the filter beds and tanks is about 1 mile distant from the river. A system of emptying the effluent into the Hawkesbury River would, no doubt, be strongly opposed by the Richmond Council.

Electric Power and Lighting.—Fortunately, the Hawkesbury Agricultural College in the immediate vicinity generates sufficient surplus current for our needs. It has a line running within 450 yards of our building site. The current is 3-phase, A.C., 220 volt, 50 cycle, the same as at Point Cook. Mr. Moss, of the Works and Railways Department, is finalizing the details of this arrangement.

Machinery.—As previously mentioned, the original machines of the Station have been removed by the State authorities. It has been arranged to supply the deficiency from these three sources:—

- (1) In stock.
- (2) Munitions Supply Board.
- (3) Purchase.

We have a considerable amount of gift equipment in stock. The items required for purchase are:—

- Shafting.
- Motors to correct voltage.
- Machine tools.

The materials proposed for the permanent buildings are either brick or timber. The hangar, store, and guard-room are the only units composed of the former; all others are timber, but are only so from the reason of initial low cost. The cost of maintenance, due to unseasoned Australian timber, painting, &c., is so high that, in future years, it looks like becoming the biggest item of our vote. The total estimated cost of these works is £188,376, composed of:—

Building	£125,267
Civil engineering	45,000
Mechanical engineering	6,180
Electricity	5,929

The amounts stated are higher than arrived at in a preliminary estimate, and, with our limited vote, it is a difficult matter to arrange the finance. The Treasury, by refusing funds for No. 1 Dépôt, Laverton, have further complicated the situation. The sum available for No. 2 Station (Richmond) this year is £23,000, and the maximum next year, if our vote is the same, is £35,000. This means six years before the work under consideration could be completed. This does not appeal to us, and the suggestion of building all units ready for a permanent water and sewerage scheme, but leaving these items to the last, is brought forward. The airmen could then occupy buildings as they went up, making use of tank supply for water, and the pan system in latrines. This method would place the personnel in the buildings years before any other. Richmond and Windsor use the pan system and partially the tank for water supply, and we are quite willing to put up with this temporary inconvenience if, by doing so, we can show some progress.

The fire risk could be covered by a liberal supply of fire extinguishers, and by insurance, if thought desirable. If the units at Richmond, Rusheaters Bay, and Botany Bay are established, the Air Board has in mind the establishment of an Aircraft Dépôt at Richmond, to the west of our present property, where a railway loop

line is possible. The design would be after the style of that approved by the Committee for Laverton. The following is the estimate of the Works and Railways Department for No. 2 Station, Richmond:—

	£
1. Two-story barracks, each for 40 men (type as those at Point Cook), £63,100 each, No. 4	24,400
2. Airmen's mess-room for 250 men, and kitchen (as Point Cook—reduced) ..	7,000
3. Recreation hall	3,350
4. Gymnasium	4,000
5. Officers' mess—as Laverton, including extension (if extension not required, £3,000 less)	10,900
6. Sergeants' mess	2,150
7. Guard-rooms—as Laverton	2,150
8. Coal Store (2,500 super. feet)	600
9. Garage—as Point Cook	2,800
10. Married Commanding Officers' Quarters, two at £1,870	3,740
11. Married officers' quarters, six at £1,400	8,400
12. Married airmen's quarters, ten at £1,330	13,300
13. Batmen's quarters—as Point Cook	1,250
14. Wing head-quarters	2,350
15. Hangars, three at £5,000	15,000
16. Removal of two existing houses (quarters)	1,850
17. Removal of existing latrines	15
18. Three new latrines	256
19. Four new huts	6,000
20. Repairs to hangar roof trusses	432
21. Repairs to roller doors of hangar	776
22. Repairs to roof of hangar	98
23. Oil store, 200 super. feet	300
24. Petrol store	600
25. Bomb store	400
26. Pyrotechnic store	250
27. Store, saw-tooth roof, 120 feet x 200 feet	13,550
	£135,267

The site at Richmond is excellent, even better than that at Point Cook, on account of the drainage facilities. It is suitable from every stand-point. For a permanent station it is exactly the right distance from Sydney from the point of view of defence. In the case of the Victoria Dôpôt, we asked that it be situated as close as possible to Melbourne, that is, at Laverton instead of Point Cook, so as to facilitate the training of the Citizen Forces. That is desirable, because Melbourne is some distance from the coast. But it must be remembered that Sydney is practically situated on the coast, and therefore, in placing the site at Richmond, we have to bear the inconvenience of its distant situation and the cost of training the Citizen Forces there. A site close to Sydney would be useless in the event of war. Liverpool, as an aerodrome site, is unsuitable on account of the vegetation and trees surrounding the district, and especially so, for Citizen Force flying. Liverpool is some 20 miles from the coast, but, even so, it is too near the coast for defence purposes. A spotting aeroplane from an enemy vessel, at a height of 3,000 feet, would have a fine view of Liverpool and any munition stores erected there. The same conditions would not apply to Richmond, as, in the event of an enemy raid, our coastal watching system could signal in time to allow of longer preparations for resistance at Richmond. A distance of 20 miles means less than 20 minutes in the air, and a distance of 40 miles means that approximately 40 minutes is available for resistance preparation. The people of Richmond requested that the lay-out should be altered somewhat by placing the living quarters on

a reserve or common so as to provide for the continuation of the town, and for better facilities for schooling, water supply, and general living. The reason for not doing so was this: In the lay-out at Point Cook the hangars are three-quarters of a mile from the living quarters, and the men have to march to and fro four times a day. It is a long walk. We do not mind the walk, because it gives the men plenty of exercise, but we object to the time lost by 300 men in walking three-quarters of a mile four times a day. In this case the time lost would be greater than at Point Cook. The Clarendon railway station will have to be used for the supply of building materials, and the farther the living quarters are away from it the greater will be the cost of cartage. It has also to be considered that the farther the quarters are away from the town of Richmond the easier it will be to establish a sewerage system. The site for the living quarters suggested by the people of Richmond is flat ground, similar to that at Point Cook, and is therefore more difficult to drain. Our proposed site for the living quarters is on the highest point of the land, and can be easily drained. The lay-out of the buildings has been dominated largely by the situation of the hangar already erected. The aerodrome site is bigger than any other that we have at present, and will be quite ample for our purposes. Portion of our property on the western side will not be fenced in, if a mutual arrangement can be made between us and the Richmond Council. We will thus have an extra area of space, and the council will have an extra area of common. Our ground is at present only 800 yards long. It is I-shaped, which is satisfactory. The prevailing wind, which is north-west, comes at the back of the hangar. The area marked out for a sports ground was not really intended for recreation purposes. It is rough ground that cannot be easily built upon, and is absolutely useless from an aerodrome point of view. It is not necessary to have a siding from the railway line entering on the site. Mr. Hill will be able to give the Committee details respecting the arrangement entered into with the State Government for an increased supply of water. I do not think there is any provision for an overhead tank for use in case of fire. We consider that the pressure will be quite enough for domestic and fire-fighting purposes. The store building will be provided with sprinklers throughout. Mr. Connell, of the Works and Railways Department, is directly dealing with that matter, and will be able to supply any information that is required by the Committee. Four of the proposed wooden buildings will be two-storied. A fire hydrant will be installed on the site. The proposals respecting sewerage will be definitely finalized this week. In order to keep the sewerage as far away from the living quarters as possible, we intend to purchase another 5 acres of ground across the road, along the northern boundary, on which will be built filter beds and tanks. The remaining portion of the 5 acres will be ploughed in order to absorb the effluent. This ground is over a mile away from the Hawkesbury River, and I do not think that any seepage would penetrate that distance. This area is about 1½ miles away from the residential section. There would be no offensive smell from a proper septic tank system. Any children living on the Richmond site will be about 2 miles from the school. Arrangements are being made with the Agricultural College to obtain a continuous supply of power at a reasonable price. I am not sure what the quote was, but it was under the price that we are paying to the Electricity Commission for power at Point Cook. I have an idea of the price of bricks. They are not made at Richmond, but on the way out from Sydney, at Blacktown. The Government will not permit of any wooden material excepting Australian being used for building purposes. We dislike

it intensely, because the timber is green. Buildings at Point Cook, on which the paint is hardly dry, already show distinct warps and defects. The contractor states that he cannot get seasoned timber. There is no prospect of utilizing concrete for building purposes. No good stone is obtainable in the locality, although there is a fair amount of gravel from the river which could be used for concrete work. I do not think that the use of concrete, except for roads, would pay, owing to the small number of buildings to be erected. This scheme was approved by the Air Board and Air Council in 1921. I am not aware that it has been approved by the Council of Defence, but I believe that General Chauvel is in favour of it. It has been fully approved by the Air Board. With the vote of £23,000 this year, and £23,000 next year, the limited programme of work which we propose at Richmond will take six years to complete. Laverton Dôpôt has the first call on the money voted, and portion of the residue will be used at Richmond in erecting buildings such as the married quarters, barracks for single men, and kitchen and dining-room for single men. The pan system is in use at Richmond and Windsor. We have been looking forward to the establishment of a de-cent-aired air force, and we are quite prepared to put up with an inconvenience so long as the actual flying operations are established. If we expend the money on an expensive system of sewerage and other facilities, there will be no men there for the next two years. We could, for the first year, do without an additional hangar, but items 1, 2, 3, 5, 6, 7, and 9 on the estimate of the Works and Railways Department would have to be provided. These would amount to, approximately, £47,000, and the remainder of the expenditure, £7,000, would be utilized in the provision of roads, and lighting and drainage services.

27. *To Mr. Blakeley.*—There is no urgent need for a petrol store, because there is a small lower installed on the site, and supplies are regularly delivered.

28. *To the Chairman.*—If possible, we should like to see this scheme completed in three years' time. This would mean an expenditure of £60,000 a year. Most of the aeroplanes needed could be obtained from the Gift Equipment. The only drawback in that equipment is that the fighting planes are about 80 miles an hour slower than some foreign fighting planes, and are really completely out of date as fighting machines. The ones to be used for flying training, and also the Army Co-operation machines, will be as good as the standard R.A.F. Our supplies in this direction will be taken from the equipment that is now being overhauled in Melbourne. Almost all of our stores can be supplied from there.

29. *To Senator Reid.*—Under the terms of the purchase of the land we must provide a 1-chain access road between our property and the refuge paddock leading into the common. The State Government desired that because the land adjoining the Hawkesbury is sometimes flooded, and it was desired to have access to the common during flood time. A fair amount of land will have to be filled in, costing somewhere about £1,000. Part of the filling-in material will be obtained from levelling the ground, but there are gravel pits at the far end of the common near Richmond, which could be used, if necessary. The water supply to the Richmond residents is pumped from an 80-foot well in the river. The Richmond Council proposes to substitute electric pumps for the present steam pumps, with the provision of a tank containing about 250,000 gallons. The water is at present pumped through a 6-inch pipe. Mr. Connell investigated the matter of the water supply, and decided that an 8-inch pipe was necessary for our requirements. The Richmond Council would not provide a pipe of

such dimensions unless we contributed towards the cost. It is proposed to have an 8-inch pipe to the point where the Richmond supply and our reticulation scheme will separate, and from there a 6-inch pipe will be taken into the aerodrome. The pressure of water at the aerodrome will not be great, but is considered to be sufficient if sprinklers are installed for the prevention of fire. It has not been settled what our contribution would be for providing the 8-inch pipe. Either Mr. Connell or Mr. Hill will give that information to the Committee. It is the best scheme that can be devised at present. It is not intended to fence our property from the common. It will be a mutual benefit scheme. Stock grazing on our property intrinsically runs to the far end of the common when they hear the machines. They help to keep the grass down. At Point Cook we have to put sheep on the land for this purpose. Without a fence we have a bigger area of land for landing purposes. We have not yet approached the Richmond Council in this matter, but we do not anticipate any objection from it. The public use the common. There is also a training track for trotting horses on portion of the common, from which the council derive a certain rental.

30. *To Mr. Mathews.*—The permanent living quarters proposed to be erected will accommodate 161 men, 33 sergeants, and 32 officers. There is a triangular piece of private ground on the south-eastern portion of the area, alongside Cornwalls-road; also there is a house close by, but it will not be in the way because we have such a long run for the aeroplanes. We have not endeavoured to purchase that property. The aerodrome site was acquired in 1916 by the State Government for the training of pilots during the war by the Technical Education Department. When the permanent buildings are constructed, the existing hut will be removed from their present site and used for the housing of the Citizen Forces. The hangar at Richmond provides for greater accommodation than does the one at Point Cook. I believe the Richmond hangar was designed for lighter than air machines of German design, and these machines are, of course, huge. There is really no need for the great height of the hangar. Item No. 5 on the estimate of the Works and Railways Department is for the provision of the officers' mess, and will cost £7,000 if an extension of it is not required. This will probably keep this expenditure within the vote. The whole of the common room must be erected. At Point Cook we have one room, a combined billiard and common room. In this case the billiard room is partially separated from the common room. The houses proposed for the officers are on the small side, and, if possible, should include an additional bedroom. If the proposed design of the men's building is carried out, it will provide all the required accommodation for them. The proposed site of the septic tank would be far enough from the living quarters so as not to be offensive.

31. *To Mr. Blakeley.*—There is practically no pressure of water at Richmond. The existing steam plant has been running for many years. An electric plant has now been placed in position to pump the water from Hawkesbury River, and the pressure will then be quite sufficient for our purposes. The council had decided to place a municipal water tower near the town on a high piece of ground. The ground is approximately level between Richmond and the Aerodrome, but the pressure will be greater than previously. I think Mr. Connell estimates that it will be 2½ lb. per square inch. There are only three feasible schemes for providing the water supply for the aerodrome. One is to install our own pumping plant, which would mean duplicating the Richmond plant. The next is to work in conjunction with the Agricultural College people, but they have their pump on the

wrong side of the river, and considerable trouble is experienced with it. They are now considering the shifting of the pumping plant to the other side of the river. The other scheme is to connect with the Richmond supply, in which case our responsibility would be to contribute towards the cost of the pipes, and then to maintain our own section. Mr. Hill will be able to give the Committee further information on that subject. For the hangar we intend to use a type of folding door, after the style of a concertina. It will be in sections of about 3 feet each, and fold round the side of the wall, with wheels at the bottom and guides at the top. The trouble with the present doors is that the great weight on the truss has made it drop in the centre. Respecting school facilities, my children at the aerodrome could not walk 2 miles to school. At Point Cook, we erected a school, which was taken over by the State Government. In this case we shall either request the State Government to erect a school near the Clarendon station, or build one ourselves, and transport the children to it. I am not aware that it is a practice of the New South Wales Education Department to supply transport in many instances. There will probably be about 40 children at the aerodrome when the scheme is completed.

32. *To Mr. Jackson.*—The hangar was at one time used as a repair shop. On one side was a line of shafting, and the machine tools driven by it. It would be quite sufficient to carry out repairs to service squadrons at the aerodrome. Only service squadrons will be used. In the field, each service squadron will have two workshop lorries attached to it. These will be normal size lorries, containing machine tools and other equipment. We could not carry out the work of reconditioning aeroplanes at Richmond.

33. *To Mr. Blakeley.*—There is a civilian machine at Richmond, and we could have a machine there about every two months. There are no departmental machines or men there now.

34. *To Mr. Cook.*—The buildings comprised in the expenditure of £47,000 will be of wooden design, but we do not really want wooden buildings. We ask for them on account of the initial cost. We would much prefer brick buildings if they could be provided. If we continue to provide wooden buildings at Laverton, Point Cook, and Richmond, we shall pile up a mass of wooden buildings requiring expensive maintenance. It is really false economy to construct wooden buildings. That is the general opinion of the Air Force Department. I take it that the difficulty in obtaining seasoned wood applies to New South Wales as well as to Victoria. I am convinced that the proposed site is the best that can be obtained. Drainage can be easily effected, and the health of the residents will be amply safeguarded. Our medical officer inspected the site, and he said that the site lent itself to drainage. Drainage would not be an expensive item. I had three years' experience in flying stations in England. I am convinced that we in Australia do not know as much as we should about English lay-outs, and I have already recommended that some officer, a member of the Royal Australian Air Force, should be sent to England to obtain the latest information on the subject. The English authorities have sent out one typical lay-out of an aerodrome which follows our design very closely, although it arrived after ours had been finished. I believe that in time the Air Force will be the senior service. Further information is desired before we commence to construct hangars for flying boats. These are big machines. We have had no experience with them out here. It would be foolish to provide buildings for such machines without first taking into consideration the latest English and American designs. I could not say whether the Minister has been so advised, but I have similarly expressed

myself in my replies to the Air Board. We can use a lot of the Gift Equipment for training purposes. There is a certain class of machine among the equipment, the motors of which are of the wrong current, and these will never be of use. Although most of this equipment would be out of date for war purposes, yet it would be quite fit for training purposes.

35. *To the Chairman.*—A normal person looking at the married quarters at Point Cook would say that they were a very nice job, but any one looking for defects, and knowing anything of house construction, would find that the whole of the studs and ceiling joists had warped and thrown the hardwood lining boards out of position, although they overlap sufficiently for weather protection. Many of the houses recently built at Point Cook are opening up underneath. Probably the timber in Victoria has not been properly seasoned. It is very likely that the Works Director cannot instruct the contractor where suitable timber can be obtained. Brick buildings would be the cheapest in the long run. If there were a chance of our vote being increased, I should certainly recommend brick in preference to wooden buildings. I favour the construction of two-storied buildings, if they are well built.

(Taken at Richmond.)

TUESDAY, 4TH NOVEMBER, 1924.

Present:

Mr. GREGORY, Chairman;

Senator Reid	Mr. Jackson
Mr. Blakeley	Mr. Mathews.
Mr. Cook	

Albert Victor Grimwood, town clerk, Richmond, sworn and examined.

36. *To the Chairman.*—I am aware of the proposal that has been referred to the Committee respecting the establishment of an aerodrome at Richmond. There is no objection to establishing it in the vicinity of Richmond. We consider that the best site for the residential quarters would be not on the site proposed, but on the high land, at East Richmond. That site would be 1 mile and 10 chains from the hangar. A site there would be much more convenient for water and electric light services, would be nearer the school, and also tend to consolidate the town of Richmond. This site being on high land could be easily drained. On the other hand, the proposed site along Windsor-road would require a good deal of draining, especially in winter time, when water to a depth of several inches lies on the property. The Richmond water supply is pumped from the Hawkesbury River into a reservoir and then reticulated through 6-in. pipes. The system is controlled by the Water and Sewerage Board. If portion of the money required to put in an independent water supply at the aerodrome were used to provide a 10-in. pipe instead of a 6-in. pipe, it would provide for all time a better supply, not only for the town, but also for the aerodrome. The head of the water supply is about 230 feet, and this would give a good pressure from a 10-in. pipe. All the water pumped from the river is put through filters under pressure before it enters the reservoir. A scheme has been proposed to supply the towns of Richmond and Windsor and other places with water from the Grose River. That would be a gravitation scheme, and the water would be purer than that from the Hawkesbury River, because of the clean catchment area. I think that that scheme will be given effect to in the near future. I could not say whether it will be in operation within the next twelve months. In any case, the

scheme eventually must come. Respecting the electric lighting and power rates, we charge 8d. per unit for lighting and 4d. per unit for power. The aerodrome, and also the residential buildings if erected at East Richmond, will be able to get current from the Hawkesbury Agricultural College. If the residential quarters were established at East Richmond, the charge for electric light and power would be 8d. and 4d. a unit respectively.

37. *To Mr. Blakeley.*—The water pressure at Richmond varies. It is a very low pressure at present on account of the 6-in. pipes. It will increase considerably if larger pipes are provided. When the water system was being installed it was first the intention to put in 10-in. pipes. With that object in view, we placed 10-in. pipes across a bridge. The pipe dimensions were afterwards altered, and now we have the position of a 6-in. pipe leading to and from the 10-in. pipe on the bridge. If the Commonwealth made a grant to the Water and Sewerage Board of sufficient money to put in 10-in. pipes, the Government would thus be saved the overhead expense of working an independent plant. I do not suggest that the Commonwealth should contribute the whole of the cost of an independent scheme towards altering the Richmond system from 6-in. to 10-in. pipes. A Commonwealth grant of this nature would be a great inducement for the Board to go ahead with the work. I do not think there would be any opposition to establishing a septic tank system at or about the aerodrome. As a matter of fact, there is a big fall from the proposed site for the residential quarters down to the flat, and the effluent from the septic tank system could be used for irrigating the farms on the flat. Respecting the common, the Council would prefer to allow that portion adjoining the aerodrome to remain unfenced. The only inconvenience would be to the armen, as they might happen to collide with the cattle on the common. No doubt they could be driven to the other end of the paddock. It has been the practice to allow the cattle to graze during flying operations. The dam at the end of the reserve is under our control. If the common remained unfenced, there would be no necessity to construct a T-chain road alongside the dam to allow cattle to have access to it. The Richmond school is 2 miles distant from the hangar. At present the State Government provides a coach for the conveyance of the children to the school. It runs along the Cornwallis-road, opposite the site of the proposed residential quarters.

38. *To Senator Reid.*—The Richmond Council is the health authority for the district. We have no objection to the effluent from a septic tank system being run on to the flat for irrigation purposes, so long as the system is a proper one. There is no residence between the proposed site for the septic tank and the river, only one house being in the immediate vicinity.

39. *To Mr. Cook.*—We have plenty of water, but the trouble is to get it to Richmond, because our pipes are not large enough. We are now endeavouring to obtain a gravitation scheme, and I think it will be established in the near future. There will never be any fear of a shortage of water so long as the pipes are large enough. After a heavy rain, the water around the aerodrome dries very quickly. The ground has a sub-soil of gravel. The common is vested in the Council as trustees. The Crown could sell any portion of the common with the consent of the Council, but not otherwise. The Council's assent was asked when the Commonwealth purchased the portion of the common it now holds. The common is worth about £10 per acre. The value of high land on the other side of the road adjoining the northern boundary would be approximately the same. Nearly all the farmers

on the flat have a portion of high ground as a stock refuge. The maximum value of the high land adjoining the northern boundary would be about £10 per acre.

40. *To Senator Reid.*—The Council would have to make the necessary arrangements with the Water and Sewerage Board for the provision of a 10-in. water pipe. The Board bears the expense, but we really pay it in rates. The Commonwealth Government would have to make its arrangements with the Board and not with the Council.

The witness withdrew.

William McDonald Hesham, Medical Officer, Richmond, sworn and examined.

41. *To the Chairman.*—I have lived in the district for about 30 years. I am familiar with the proposal to establish an aerodrome at Richmond. The general health of the community is very good. The water supply is unsatisfactory in that we cannot get a sufficient quantity. The system of filtration is quite satisfactory, judging by my own experience and by the reports of the Board of Health. I have not had a case of typhoid in this district for the last ten years. We have the pan system here, and it is very good. There is no likelihood of it being altered, owing to the enormous expense of establishing a sewerage system. I have no objection to septic tanks. In my opinion, the Commonwealth Government should purchase that portion of the common on the northern boundary between the cemetery and the refuge paddock as a site for the residential quarters. It could be easily drained, and the effluent from a septic tank system could flow either northwards or southwards. That site would be just as good as the one suggested at East Richmond. It is no distance from the aerodrome. The proposed site to the north-east of the hangar could not be easily drained. The site I suggest would be much nearer to Richmond, and thus facilitate the attendance of children at school, and the social life of the community. The womenfolk would be within easy reach of the shops at Richmond.

41a. *To Mr. Mathews.*—I have had experience with septic tank systems. There is one connected with the Richmond hospital. I am quite satisfied that the effluent is not injurious.

The witness withdrew.

Richard Matson Dowle, farmer and alderman of the Richmond Council, sworn and examined.

42. *To the Chairman.*—The members of the Water and Sewerage Board recently visited Richmond, and were very much in favour of the Grose River scheme to serve Richmond and other areas far as Blacktown. Such a scheme would give an ample supply of water over this area, and supplement the water supply for Sydney. If the Commonwealth Government, instead of establishing its own permanent scheme, would supplement the larger scheme favoured by the Water and Sewerage Board, the work might be put in hand immediately. The Sydney water supply must be augmented sooner or later. This would be a gravitation scheme, and a considerable improvement upon the existing method of pumping water from the Hawkesbury. This scheme, if established, would overcome the water supply difficulty and give an abundance of water. It would not entail scrapping the whole of the present system, because the reservoir could still be used. It would mean the substitution of 10-in. pipes for a certain distance. A hydro-electric scheme has been suggested to meet the requirements of the aerodrome and the surrounding district.

43. *To Senator Reid.*—The Council has no representative on the Water and Sewerage Board, but one member represents the municipalities as a whole.

44. *To Mr. Cook.*—The road along the northern boundary of the common is used for cattle during flood time, and they are watered from the dam in the refuge paddock. If necessary, I do not think that the Commonwealth would have any trouble in fencing that road so long as a right-of-way was given to owners of cattle who wished to use it during flood time. The value of the high land on the northern boundary is about £10 per acre, but of course the owner might think it worth considerably more. The Council would have no objection to leasing the road.

The witness withdrew.

Charles Walter Brebner, Engineer, Hawkesbury Agricultural College, New South Wales, sworn and examined.

45. *To the Chairman.*—The electric lighting plant at the college supplies three other consumers, the Water and Sewerage Board, and the municipalities of Richmond and Windsor. We supply alternating current. The college authorities will easily be able to supply continuously the amount of power that will be required at the aerodrome. Power is generated with small coal, and not by hydro-electric system or by motor power. Our prices compare favorably with those charged elsewhere, taking into consideration the size of the plant. I can assure the Committee that ample power will be available for the purposes of the aerodrome.

46. *To Mr. Blakeley.*—I know nothing of the proposed Grose River water scheme.

The witness withdrew.

Benjamin Ezzy Sullivan, auctioneer and agent, Richmond, sworn and examined.

47. *To the Chairman.*—I am aware that it is proposed to establish an aerodrome at Richmond. I know the site very well. In preference to the proposed site for the residential quarters, I favour a site on the common as recommended by Dr. Hildsham, situated between the cemetery and the refuge paddock. This site could be easily drained. It certainly would mean the acquisition of further land on the common. I was Mayor of Richmond when the Commonwealth purchased portion of the common for aerodrome purposes. I am quite sure that the present Council would do everything in its power to assist in establishing this scheme, even to disposing of the whole of the common to the Commonwealth Government if necessary. Regarding the water supply, some time ago the Water and Sewerage Board placed an amount on its estimates for the purpose of establishing a larger main from the present reservoir to serve the town of Richmond, but up to the present nothing has been done.

The witness withdrew.

John Thomas Drayton, coachsmith and alderman of the Richmond Council, sworn and examined.

48. *To the Chairman.*—I am aware of the proposal to establish an aerodrome at Richmond. In my opinion, that portion of the common on the northern boundary, situated between the cemetery and the refuge paddock, would be the best site for residential purposes. The land could be easily drained, and is about half a mile from the hangar. I do not think there would be any difficulty in the way of the Commonwealth Government acquiring that portion of the common. Without it we would have sufficient common for grazing purposes.

(Taken at Sydney.)

WEDNESDAY, 5TH NOVEMBER, 1924.

Present:

Mr. GIBSON, Chairman;

Senator Reid
Mr. Blakeley
Mr. Cook

Mr. Jackson
Mr. Mathews.

John Smith Murdoch, Chief Commonwealth Architect, sworn and examined.

49. *To the Chairman.*—I have been consulted in connexion with the proposal to establish an aerodrome at Richmond. The Department of Works and Railways, which is preparing the drawings, has been in touch with the responsible Defence officers. There has been very satisfactory collaboration between the two departments respecting the requirements of the aerodrome. As the chief engineer for the Department of Works and Railways will give evidence regarding the engineering services, I propose to confine my remarks to the nature of the various buildings proposed at the aerodrome, of which there are a large number. I propose that the Works Director of New South Wales shall supply evidence regarding the estimate of the cost of the buildings. He is busy working on these at present, and in view of his local knowledge, superior to that possessed by the officers in Melbourne, respecting the values around Sydney, his evidence will be of more value to the Committee. I believe that as a result of the revision of the estimates by the Works Director of New South Wales, in some cases they will be lowered. I do not think that any of the estimates prepared in Melbourne will be increased. I understand that the Committee has ascertained from the Defence officers the reasons for selecting the site at Richmond for an aerodrome. The Committee has had the advantage of inspecting the site, and will therefore be able to follow clearly the nature of the proposed buildings. I also refer to the various buildings numbered on the lay-out plan of the station, Drawing No. 2. The lay-out of the buildings is dominated by the position of the existing hangar on the site purchased by the Commonwealth from the New South Wales Government. Building No. 1 on the lay-out plan is the wing head-quarters, which will be the administrative offices of the station. It is proposed that it shall be a building 72 feet long by 35 feet wide, timber frame and weatherboard, with a wooden floor, corrugated iron roof, 10-ft. ceilings, with a 9-ft. 6-in. verandah extending over portion of the front. It will contain rooms for the wing commander and his adjutant, an inquiry room, and rooms for the equipment officer, gunnery officer, and wireless officer, and two rooms for the clerical staff. The Melbourne estimate for this work is £2,200, but I should like the Committee to take these estimates as subject to correction, as they are being revised by the Works Director of New South Wales. For the sake of economy the building is to be of wooden construction. The Committee knows the difficulty of finding capital for the establishing of air stations, and that is why the buildings are proposed to be of wood. There would be a considerable difference between the price of reinforced concrete buildings and wooden buildings, but not so much in brick, especially if the internal divisions were of timber. I strongly recommend that, in view of the adaptability of wooden partitions for alteration and meeting future requirements, they should be used, with brick outside walls. The increase in cost would be about 7½ per cent. All timber used would be hardwood. I would not use soft woods in the construction of buildings, notwithstanding the fact that hardwoods do not give such a good appearance. There is great difficulty in all the States in obtaining seasoned hardwood. Usually, the timber has been cut for a few

months only. For the majority of these buildings the contracts are likely to cover a period of seven or eight months, and, of course, as soon as a contractor gets to work he will order his material. The finishing timber would probably have five or six months' seasoning. It really does not matter whether the constructive timbers, such as joists, studs, rafters, and so on, are seasoned, although it would be preferable. I believe that at Point Cook unseasoned timber used in the buildings has warped considerably, but that must be expected in timber buildings. Although hardwood timbers have their drawbacks, they are quite useful for general purposes of utility. One argument used against the construction of timber buildings compared with brick buildings is the cost of maintenance. For a group of timber buildings it may be necessary to set aside 1½ per cent. of the cost for maintenance, whereas with brick buildings ½ per cent. would be sufficient. Hardwood buildings, except to add to appearance, do not require very much in the way of painting. I have known hardwood buildings in Queensland to remain unpainted for 40 years, and even then were as good as when they were first erected, with the exception of the nails, which had decayed through rust. If the selection of good hardwood is always insisted upon, there need be no fear of deterioration, even although the Government do not find the money to paint them every four years or so. I favour simply staining the walls with a mixture of creosote and kerosene, or Stockholm tar, and picking out the sashes and barge and eave boards in white. This gives a pleasing appearance. The Committee no doubt noticed, when recently in Brisbane, that many of the domestic buildings had dark walls stained with creosote and kerosene.

50. *To Senator Reid.*—In my opinion, stain lasts longer than paint, although it has not the same glossy surface. A small detail like that would not be noticed by the average person viewing a group of buildings. A group of buildings stained with dark colour, and the window sashes, doors, and verandah posts painted with a contrasting colour, looks very well.

51. *To the Chairman.*—Artificial seasoning is used for softwoods, but not hardwoods. In any case, it would add very much to the cost of the timber, and would cost probably from 10s. to 12s. per 100 feet. Under our contracts, the contractor to a certain extent is held responsible for any warping or shrinkage of timber used in construction, but that power can only be exercised to a point. If a contractor cannot obtain seasoned timber, we cannot compel him to use it. We say that the buildings have to be constructed of the best material and in the best manner. We have to accept conditions as they arise. Fifteen years ago, 9-in. boards would have been specified, but now 3 inches and 4 inches is specified so that the shrinkage will be less. Building No. 2 on the lay-out plan is the guard room and the quartermaster's store. It is alongside the wing head-quarters at the entrance gates. It is a brick building, 71 ft. 6 in. long and 34 feet wide. The accommodation includes two detention cells, two rooms for military officers, telephone and inquiry rooms, and space for fire car and lavatory, &c. The external walls will be 11 inches thick, with reinforced concrete partitions to the cells, but single-board partitions elsewhere. The roof will be of tiles, floor of concrete, and ceilings 10 feet high, with the exception of the ceiling of the guard room, which will be 13 feet high. I do not know really why this building is to be of brick with a tiled roof, seeing that the remainder of the buildings, with the exception of the residences probably, are mostly to be of timber, with iron roofs. It may be regarded as a more important building than the others in the group, and probably the Defence Department prefer it to be of brick with a tiled roof. It seems inconsistent to construct a jail in timber, but as a matter of fact I have provided many such jails. A single-board partition would be quite satisfactory.

With a change of personnel, the accommodation will very likely be altered. This was so with the buildings that were erected at Richmond on land held under permissive occupancy. It is a good idea to have the inside partitions easily removable, and if the outside walls are to be of brick, then the partitions should be of timber.

52. *To Senator Reid.*—The detention cell will have a concrete wall. It is not so easy to break through a concrete wall as it is to break through a brick wall. In Queensland there is a greater degree of understanding than elsewhere respecting the construction of the brick external walls and wooden inside partitions. The brick walls will have a foundation, but the partitions will simply be built on the wooden floor, irrespective of independent foundations altogether. In this way the accommodation inside can be changed without altering the construction of the building. The supporting capacity of a 6-inch by 1-inch board, standing on its end, in position as part of a partition, is enormous. Stud walls would have to be put at the end of the partition, and also at the sides of each door. No other studs would be required, and studs 3 x 2 in. would be quite sufficient. In Melbourne, and even to some degree in Sydney, builders are horrified at these methods of construction, but in Queensland there is a full understanding of this class of building. After all, wooden partitions are quite satisfactory for the buildings that have to be constructed at the Richmond aerodrome.

53. *To the Chairman.*—The next building is the coal store, marked No. 3 on lay-out plan. It is an unroofed enclosure 50 feet long by 25 feet wide, with concrete floor, reinforced concrete walls 9 feet high, and three strands of barbed wire on top. This building will be 50 feet distant from the guard room, and its proximity will no doubt prevent stealing. There is no need for the coal store to be placed close to the workshops, because I do not think coal will be required for their operation. They all contain electrically driven machinery. I think the coal store is purely for domestic fuel, which will be rationed out by the quartermaster. The next building is the garage, No. 4 on the lay-out plan. The drawing is No. 6. The size of this building is 79 feet long by 62 feet wide. It is a similar plan to that for Point Cook. The building will be of similar construction. The walls and roof will be covered externally with galvanized iron, with a concrete floor and concrete washing areas in front.

54. *To Senator Reid.*—I do not favour the use of fibrous cement for these buildings. The Committee has seen the effect of using fibrous cement at the Richmond aerodrome, where many of the sheets are cracked and broken. I do not think there would be a great deal of difference in the cost although galvanized iron would be slightly more expensive. A fibrous cement square costs from £2 15s. to £3. In any case galvanized iron is by far the more preferable. The next time the Committee are at Adelaide I suggest that they look at the Defence stores at Keswick. They are constructed of galvanized corrugated iron, and have a very pleasing appearance. Corrugated iron is all right so long as it is treated well. Buildings of this type have been constructed at Forsyth Bay, Flinders, and Adelaide. It is not desired to have inflammable material in a building of this description.

55. *To Mr. Mathews.*—The building will consist of a hardwood frame, covered on the outside with galvanized iron. I should not recommend tar asphalt for the floor and washing areas. It does not stand the wear of traffic, repairs to curbs, and dropping of tools.

56. *To the Chairman.*—The next building is the general store building, No. 5 on the lay-out plan, and is the largest building proposed. The plan is a replica of the one proposed for Laverton, which was considered by the Committee in all its detail. The

building is 200 feet long by 120 feet wide, with 11-ft. brick external walls, 18-in. brick piers under the roof principals, steel stanchions and beams supporting steel saw-tooth roof trusses, with provision for continuous light. It will have a galvanized corrugated iron roof on wood purlins, and internal partitions of wrought iron piping covered with wire netting. The estimated cost of this building at Laverton was £13,550, but in this case the estimate, subject to the revision of the Sydney office, may be a little less. There will be 24,000 square feet of floor space in this building, and at the estimate, would work out at about 12s. per super foot. If one half of the buildings were erected first, a temporary wall would have to be constructed across the building. There would be no objection to such an arrangement if the Defence Department thought it would be in the interests of economy, but I rather think that when the whole building is constructed a wall across the centre would interfere with the open arrangement of storage that the Defence Department has in mind.

57. *To Mr. Mathews.*—A similar arrangement has been carried out at the ordnance stores and other Defence buildings in Sydney, but I doubt whether that kind of stores building would meet the requirements at Richmond.

58. *To Senator Reid.*—The stores would largely be parts belonging to aeroplanes. If possible, the station should be completed within three years, and as a store is apparently required for the full institution it would be a good thing to build the whole of it straight away. It is proposed to build the whole of the Laverton building in one operation. The next items are Nos. 7, 8, and 9, comprising three additional hangars. The existing hangar faces the aerodrome at an angle of 45 degrees. It is proposed to add to it two wings, and the three hangars will be erected alongside. This type of hangar has already been considered in connection with Laverton. Each hangar will be 100 feet by 80 feet, with the doors capable of being opened for the full length of 100 feet. The external walls will be of brick. It is intended to build the three at once, and they can be multiplied as the station grows. I take it that they will be built to a standard in accordance with the present-day knowledge of aircraft. It is the latest type of hangar, and a great improvement on the existing hangar which is about 30 feet high. The doors will be of a sliding type in sections of about 3 feet resting on a steel curved track, and as the doors open, instead of accumulating at the side as they now do in the existing hangar, they slide back inside the building along the side walls. The door will hang on hollow tubes, supported on a steel roof principal placed over the opening 100 feet wide. Doors of this type are very easily handled. There will be no terrific operation as is now necessary at the existing hangar. The sections will run one after the other, and carry their own weight. The Committee may have seen the same system operating in private garages. It is a very easy arrangement, and the best type of hangar door that has so far been devised. At any rate it will be first tried out at Laverton, and any improvements, if necessary, can be embodied in this plan. The hangars will be constructed of steel roof trusses with corrugated iron roofing and brick walls. The floor will be of concrete 6 inches thick. The cost of the hangars for Laverton is estimated at £5,000 each. I do not think that this estimate will be altered in the case of the Richmond aerodrome. The next buildings are for the use of the citizen forces, marked Nos. 10, 11, and 12 on the lay-out plan. It is proposed to erect these to the east of the site reserved for future hangars, for which ample room has been provided. Four of these huts are proposed, each one being 101 feet long by 26 feet wide. They will be of timber and weather-board construction, galvanized iron roofs,

and inside walls and ceilings lined. There will be one large dormitory 70 feet by 25 feet with a living room and verandah at one end, and lavatory and shower at the other end. It is estimated that each building will cost £1,300, the total cost being £5,200. It is not proposed to have partitions in the dormitory. The plan shows partitions, but they will not be erected at present. It is proposed to remove to the aerodrome the buildings erected on land held under permissive occupancy, but they will be in addition to the four huts proposed. I think it could be arranged to enlarge the bathroom to provide for three showers. It would be an improvement, and would cost very little extra.

59. *To Senator Reid.*—These huts will be utilized practically throughout the year by various units of the Citizen Forces.

60. *To the Chairman.*—The next building is the permanent officers' quarters, marked No. 14 on the lay-out plan. It will be situated east of the ground reserved for hangars, and east of the huts for Citizen Forces. The drawing is No. 10. The building will be exactly on the lines proposed for Laverton, the plan of which the Committee has recently considered. It is proposed to erect this building in two sections, the centre and the right wing now, and the left wing at some future time. The first portion proposed to be built will consist of fourteen bedrooms, with billiard room, reading room, and dining room in the main building. A kitchen will be connected with a covered way. The dining room will seat 60. It is proposed at some future date to provide fourteen additional bedrooms. Each bedroom is a single room 12 ft. by 10 ft. The dining room and reading room are 24 ft. by 20 ft. The estimated cost of the future extension is £3,000. There is no chimney in the building. No fireplaces are provided, but the building will be heated by a hot-water system. From the point of view of appearance, fireplaces look well, but the hot-water system will be cheaper. I should be inclined to favour the installation of fireplaces and also the hot-water system if it meets with the requirements of the Defence Department. I do not think that it is intended that the hot-water system should extend to every bedroom. This is done at Duntroon, because the bedrooms are really studios. This building will be of timber and weatherboard construction, with a galvanized iron corrugated roof, and inside walls and ceilings lined. The quartermaster's messroom and messroom for cooks, &c., will be erected as separate buildings on each side of the kitchen block. There is, except cost, really no reason why each bedroom in the permanent officers' quarters should not be provided with a fireplace. The next item is the temporary officers' quarters, No. 15 on the lay-out plan. It will be situated south of the permanent officers' quarters. These buildings are now situated on portion of the common held under permissive occupancy, and will be removed and re-erected. I do not think it would be possible to remove them without dismantling them because the fibrous plaster sheeting would not stand off all the fibrous plaster sheeting. I dare say 25 per cent. or 30 per cent. of it could be re-used. The frames could be re-erected and sheathed with weatherboard, the inside being lined with fibrous plaster sheets. These buildings are now the property of the Defence Department. The whole of the buildings, with the exception of the roofs, should be dismantled. In any case, we should take all the plaster sheets out. They are good buildings, but if removed as a mass the fibrous plaster would probably crack. I do not think that the New South Wales Government erected these buildings under the cost of £4,000. The next building comprises officers' quarters, men's quarters, and two separate quarters, probably for the married officer in charge and his adjutant. It is marked No. 16 on the lay-out plan. Drawing No. 11 shows quarters for sixteen batmen.

This building will be erected immediately behind the kitchen wing of the permanent officers' quarters. It is a weatherboard building 78 feet long by 28 feet wide, with a galvanized iron roof. It will be somewhat similar to the plan proposed for Point Cook, consisting of six bedrooms and front verandah and lavatory accommodation at each end. The bedrooms will be 12 ft. 6 in. by 10 feet, and two men will be accommodated in each room. A 6-ft. verandah will be provided outside. This building will provide accommodation for twelve men. Items Nos. 19, 20, 21, and 22 are four commencing buildings of a group of eleven. It is proposed to erect these four buildings at a cost of about £6,100 each. They will be two-storied buildings of timber construction. Each will have accommodation for 40 men in single rooms 12 ft. by 8 ft. Good verandah accommodation and suitable lavatory accommodation on each floor will be provided. These buildings are on the same plan as those proposed for Point Cook. The total estimate is £24,400, subject to Mr. Oakeshot's revision. From inquiry at Richmond yesterday, I ascertained that that town is very favorably situated for obtaining materials locally. Labour will cost about 10 per cent. more than in Sydney. Personally, I should like to see these buildings built in brick. Bricks cannot be obtained locally, but are available about half-way between Richmond and Sydney. Brick buildings at Point Cook will be rather an expensive item, due to the long haulage. I do not think a building of brick walls and wooden partitions would add very much to the cost. The increase would be about 7½ per cent. Of course, the roof would be galvanized iron. These are to be two-storied buildings, and will appear prominently in the group. It will therefore be very satisfactory to have them built of brick. A front verandah and balcony is provided in each of the buildings. Good bricks will cost from 9s. 6d. to 9s. per 1,000 delivered at Richmond. The next building is the gymnasium, No. 29 on the lay-out plan. It will be situated conveniently for the men, being among the group of two-storied buildings. It will be a one-storied building, but higher than the ground floor of the two-storied buildings. Its dimensions are 84 ft. by 36 ft. The building will be of timber and weatherboard construction, with wood floor and galvanized iron roof. The size of the gymnasium hall itself is 57 ft. by 34 ft. 6 in. There will be a stage and dressing room at one end and a cloak room at the other end, with a cinema room overhead. The inside walls and ceiling will be lined. The ceiling will be 14 feet high, the roof being open to the ridges, which will be 23 feet from the ground. The estimate of £4,000 seems too much for a building of this kind, and no doubt it will be lowered in the revision. There are various sawmills in this district, and very likely most of the timber could be supplied on the spot. The next building is the recreation hall, item 30 on the lay-out plan. It will be the central building of the group, facing Cornwallis road. Its size is 82 ft. by 46 ft. It will be a large building than the gymnasium. It will be of timber and weatherboard construction, walls and ceiling lined, with galvanized iron roof, lounge 40 ft. by 25 ft., with billiard room 45 ft. by 20 ft. at one end, and reading room, library, barber shop, and lavatory at the other end. It includes verandah, canteen store, and cloak room. Lieutenant Hepburn is arranging to provide fireplaces in this building.

61. *To Mr. Bakley.*—The recreation hall will be mostly for the men's use.

62. *To the Chairman.*—The next building is the air-men's messroom and kitchen, situated behind the recreation building. It is No. 31 on the lay-out plan. It is on the same plan as the building at Point Cook, which has been put to the test and found suitable. It will accommodate 256 men. In the first stages, in the

interests of economy, two bays of the building might be left out of the plan. Accommodation for fewer than 256 men might suffice for the first year. The Defence Department is not putting forward any extravagant proposal, and these details could safely be left to its discretion. The size of this building is 70 feet long and 42 feet wide. In addition, there are two 10-ft. 6-in. verandahs. It will be of hardwood timber construction and galvanized corrugated iron roof. The extreme size of the kitchen will be 65 ft. by 40 ft., sculleries, pantry, cooks' lavatories, &c., being provided. If the barracks are constructed in brick, I should recommend that this building should also be constructed in brick. In fact, I recommend that the buildings comprised in this group should be uniform, built of brick, with galvanized iron roofs. This will be a one-storied building. The next building is the sergeants' mess and recreation room, No. 32 on the lay-out plan. It will be situated at the rear of the kitchen of the men's messroom. The idea is that the same kitchen will supply both messes. The actual messes will be separate, but the meals will be served from the same kitchen. It is the practice in the army and the navy to keep the sergeants' mess separate from the men's mess. Space is provided for future extension. Two bedrooms are also provided. The main building will be 33 ft. by 26 ft. Each of the wings on each side will be 20 ft. 6 in. by 25 ft. The next building is the married officers' quarters, items 33 to 38. The same class of house has been recommended at Laverton. It will be remembered that the committee recommended that similar quarters of brick should be erected at Laverton, if the tender were within 12½ per cent. of the estimate for wood construction. As pointed out by Lieutenant Hepburn when giving evidence, these houses are rather on the small side, and we have therefore increased the accommodation by the addition of a bedroom. We are calling tenders for buildings with brick walls, and lath and plaster inside partitions. In this way we shall probably meet the views of the Defence Department and of this Committee respecting the cost. Tenders are now being called, and we shall soon know the result. It would be a pity to erect houses not considered suitable by the Defence Department. After all, for a commanding officer, a house containing four bedrooms is not a great deal to ask for. The size of the house would have to be increased to some extent to provide for an extra bedroom.

63. *To Senator Reid.*—The saving in providing timber or lath and plaster partitions would be something like £150 on each house, due to dispensing with foundations for inside walls.

64. *To the Chairman.*—It is proposed that there shall be six married officers' houses, two houses for the station commander and the wing commander, and the married air-men's quarters. These buildings should be built of brick. Although the designs of these houses are not extravagant, yet the estimated cost seems to be forbidding. We are all apt to forget that the cost of building has within the last ten years increased nearly 100 per cent. I think that it would meet the Defence Department's requirements if these buildings were constructed of brick with lath and plaster partitions. I shall show the Committee later a modified plan showing the increased accommodation. The next building is the oil store, item 51 on the lay-out plan. It will be a one storey brick building, 17 feet by 12 feet, with 10 ft. 6 in. ceiling and galvanized iron roof. It will have a concrete floor, and walls lined with fibrous cement up to the ceiling. There are four stores to be erected. Item 52 is the petrol store, of two chambers each 20 feet by 12 feet by 10 ft. 6 in. high, with brick walls and iron roof. The next item is the bomb store, to be situated between the oil store and the pyrotechnic store. Although this building will contain bombs, the detonators and fuzes will not be stored in it. Its size

will be 20 feet by 12 feet. It will have a griless concrete floor and a double roof. The external roof will be galvanized iron on boarding, and the internal roof of timber lined on the under side with fibrous cement on boarding, and on the upper side with bituminous material. The windows will have steel shutters. The bituminous roof will be flat and the outer roof pitched. I take it that this form of roof is desired to keep bombs at a certain temperature. In addition it is suggested that the existing hangar be remodelled. Roof repairs are estimated at about £28, repairs to roof trusses £432, and new roller doors £774, totalling £1,306. Regarding the site for the residential quarters at Richmond, I prefer the proposed site to that situated on the common between the cemetery and refuge paddock, as favoured by the members of the Richmond Council. In the interests of economic building these quarters should be close to the railway station. I do not think that the proposed lay-out could be much improved. There is no drainage difficulty as far as I know. It may be necessary to acquire extra land on the other side of the road along the northern boundary for the treatment of sewage effluent. The biggest factor dominating the position of the residential quarters is the vicinity of the men to their work, and therefore the houses should be as close to the hangars and railway station as possible.

The witness withdrew.

Allan Hopburn, Flight-Lieutenant, Royal Australian Air Force, recalled and further examined.

65. *To the Chairman.*—It is not likely that any explosive bombs will be stored in the bomb store. The airmen must have practice in bombing, and in this respect we use other dummies or petrol bombs. The petrol bombs have no high-power detonator, but are filled with petrol. They do not explode when landing, but simply burst into flame. The petrol itself will explode, but it is a very unlikely occurrence. Amatol, which is used in live bombs, will not be stored in the bomb store. The detonators will be kept at Liverpool. Only Very light pistols, flares for night landing, and rockets will be stored there. Nothing will be stored likely to cause any explosion.

(Taken at Sydney.)

THURSDAY, 6TH NOVEMBER, 1924.

Present:

Mr. GREGORY, Chairman;

Senator Reid	Mr. Jackson
Mr. Blakeley	Mr. Matthews.
Mr. Cook	

John Norman Campbell MacTeggart, M.E., M.Inst.-C.E., Acting Chief Engineer, Water and Sewerage Board, Sydney, sworn and examined.

66. *To the Chairman.*—Respecting the water supply for the Richmond aerodrome, a letter was received from the Commonwealth Department a few days ago asking the board to lay certain water pipes. I have not a copy of the letter with me, but I believe that it requested the board to increase the dimensions of the pipe leading from the reservoir from 6 inches to 8 inches. The Richmond water supply is pumped from the Hawkesbury River to the reservoir on the western bank, and from there it flows through a 6-in. pipe into the town. It was originally proposed to erect a small elevated reservoir in the town, to augment the supply, and also to increase the size of the pipes part of the way from 6 inches to 8 inches. The reduced level of the reservoir is 206 feet. The age of the existing 6-in. pipes has reduced the discharge. Cast-iron pipes con-

rod, and in five or six years' time the discharge is much less than when the pipes were originally laid. They, of course, have to be cleaned out periodically, but their condition soon deteriorates. It is now proposed to erect in the town a service reservoir with a capacity of 111,000 gallons. I do not think that the pressure will be sufficient for fire-fighting purposes at the aerodrome, in addition to the water supply. The plant at the river will pump 200 gallons a minute. When the pipes into the town have been increased to 8 inches, and 6-in. pipes have been laid from there to the aerodrome, we shall be able to deliver 160 gallons a minute at the aerodrome. The pressure there will not be great, because the ground has an elevation of about 50 feet. The reduced level of the reservoir is 206 feet above Sydney water level, and the reduced level of the elevated tank that we propose to erect in the town will be 145 feet. This will provide 160 gallons a minute at street level, that is, a reduced level of 50 feet at the aerodrome. If it is proposed to supply water at the height of the roofs of the building, the pressure would naturally be decreased, and therefore for fire-fighting purposes it would be necessary to have at the aerodrome an elevated reservoir that would be filled at night-time. This would provide a constant supply of water for fire-fighting purposes. The Grose River scheme was investigated in 1907. It really concerns the Burrallow Creek, which connects with the Grose River. The scheme was to erect a small dam across the creek, and to have a pipe-line from there in the town. The water would be supplied by gravitation. The water is excellent, as the catchment from the Burrallow Creek is comprised of sandstone country. The present water supply is taken from the Hawkesbury River. The water is quite clear, but we precipitate any clay by the use of alumino-ferrous solution. A medical officer makes regular chemical tests, and so far they have been very satisfactory. That method of treatment is absolutely safe. I should be quite satisfied to continue the Hawkesbury River scheme, so far as the health of the community is concerned. There is no possibility of the Burrallow Creek scheme being established in the near future. It requires a great deal of investigation. Another scheme called the Grose River scheme to augment the Sydney water supply, was also suggested. That scheme has never been investigated by the board. The estimate for the Burrallow Creek scheme in 1907 was £170,000, but now it will probably be £300,000. I cannot guarantee the figures, as the officers who considered the scheme have all passed out of the service. It is probable that the cost of the scheme would be prohibitive. The Water and Sewerage Board would not concern itself with this scheme, although if a private company were to take up this matter and install a hydro-electric plant, it might be made a paying proposition. The Grose Valley scheme, by which the Sydney water supply might benefit to the extent of anything up to 40,000 gallons a day, has not been sufficiently investigated. It would take some years of investigation before it could be put before any board of inquiry. Even if it were suitable, it might be 50 years before being completed. The Water and Sewerage Board has expressed itself as agreeable to carry out the alterations asked for by the Commonwealth authorities, that is, to put in an 8-inch pipe from the reservoir to the town, and an independent 6-in. pipe direct to the aerodrome. I would recommend that the Commonwealth install at the aerodrome a 30,000-gallon tank as a reserve for fire-fighting purposes. The scheme, while the pipes were clean, would ensure an adequate supply to the aerodrome of 150 gallons per minute. In ten years' time the supply would be reduced to half because of the corrosion of the pipes, unless, of course, they were periodically cleaned out. The main to the aerodrome would be under the Board's control. The Board would see that an adequate supply was maintained to the aerodrome. The maintenance of the pipe line would

be the responsibility of the Board. The Commonwealth has offered to pay a moiety of the cost of installing 8-in. pipes, and the whole cost of the independent 6-in. pipe line. The ordinary flat rate for water in Sydney is 1s. a 1,000 gallons. The rate is 1s. 6d. a 1,000 gallons at Richmond. It is a losing proposition as far as the Board is concerned. If the Commonwealth had not asked for this work to be carried out, it would have been completed by the Board and the Commonwealth charged the usual rate of interest on the money expended. It really amounts to the same thing whether the Commonwealth pay the capital cost or the interest upon it. It is the usual procedure for the Board to receive 5 per cent. on the capital cost, including rates. Any interest in excess of the rates charged is treated as deficiency, and whoever requires the pipes laid has to guarantee the deficiency. In this case the Commonwealth has asked us to carry out certain work, and the Board has approved of it. The estimated cost of the 8-in. main for 5,205 yards is £12,564, and the cost of laying the 6-in. pipes at the aerodrome for 4,600 yards, £6,785. The Commonwealth has offered to pay a moiety of the cost of the 8-in. main, and the whole of the cost of the 6-in. main. The cost to the Board would therefore be £6,282, and to the Commonwealth £13,068. The estimate may be more or less. Respecting the establishment of a sewage treatment plant on 5 acres of land across the road on the northern boundary of the aerodrome, if the land is of clay it will gradually foul even if ploughed up. It would not be a permanent success. If the land is of a sandy nature, there is no reason why the system should not be a success, especially with a small population, and in addition be perfectly healthy. It is proposed to carry out some experiments on a small scale in the way of treating septic tank effluent, and if successful the system will be suitable for small settlements like country towns. I presume that compressed air will be available at the aerodrome, and therefore the activated sludge system would really be the best. Experiments are being made by the Sydney Public Works Department at Folly Point in a tank provided for experimental purposes. The results of those experiments will be available in about a couple of months. I see no objection to a sewage treatment plant being established at Richmond. The effluent is quite innocuous, and really just like drinking water.

67. *To Senator Reid.*—The effluent from a septic tank has a fertilizing value. Much greater than that of water. There will be plenty of water for domestic purposes at the aerodrome. The Board's proposed expenditure of £6,282 on the water system does not include the cost of the elevated reservoir. Unless the Commonwealth provides an elevated tank at the aerodrome the water supply will not be sufficient for fire-fighting purposes. Sprinklers could be installed at the aerodrome, but if they were supplied from the Richmond water system the pressure would be reduced. Many buildings in Sydney have water towers which supply a pressure sufficient for the Grinnell sprinkler, which is one of the best fire-fighting appliances. A pipe would not take more than one loss. Information as to the quantity and pressure of water supplied by a fire hose could be obtained from the Fire Department.

68. *To Mr. Cook.*—I am satisfied that the aerodrome will have an abundance of water for domestic purposes. It is proposed to lay about 6 miles of piping, and this will reduce the head. Although there will be a flow of 150 gallons per minute, the pressure would be greatly lessened. I have no information respecting the loss of head.

69. *To the Chairman.*—The 8-in. pipe will end at the reservoir, and the aerodrome will have a direct 6-in. main. The elevated tank in the town will be 145 feet high, and instead of connecting the aerodrome supply

with the tank, it is proposed to commence it from a head of 206 feet. I am doubtful about the pressure of water in the event of fire at the aerodrome. We have no means of supplying increased water. If a sewage-treatment system were installed near the aerodrome I do not think that the inhabitants of Richmond would object to the effluent. The Richmond water supply is continuous. If the electric pumps at the pumping station break down the steam pumps can be used temporarily.

70. *To Mr. Blakeley.*—With 8-in. pipes the pressure of water will be greater. I think that each inhabitant would use an average supply of 50 gallons a day, taking into consideration baths and other supplies in hot weather. Sydney people consume something like 60 or 70 gallons a day, according to the weather. I suggest to the Committee that it consults the fire brigade about the capacity of an elevated tank sufficient for fire-fighting purposes. With a 200-ft. head we could supply an elevated tank 100 feet from the ground with water every night by gravitation.

(Taken at Sydney.)

SATURDAY, 8TH NOVEMBER, 1924.

Present:

Mr. GREGORY, Chairman;

Senator Barnes	Mr. Cook
Senator Reid	Mr. Jackson
Mr. Blakeley	Mr. Matthews.

Allan Hopburn, Flight-Lieutenant, Royal Australian Air Force, recalled and further examined.

71. *To the Chairman.*—On the advice of the Committee I have further considered the question of the building material to be used at the Richmond aerodrome, and have come to the conclusion that the following buildings should be constructed of brick:—The hangars, the oil store, the petrol store, the bomb store, the pyrotechnic store, and the general store, with a saw-tooth roof. These buildings will contain, approximately, £150,000 worth of material which will be subject to considerable damage if not properly protected from sudden changes of temperature and fire. If destroyed by fire the material could not be replaced in a period under twelve months. In case of fire the principle adopted by the Royal Air Force is that the first care must be for aircraft in flying condition, and, second, for parts of aircraft. The buildings mentioned contain aircraft and parts of aircraft, and, therefore, must be adequately protected from fire. The temperature in the bomb and pyrotechnic stores must be kept as even as possible, and, therefore, these buildings are designed with a double roof. If the remaining buildings were constructed of timber the units established at the station could carry out their duties in an efficient manner. The greatest argument against wooden buildings is the continuous depletion of our future votes to provide for maintenance. Respecting the proposed two-storied barracks, under the present design there is a risk to the personnel from fire, because at present only one exit to the upper story is provided, but designs are now being prepared to provide doors and a porch at the end of the passage, similar to those on the ground floor. If the hangars and stores were built of brick all buildings, except for the two-storied building, would be adequately covered against fire risk. Our greatest objection to wooden buildings is the cost of maintenance. If the two-storied barracks were destroyed by fire the loss of equipment would not be great, but the building itself would be of considerable value. The airman's mess and the sergeants' mess are in the same group as the two-storied building. From an architectural point

of view, if the two-storied buildings are to be erected in brick then the other buildings in the group should not be erected of timber. It would not look well to have a mixed group. In addition, the kitchen attached to the airman's mess in that group will contain a large boiler which will supply hot water for the whole of the quarters and the cook-house. The kitchen will also contain a large cooking range capable of supplying 300 men. Owing to the risk of fire from these facilities it is necessary that the building should be constructed of brick instead of timber. It is not advisable to have a boiler in a timber building. The gymnasium and recreation building will not be in such continuous occupation as will be the two-storied barracks. There is nothing against building them of timber, except the cost of maintenance. If it is decided to build them of timber I suggest that the lay-out be re-adjusted to make a timber group and a brick group. I do not think it would be wise to construct the two-storied buildings of wood. Buildings with brick outer walls and timber partitions inside would answer our purpose very well. In addition to the walls the staircase should be built of brick, because it is the only exit, and if it were destroyed by fire there would certainly be a danger to the personnel. The estimate of £4,000 for the gymnasium seems to me to be high, and I think it could be considerably reduced, very likely by from £200 to £2000. It would be quite suitable and if the cottages were built of timber. The Richmond climate is hot in summer and very cold in winter. Our expenditure is limited to the amount of the vote allotted to us, and we prefer to have a number of cheap wooden houses instead of a few expensive ones built in brick. Timber cottages will be quite satisfactory. No stone is obtainable near Richmond for concrete construction. There is ample suitable ballast in the river for concrete work. There is also a gravel pit on the grounds. I do not think it would be economical to use this ballast for concrete construction.

72. *To Mr. Mathews.*—The gravel to be suitable for walls would have to be put through a screen.

73. *To the Chairman.*—Respecting sewerage, I think it advisable to purchase 5 acres of land situated on the other side of the road on the northern boundary of the aerodrome. It was first proposed to place the septic tanks in the aerodrome area, but we do not think that that is really advisable. It would be much better to have the septic system as far as possible from the quarters. If the 5 acres mentioned can be obtained at a reasonable cost, I recommend that that area be purchased as a site for the sewage plant, and for the disposal of the effluent. The Works and Railways Department proposes to install an efficient plant. With reference to the water supply, it seems to me to be necessary to supplement it by the erection of an elevated tank for fire-fighting purposes. This could be done at a cost within the existing estimate for water supply, viz., £16,000. Mr. MacTaggart, when giving evidence, quoted £14,000 as the cost of the existing scheme without the provision of an overhead tank. A tank of 300,000 gallons capacity would cost from £2,000 to £3,500, therefore, even with the addition of the tank, the estimate would still be within £16,000.

74. *To Mr. Blakeley.*—The pyrotechnic, bomb, and petrol stores will be mounded and fenced. Further plans of the residences have been completed, and are very much to my satisfaction. They have not been submitted to the Committee, because it was thought that the price was too high, and would not be approved. The estimate for the officers' quarters is £1,870, but I think that can be reduced to £1,500. The new estimate for the commanding officer's quarters is somewhere about £2,300. The estimate for a brick residence, containing four bedrooms, a drawing-room, dining-room, a large sleep-out, and a kitchen, is £2,300. We thought it useless to place this high estimate before the Committee. The officers

and men are paid house allowances, and the deduction for the occupation of residences will be 4s. 6d. a day in the case of officers, and 1s. 9d. per day in the case of the men. It represents nothing like the interest on the capital invested in the houses. I have no alternative plans for other quarters. The sergeants' quarters and the men's quarters are very satisfactory. We have erected something after the same style of quarters at Point Cook. The houses are quite big enough. To suit the exigencies of the service the men are liable to be moved from place to place, and they do not want a lot of furniture, nor do they want large houses.

75. *To Mr. Mathews.*—Respecting the water supply, I think that a reservoir, with a head of 200 feet, an 8-inch pipe to the reservoir, and a 6-inch pipe thence to the aerodrome, with the addition of an elevated tank at the aerodrome, would be quite sufficient for domestic and fire purposes. At Point Cook a water tower was erected and booster pumps provided. The trouble there is that the tower is not situated on the highest part of the land, and in that way a head of about 8 feet is lost. At Richmond the tower would be situated on the highest part of the land, and booster pumps would not be required.

76. *To Senator Barnes.*—Respecting the cost of the officers' quarters, we have based our estimates at about £200 square. We have taken into consideration the distance from the large towns in which houses can be built at £35 a square. Timber in the town costs about £65 a square. I know that the War Service Homes erect houses at under £62 a square. It is difficult to understand why we cannot get the same thing done. The Laverton houses were estimated by the Department to cost about £1,100 each. The lowest tender was £1,400, and others were considerably higher.

77. Some of the men at Werribee have, through the State Bank, erected five-roomed houses at a cost of £350, including the land.

78. *To Senator Reid.*—The cost of a house depends a good deal upon the class of material used in its construction.

79. *To Mr. Jackson.*—I do not approve of the suggestion put forward by a number of the councillors at Richmond to build the residences on a block of land close to the town of Richmond. It is undoubtedly closer to the town of Richmond and would therefore provide better shopping and social facilities. Of course, in the event of a fire or explosion there would be less risk of the whole of the buildings being destroyed. But the disadvantages of that situation would be considerable. A roadway would have to be constructed to connect it with the aerodrome. It would mean additional sewerage treatment with which we may yet have trouble. It would mean the duplication of water-mains, surface drainage and electric light and power supply. The fire risk would be increased because the men would be further away from the hangars which at night-time are guarded by four men. In the day-time only a few cooks and the women would be left at the living quarters, and, in the event of fire there the men would have to be rushed from the hangars to the living quarters.

80. *To Mr. Cook.*—The Savings Bank would not consider constructing the residences at Richmond without payment of deposits. Some time ago we were short of money, and we were unable to erect additional married quarters at Point Cook. Believing that it was essential to have the men content and not living away from their families, I approached the Savings Bank authorities and asked what they would do in the way of building houses. The men did not want to put down a deposit. We said that we would guarantee that the men would remain at the station if the Savings Bank authorities erected the houses. They would not look at the proposition without the actual deposit being paid. Our building operations have been confined mostly to Victoria. We have considered purchasing the timber and calling tenders for labour and construction. The Works

Director will supply you with information on that subject.

81. *To Senator Reid.*—For sewage purposes, the 5 acres of land situated on the other side of the northern boundary road would consist of a long strip so as to provide a proper grade. We considered that a block 5 chains along the road frontage, and 10 chains down the decline would be quite sufficient. The effluent from the tanks would not go right down to the flat. If it were found by actual experience that the 10 chains were not sufficient to stop the effluent getting down to the flat, we would increase the road frontage. The land would be ploughed to absorb the effluent. Possibly use could be made of the effluent for irrigating the flats. It is not proposed to put sprinklers for fire-fighting purposes in any of the buildings except the stores. If a portion of the general stores were built now and added to later there would be no objection to the dividing brick wall being allowed to remain. From our view-point it would be advisable for protection from fire. The idea of having a large vacant space was to keep every class of store entirely separate, and so that portion of the store would not remain unoccupied it was thought that the most economical way to handle incoming and outgoing material was to have movable wire framework.

82. *To the Chairman.*—The area of common acquired by the Commonwealth is quite sufficient for Air Force purposes. On the other hand, if seaplane bases are established in New South Wales at Rushenters' Bay and Botany Bay, we will need a dépot at Richmond on similar lines to Laverton, but allowing for a rapid expansion in war time. In that event, Richmond would be one of the key places, and the whole of the common would have to be procured. If that were done it would be advisable to control the grazing of stock on the common. In any event, it would be necessary to graze stock to keep the grass down. It is not proposed to erect a fence between the aerodrome and the common, and stock will thus graze upon portion of our area. This will also allow a greater area for aeroplane landing purposes. It would not be necessary for the dwellings to have tiled roofs. During the war the practice was to camouflage buildings in order to try to reproduce the natural features of the site. In any future war the buildings would have to be camouflaged and galvanized iron is much easier to paint than tiles, and I think it is a much better roof.

(Taken at Sydney.)

TUESDAY, 11th NOVEMBER, 1924.

Present:

Mr. Gazeony, Chairman;	
Senator Barnes	Mr. Cook
Senator Reid	Mr. Jackson
Mr. Blakeley	Mr. Mathews

George John Onkeshot, F.I.A., Commonwealth Works Director, New South Wales, sworn and examined.

83. *To the Chairman.*—I am aware of the reference submitted to the Committee respecting the erection of buildings at the Richmond Aerodrome. I have been given particulars of the buildings. I have had nothing to do with the engineering work. I have taken out estimates of the various buildings. Mr. Murdoch, I believe, has informed the Committee that the estimates prepared in Melbourne were only tentative. I have gone very carefully into those estimates, revised them and taken out rough quantities. Very many of these buildings were very difficult to cube out. The hangars comprise large empty spaces. Therefore, I have taken out the quantities roughly to determine the estimated cost.

They vary a little from the Melbourne estimates. In one case, there is a considerable difference. I estimate the wing head-quarters at £1,850. The Melbourne estimate is £2,200, which I think is a little excessive. That building cubed out at 9.3d. The building is of hardwood, weatherboard construction, with wood flooring galvanized from roof, 10 ft. ceilings and verandah in front. The building will be of hardwood weatherboards, principally for the reason of economy. I suggest that every building should be erected in brick, because it would cost only 12½ per cent. more. That is an average estimate. The whole of the wooden buildings, as specified at present, according to my estimate, will amount to £73,855. If they were all done in brick it would mean an additional £9,250. With wood-work there must be constant painting. It would have to be done at least once every four years. I take it that these buildings are to last, and that the aerodrome will be there for some considerable time. If it is to be a permanent establishment, it will pay to erect buildings of brick. However, that is a matter for the Committee to decide.

84. *To Mr. Cook.*—In future there might be a change in the type of hangars, but not in that of stores, recreation rooms, and other buildings. In this case, the hangars are to be of brick.

85. *To the Chairman.*—The bricks will be obtained from Auburn, which is situated about midway between Richmond and Sydney. Richmond is considered by the railways to be an extreme suburb of Sydney, being a little less than 40 miles away. The gardroom and quartermaster's store is No. 2 on the site plan. It is drawing No. 4. It provides for 11-in. brick external walls, with concrete partitions to cells. It is a brick building, estimated to cost £2,150, working out at 11.75d. per cubic foot. The coal store will be of concrete. That is No. 3 on the plan. I have had to take out quantities for that building, because I could not cube it. That structure will cost £577. It could not possibly be built under that amount. The garage is of wooden construction, estimated to cost £2,500 or 3.5d. per cubic foot. The general store, No. 5 on the plan, is a brick building estimated to cost £16,000, working out at 6.7d. per cubic foot. It was estimated in Melbourne at £13,550. It could not possibly be built near Sydney at that price. The estimate for three hangars is £5,175 each, totalling £15,550, working out at 5d. per cubic foot. The Melbourne estimate is £5,000 each. The estimate for four huts for the Citizen Forces is £1,450. The Melbourne estimate is £1,300 each. The total cost will be £5,800, working out at 9.4d. per cubic foot. The permanent officers' mess is a wooden building, estimated to cost £7,700, working out at 9.3d. per cubic foot. It was estimated in Melbourne at £6,000. The estimate for the temporary officers' quarters, a wooden building, is £1,850. That estimate was made by myself some time ago. The quarters are the existing timber buildings that are built on land held under permissive occupancy. It seems an excessive cost, but one has to consider the difficulty of moving buildings constructed of fibrous cement slabs, and their liability to breakage. The roofing is of Bakelite, which, when being moved, will crack a good deal, and directly it cracks, there is a danger of the roof leaking. The building, if made in weatherboard, could be moved in two or three sections, but the trouble with the fibrous sheets is that directly a strain is put on them, they crack. They are not at all flexible. The roof could be mended with bitumen, but it does not make a good, sound job. The next item is the batmen's quarters, a wooden building, estimated by Melbourne at £1,150. I have arrived at the same estimate, which works out at 17d. per cubic foot. The estimate for the latrines is £176. These are to be shifted and re-erected. The next items, Nos. 19, 20, 21, 22 on the site plan, are four quarters for 40

airmen or single mechanics. They are estimated by Melbourne at £8,100 each. My estimate is £4,780, totalling £19,120 for the four buildings, working out at 15d. per cubic foot. These four buildings are to be two-storied. The gymnasium, item 29 on the site plan, is estimated by Melbourne at £4,000. I cannot agree with that estimate. My estimate is £2,475, which is a little over 6d. per cubic foot. The Melbourne estimate for the recreation hall is £3,350. My estimate is £2,850, working out at 11.8d. per cubic foot. The Melbourne estimate for the airmen's mess and kitchen is £7,600. My estimate is £5,250, working out at 10.1d. per cubic foot. The Melbourne estimate for the sergeants' mess, No. 32 on the site plan, is £2,400. My estimate is £2,130, which is exactly 1s. per cubic foot. The Melbourne estimate for 6 married officers' houses is £1,270 each. My estimate is £1,245, totalling £7,470, and working out at 11.2d. per cubic foot. Then there are two other houses, one for the station commander, and the other for the wing-commander, which I estimate at £1,490 each, working out at exactly 1s. per cubic foot. I estimate two married airmen's houses or married N.C.O.s' houses at £1,004 each, making a total of £10,930, working out at 11.2d. per cubic foot. Then there are sundry small buildings, including the oil store, in brick, which I estimate at £300, and the petrol store at £600, both of which work out at 1s. 6d. per cubic foot. That is a heavy cost per cubic foot, but it provides for elaborate brickwork in small buildings. I estimate the bomb store at £350, which is 1s. 5d. per cubic foot, and the pyrotechnic store at £350, 10.75d. per cubic foot. Repairs to existing hangar will cost £1,300. The whole of my estimates total £11,200. The houses are quite good and will suit a warm climate such as that of Richmond. If I were building ten houses, I would build them pretty well to the one style and scale, the reason being that in small settlements a difference in the design of the houses arouses jealousy amongst the wives of the men. It would be a great convenience if the verandahs were continued around the ten buildings, and would cost very little extra. The verandahs, as designed, would cost about 50s. per running foot, and an extension of 12 feet would mean an additional expense of £18.

86. *To Mr. Cook.*—Verandahs undoubtedly tend to conserve houses. They would certainly be an improvement, but we are endeavouring to keep down the cost.

87. *To the Chairman.*—The roofs on these buildings overhang about 2 ft. 6 in. The overhanging roof adds very little to the cost. It means an extra length to the rafters, which would be unlined. At midday, when the sun is high, the overhang shelters the house. I should like to provide these houses with more verandah space. Drawing 18 c. 47 shows the married non-commissioned officers' quarters. At the back of the dwelling, between the bedroom and the wash-house, there is ample space for a sleep-out. If this were provided, it would improve the building. I would advocate verandahs being provided to these houses, except towards the south.

88. *To Mr. Blakeley.*—To provide in the non-commissioned officers' quarters a sleep-out, say 16 feet by 8 ft. 6 in., would cost about £30. I do not think it wise to extend the verandah to the end of the building, because it would be a waste of money.

89. *To Mr. Mathews.*—On the present plan, the married officers' quarters and the non-commissioned officers' quarters have no back verandahs, only back porches. It would be quite easy to extend the porches.

90. *To Mr. Jackson.*—There is great objection to removing the buildings now erected on land held under permissive occupancy, owing to the great risk of cracking, and the considerable distance they would have to travel. The distance is about a mile, and unless it is a perfectly smooth road, every sheet would be cracked. Weatherboards are more or less elastic, and no great harm need be done to a weatherboard building when it

is moved. The fibrous sheets could be taken off, but there would be great risk of chipping off pieces at the nail holes. What we intended to do was to move it in sections, as carefully as possible, and if the sheets cracked to renew them. That is allowed for in the estimates. The same applies to the Tuberooid roofing. Possibly, the luts may be shifted for £1,800.

91. *To Mr. Cook.*—These buildings, in their present position, are of no use to the State Government, and it is not very likely that it would repurchase them. It is possible that they could be used for workmen's homes. I presume the aerodrome buildings will be carried out by contract, and probably the contractor might find use for the luts. It would be better to sell the luts just as they are. I have not yet suggested selling them. I do not think that the State Government would object to the use of them by the contractor for housing his workmen. I cannot say what will be the value of these luts when removed. Since I am recommending to the Committee that the whole of the buildings be constructed of brick, I favour inviting tenders for the purchase of the luts. My estimate for new brick buildings to replace the existing wooden and fibro-cement buildings is £2,335 for staff officers' quarters, and £2,558 for men's quarters. If the Committee decide not to construct the whole of the buildings in brick, it is a very fair proposition to remove the luts as they are and make good any damage. It would be a pity to waste them. It is worth the expenditure of £1,500 for four buildings, 100 feet long.

92. *To the Chairman.*—If tenders were called for the luts, I do not think we would get anything like a reasonable price for them. I am familiar with the building material known as Konkra. I have never used it myself. If it is intended to have wooden buildings at the aerodrome, it would be advisable to call for alternative tenders. Konkra is made of New Zealand pumice and cement. The fibre used in the slabs is not to strengthen them, but to enable the stuff to be handled when it is green. When the material is set the fibre really does not add to its strength. The Konkra slab is fastened to studs by a clip, quite an ingenious arrangement. This class of construction requires a timber framework. For external walls Konkra is cheaper than brick. It is £14 per square in Konkra and £17 in brick. This means the Konkra is 17½ per cent. cheaper than brickwork for outside walls. It is slightly dearer than weatherboard, but a much better material. The cost of Konkra partition walls works out at £12 7s. a square, and brick internal walls at £8 12s. a square. This makes Konkra 44 per cent. dearer than brick for inside partition walls. The statement that Konkra is 20 per cent. cheaper than brick is rather misleading. I object to the use of wood and plaster walls because the junction between the stud and the solid brick wall always cracks. The cost of wood and plaster, or fibrous cement internal wall, is £9 a square. Konkra is, therefore, 37 per cent. dearer. Konkra walls will crack just the same as wood and plaster walls. It is the wood that moves and not the plaster. Brickwork is rigid and will not move. Konkra requires the same framework as weatherboard, and makes a good outside wall. If a house were built with a Konkra exterior and a lath and plaster interior, there would be far less outside maintenance than is required for hardwood. Both hardwoods and softwoods can be used with Konkra. The Konkra Company provide for Oregon, but if we used building houses of Konkra we would use a hardwood frame. Oregon timber, coming all the way from America, is naturally well-seasoned, but we do not like to use a foreign material. Practically all hardwood on the Australian market is unseasoned. If hardwood were used for Konkra walls there might be a great deal of cracking in the plaster. Seasoned hardwood is difficult to obtain. Hardwood is the most capricious of wood. I have seen hardwood that has stood in a house for 30 years twist when sawn for re-use.

93. *To Senator Reid.*—The price of hardwood walling is £2 8s., and of Oregon, £2 7s. 6d. I have never yet put a stud partition on a brick wall without it cracking, although it settles down in time.

94. *To Mr. Mathews.*—It would not be satisfactory to erect a hardwood framework and allow it to stand for three months. We could not afford the time. There is one advantage in using wet hardwood; it is easier to work than when seasoned.

95. *To Mr. Cook.*—We have tried Tasmanian oak for vertical hardwood lining and it has proved very effective. There would be very little difference in cost between a lining of lath and plaster and one of Tasmanian oak. Any kind of lining can be used with Konkra exterior walls.

96. *To Senator Reid.*—Fibrous cement inside partitions are dearer than lath and plaster walls; the junctions are covered with strips of wood, which are afterwards painted. It makes an excellent job.

(Taken at Sydney.)

WEDNESDAY, 12TH NOVEMBER, 1924.

Present:

Mr. Gzozow, Chairman;	
Senator Barnes	Mr. Cook
Senator Reid	Mr. Jackson
Mr. Blakeley	Mr. Mathews.
Henry Gustavus Connell, Chief Civil Engineer, Department of Works and Railways, sworn and examined.	
97. <i>To the Chairman.</i> —I am concerned with the engineering services at the Richmond aerodrome, the estimates for which are as follows:—	
Water supply	£16,400
Sewerage	4,500
Storm-water disposal	2,400
Roads and footpaths	20,000
Grading, &c.	1,000
Contingencies	700
Electric transmission line, sub-station, and equipment	1,245
Low tension distribution and interior wiring	3,150
Hot water supply to gymnasium, airmen's and sergeants' dining-rooms, officers' mess and quarters	1,730
Steam cooking plant	1,250
Ice-making plant	550
Patrol tank and motor	250
Sprinkler installation	3,440
Additional machinery	450
	£87,105

I have collaborated with the State officers respecting the water supply, and proposed a scheme to them. There is only one satisfactory source of supply, and that is the Hawkesbury River. The water service to the town of Richmond is at present supplied from the Hawkesbury River by a pumping station, but it is not a satisfactory supply. An extension of the mains from the town of Richmond would not provide the aerodrome with sufficient water. The pumping station is in an exceptionally good position. It has been established for about 30 years, and has been developed in such a way that the floods and freshets of the rivers which bring down large quantities of sand do not interfere with it to any great extent. The Richmond Council are improving the plant, having put in new pumps and motors. The pumping station is on the far side of the

river. The water is deep, and is pumped up to a 250,000-gallon reservoir built on a hill on the left bank of the river. The reservoir is 200 feet high. From there a 6-in. main runs into the town of Richmond. The supply is not good. In the first instance, it was proposed to increase the main to 8 inches, but the Metropolitan Board of Water Supply and Sewerage later decided to erect on the border of the town an overhead tank about 70 feet high to contain 110,000 gallons. The water would gravitate to the town. The Board considered that the supply would be sufficient for town requirements, but it would not be of any value to us at all. We proposed to the Board to increase the size of the main supplying the town, and then from the point at the main where it diverts into the town tank to give us a separate connexion to the aerodrome by a 6-in. main. In that way we would have a connexion from the reservoir to the aerodrome without any draw-off. This would give us a distinct advantage, because in case of emergency we would be able to draw off water quickly. It was proposed to the Board that we should pay a moiety of the cost of enlarging the main. A later development has occurred within the last few days which may improve the quantity of water available at the aerodrome. The Agricultural College situated on the Hawkesbury River has its own independent pumping supply from the river but it is not a very satisfactory arrangement. The secretary of the College had an interview with me, and he proposed that the College should join in with the Richmond supply and improve it to the extent that both the College and the aerodrome could draw off it. If that were done it would not make any difference as far as the domestic supply at the aerodrome was concerned, but in case of fire we would have twice the quantity of water to draw from. This arrangement would make no difference to the cost. The College would have its own independent 6-in. main, but the main pipe would be 10 inches or 12 inches. There would be no draw-off other than for aerodrome purposes from our own 6-in. pipe. With this new method of connexion we will obtain 140 feet static head. We are 140 feet below the reservoir, the distance being about 6½ miles. We would be able to deliver water at a 50-ft. head through a fire hydrant. The supply would not be sufficient for fire-fighting purposes for the whole of the buildings at the aerodrome, but would be sufficient for a fire service for the kitchens and domestic buildings. We propose to install Grinnell fire sprinklers for the workshops, store-rooms, and hangars. There will be a 6-in. pipe coming in from the Windsor-road to the aerodrome. It will be 6 inches to a point beyond the take-off from the sprinkler system, and then 4 inches. The situation of the hydrant is shown on the plan. The arrangement was made in consultation with Mr. Lee, the fire chief of Melbourne. He considers that the distribution of hydrants is quite satisfactory.

98. *To Senator Reid.*—The hydrants are placed in such a way that at any point we can draw off two or three hydrants.

99. *To the Chairman.* A hydrant could easily be placed close to the workshops. I should say that the proposed fire service, in conjunction with the sprinkler system, would be sufficient to cope with fires that may occur in the stores. When everything is working at the aerodrome it might be necessary to erect a tower and put in booster pump, but that would be a matter for later consideration as the place develops.

100. *To Senator Reid.*—The pressure would be sufficient to hose the roofs of the single men's quarters, probably for two hydrants. With the increased water supply when the Agricultural College is linked up we might be able to use three hydrants. The hose would give a supply 10 feet over the ridge of the buildings. Next week I am making an inspection of the source of water supply with representatives of the Agricultural

Department and Water Supply. I do not think that we should be asked to pay more than the cost of putting in our own service no matter what arrangements are made with the Agricultural College. I anticipate that the sewerage at the aerodrome will cost £4,600. The whole of the area will be sewerled.

I have considered as a contingency the acquisition of 5 acres of land across the northern boundary road. The estimate for the storm water disposal is £2,400. It is a large one, but the aerodrome has a big area. It is half a mile north and south, and 1,100 feet east and west. There is hardly any fall in that area, although it looks as if there were a fall to the south of 7 or 8 feet. From the north-eastern corner to the south-western corner there is a difference of 1 foot. Having to run pipes on long lines is always costly. If we were to run the sewage in 6-in. pipes we would be over 30 feet deep at the outlet. I was reckoning on sending the storm water in two separate ways. There is a small defined ridge running east and west through the site for the buildings, and I reckoned to take all the water on the southern side away down to the south towards Windsor-road. The water on the northern side would naturally be taken to the gully which runs across the land towards the river. The stormwater running to the Windsor-road will run into the culvert across the road on to flat ground, which is Crown land. There are two ways of obtaining electric power. The generating plant is at the Agricultural College under the direction of the Agricultural Department. Power can be obtained either from Richmond or from the main that goes to Windsor. To take power from the Richmond main would involve the provision of high-tension lines for 1½ miles, whereas the Windsor main crosses just below our property on the Windsor-road. We could certainly save £600 by taking power off the Windsor main. We have approached both the Agricultural Department and the Windsor Council regarding a supply, and the Department is agreeable to supply us with current under certain conditions. We must first agree with the Windsor Council as to the use of its line and the payment for general leakage. The Windsor Council was interviewed. It is agreeable to our proposal provided we come to a satisfactory arrangement regarding payment for the line and leakage. The proposal put forward was that the Commonwealth should pay annual rental for the use of the line, which would be equal to half the charges for interest and sinking fund which the council pay for that portion of the line. It is anticipated that the rental will be probably £50 a year. It is a most reasonable agreement. Then a certain amount has to be allowed for leakage. That can be done in two ways. We could take a percentage of the amount of current supplied—4 per cent. was the amount proposed—and pay that as the loss on the line and on the transformer. As an alternative, we could put two meters side by side, one for the Windsor Council and one for ourselves. The sum of those readings would be compared with the meters at the College on which the charges are made, and we could divide the difference. We think this the better way, because it is quite possible that the readings of those meters will be the same as the reading of the one at the College. To run an independent line direct from the College to the aerodrome would cost £1,000. There is a big plant at the College. The arrangement with the College is that it will supply current either on a cost basis of a maximum demand charge of £10 per kilowatt per year and a charge of 2d. per unit for all units consumed or a flat rate of 3½d. per unit. These two methods practically amount to the same thing. The flat rate has a certain advantage, because if our supply stops, or if for any reason we do not want to use the current, we pay nothing. By the other method we would have to pay £10 per kilowatt. These charges are based on the price of coal. At present the price of coal is 28s. per ton, and it is

proposed if coal goes up 1s. 6d. per ton the cost per unit will be increased one-fifth of a penny. That variation would be subject to an increase or decrease in the price of coal. I consider that sprinklers should be installed in the workshops as well as in the stores. I believe that sprinklers are installed in the Newport Workshops.

101. *To the Chairman*.—It is proposed to install sprinklers in the hangars, workshops, and the big store. Mr. Lee proposed that sprinklers should be installed in the hangars in accordance with English practice. That installation was not included in the first estimate. The sprinklers do not want a great deal of heat to start them. I saw one at the Leichhardt stores that acted from the heat of a small quantity of burning paper about 12 or 14 feet away from the sprinkler.

102. *To Mr. Blakeley*.—The ice-making plant is mostly for domestic use. A certain amount of iced water would be used at times.

103. *To Mr. Cook*.—There is any quantity of water available. The difficulty is the pressure. If at some future time it were necessary to increase the pressure, booster pumps could be installed.

104. *To the Chairman*.—It would be necessary to resume an area of land for sewerage purposes. The sewage has to be pumped, and a pump will need to be installed. The scheme will be similar to the Laverton scheme, except that we propose to run the sewage over aeration beds placed at a high elevation on the land, so that the effluent can be run on to ploughed land, and thus disappear. The system proposed was an ordinary sedimentation tank. If we use an Imhoff tank it will be smaller than a tank used in any other system. I do not think it will be necessary to get the State authorities to approve of the sewage proposal. The aerodrome is a mile away from the river, and if we utilize the 5 acres of land on the northern boundary road the effluent would be perfectly safe. We consider that the population will be 300. The system proposed will be quite satisfactory for a small community. I do not anticipate any trouble from the occupant of the adjacent farm.

105. *To Senator Reid*.—The cost of putting sprinklers in the general store is estimated at £2,000. The amount of £1,400 was added for the installations in the other buildings. The reason for the high initial cost is that an overhead tank must be erected for a sprinkler system. This tank would be suitable for all the buildings.

106. *To the Chairman*.—Sprinklers cannot be run direct from the mains. It is preferable to have a storage in case of a stoppage in the mains.

107. *To Senator Reid*.—The tank is simply a storage to feed the sprinklers.

(Taken at Sydney.)

THURSDAY, 13th NOVEMBER, 1924.

Present:

Mr. GREGORY, Chairman;	Mr. Cook
Senator Barnes	Mr. Jackson
Senator Reid	Mr. Mathews.
Mr. Blakeley	

Alfred Edward Bennett, Managing Director, Konkra Limited, Sydney, sworn and examined.

108. *To the Chairman*.—Konkra has certain advantages over other building material. While it gives a tensile strength, said to be much superior to Durabestos sheets, and a durability and attractiveness equal to brick, yet in actual construction it is 20 per cent.

cheaper. There are several materials used in Konkra, but the main substances are punicee and cement. It is made in sheets 3 feet by 2 ft. 6 in. by ½ inch in thickness. The material is made at our factory at Leichhardt, Sydney. We hope, at an early date, to establish factories in other capital cities. It is a patent process taken out in 1920. Konkra can be used with wooden or concrete studs. Up to the present wooden studs have been mainly used. Brick piers are erected at about 6 feet centres, and for appearance only a 4½-inch curtain wall is erected between the brick piers so that the outside appearance is a continuous foundation. It is possible to put in concrete piers or a concrete wall for the foundations, or else to put in brick piers and run the Konkra itself right down to ground level. For appearance we recommend brick piers with a 4½-inch curtain wall in between. The framework generally consists of 4-inch by 3-inch studs which are placed at 18-inch centres. The Konkra sheets being made 3 feet wide cover two studs. There are two methods of supporting the horizontal joints to the studs. One is to fix 4-inch by 2-inch dwangs between studs, alternately skew nailed and spiked. Another method is to check in flush with the face of the studs a 3-inch by 1-inch batten, which makes a very rigid framing. The Konkra is then nailed on to the studs, nails being driven through a special diamond-shaped clip into the studs. Nails are fixed between the joints of the sheets, three nails being driven between joints on the vertical side, and two on the horizontal side. Also two nails with clips are driven right through the sheets into the central stud. We use 3-inch by 12-gauge galvanized iron nails. The clips are of galvanized iron made in a diamond-shape nearly 2 inches long and ½ inch wide. Having fixed the sheets on the walls, both on the inside and outside studs, and nailed them in place, we then take a 4-inch strip of hessian with a selvaged edge. This is dipped into liquid cement and laid over all the joints. This is fixed on after the joints have been thoroughly grouted with a float of cement wash. Scrimming is done on both inside and outside walls. Finishing coats are applied outside by applying rendering from ½ inch to 1 inch thick, according to the wish of the architect. Generally a cement rendering ½ inch thick is used. The Konkra absorbs the cement from the cement rendering and attains a certain hardness. Konkra in its original state can be easily sawn, nailed, and handled; but when the cement rendering is applied it becomes one hard, homogeneous mass. Cement rendering is not used on the inside. After the joints are grouted and scrimmed a floating coat of lime mix is applied, generally from ½ inch to 1 inch thick, and when that floating coat is dried out a plaster coating is applied, exactly the same as is done to inside walls of a brick house. There is no difference whatever between the inside appearance of a Konkra house and a brick house. Outside the appearance is exactly the same as a brick house that has been rough-casted or cement rendered. The finish need not be rough-casted. The walls can be finished off smoothly, which is a method sometimes used. In addition to the use of hessian there is a method of fixing the joints by Exmet, which is an expanded metal, or else using a special metal strip which we have patented. This metal strip has a certain strength, having a burred edge so that the cement rendering binds into it. We are now investigating the use of concrete studs. This method has been used in New Zealand. There, wooden studs are preferred, because timber is cheap. We find that by building with concrete studs and reinforcing with iron rods, houses can be erected at about the same price as with wooden studs. Concrete studs are made on the job as the walls are erected. We use brick or concrete foundations. Then Konkra sheets rest on the edge of the foundation. This leaves a 3-inch cavity into which we let down two lengths of 3-inch by 1-inch timber. The length depends on the height of the ceiling. These

lengths are placed inside the sheets and form a box. Over the joints is placed a piece of timber about 5 inches by 3 inch thick. That is nailed right through the Konkra to the piece of timber between the studs. The pieces of 3-inch by 1-inch timber are put in temporarily and nailed across. This process is continued until the full height of the wall is reached. The box having been made, a 3-inch reinforcing iron rod is inserted, and concrete poured in from the top. After three or four days, when the concrete is set, the nails are withdrawn from the timber and the timber is used in the same process elsewhere in the building. The concrete stud gives an additional advantage over brick walls. The reinforced rod can be made to project above the top of the stud, and the top plate placed over the projection and then bolted down if necessary. This method of construction is about as strong as brick. A gale has been known to blow down a brick wall, but Konkra provides such a rigid structure that it would take a tremendous gale to affect it. Even during construction a storm could not shift the material, because, from room to room, there is a bracing. In addition to the studs the Konkra sheets have a great strength in themselves. In New Zealand tremendous walls have been experienced. In one instance two buildings were being erected on the open beach. The points of the outside walls were grouted and scrimmed, but were not cement rendered. These houses were inspected by our architect after several inches of driving rain. He went inside and found the rooms perfectly dry and intact. The surface of the outside sheets gradually hardens. We are willing to guarantee that a Konkra house can be built 20 per cent. cheaper than one in brick. Of course, prices vary according to design, but the difference is mainly in the cost of material. Our saving is 20 per cent. In some cases it has been 30 per cent. My estimate of 20 per cent. allows for variation. We are now erecting in Sydney places costing from £2,000 to £3,000. We have erected houses at a cost of from £500 to £1,500. I received the following letter from Mr. Godsell, a member of the firm of Robertson and Marks, architects, of Sydney:—

Undoubtedly the cost of the building inspected was considerably less than could have been obtained by the use of brick. This, for the most part, is because the timber wall framing is erected on brick studs, and thereby the cost of foundations is largely saved. In comparison with cheaper building materials as substitutes for brick Konkra appears to us to be the best.

Professor L. Wilkinson, of the School of Architecture, University of Sydney, wrote on the 3rd November, 1924, as follows:—

After having investigated the process of manufacture and methods of using Konkra slabs I have pleasure in stating that the system seems to me to provide a very useful substitute for brick for cottage buildings and other light structures, such as internal partitions on upper floors. The material itself is easily handled, cut, and ingeniously fixed, and its porosity would ensure good adhesion of finishing coats also in promoting an equable temperature within the building. With adequate protection against decay of the timber framing I consider that the system can be strongly recommended in cases where heavy materials are ruled out on the score of cost. I have examined the sample sheet submitted, and marked same. The sheets which I have used have been fully up to the sample, and have made a perfectly satisfactory job. Mr. John T. Dale, of Gordon, Sydney, wrote on the 30th October, as follows:—

It is now just about twelve months since I entered into contract for a cottage constructed of Konkra, and I must endorse all the favorable opinions which have been expressed concerning this material. The cost of construction ran out just about 20 per cent. less than the estimate furnished for a similar residence in brick, which, of course, is of great importance. In addition, it has proved to be warm in winter, and owing to the interior walls and the exterior walls being cavity it is cool in summer. There can be no doubt that when its effects are more widely known Konkra will be extensively used in the construction of dwellings, more particularly in warm climates.

In New Zealand, where we have been established for eleven years, the Government are granting loans of from 80 per cent. to 100 per cent. on Konkra buildings.

repayments being made over a 30 years' period. In one case a man was advanced 100 per cent. It shows the confidence the New Zealand Government has in this method of construction. The Railway Department in New Zealand is using it for workmen's homes on country lines.

109. *To Mr. Blakeley.*—My estimate for the commanding officers' quarters (two) Richmond, with Konkra, interior and exterior, is £900; for married officers' quarters (six), £700; and for married airmen's quarters (ten), £650. This estimate would include the ordinary bath, costing about £7, a wash-basin, lavatory seat, fire stove and chimney. If concrete studs were used the increased cost would be 5 per cent. at the most. They might work out at the same price as wooden studs. These prices are approximate. We provide for brick or concrete foundations according to the plan. I am surprised to learn that the Commonwealth architect, in giving evidence before the Committee, said that Konkra walls were approximately 17½ per cent. cheaper than brick, but that for internal partition walls Konkra would amount to £13 7s. per square, as against £8 12s. per square for brick, the difference being 44 per cent. Evidently the Commonwealth architect has received misleading information. One cannot estimate the cost of a house by taking one section of wall. We are prepared to get genuine tenders for the buildings at Richmond at the estimates I have submitted. I am prepared to go into the figures with the architect and show him that Konkra internal walls cost no more than brick internal walls.

110. *To Senator Reid.*—I have taken the square of a wall in brick, Konkra, and weatherboard. I came to the conclusion that Konkra was cheaper than brick or weatherboard. It is a recognized fact that weatherboard is cheaper than brick. One cannot arrive at the cost of a house by taking the square of a wall.

111. *To Mr. Mathews.*—If I am allowed a fortnight I am prepared to bring down signed tenders at the figures submitted. Unless a person has created buildings in Konkra he cannot be familiar with the cost of building.

112. *To the Chairman.*—The transport of Konkra is very cheap. Konkra is easily made, and if necessary we would be prepared to erect a small plant and make our material on the job. This would cheapen the cost somewhat. The saving is not so great in the case of a two-storied building as it is in the case of a one-storied building, because it is mostly gained on the foundations. Even with concrete studs there might still be a 20 per cent. saving on a two-storied building. My estimate for the recreation hall, Richmond, is from £1,950 to £2,050. If alternative tenders are called, we shall see that tenders are put in at right figures. Workshops containing machinery could be built of Konkra. There would be a saving in this respect, because the inside

walls would not need to be lined. They could be white-washed or painted. This would probably make the cost even in some cases 40 per cent. cheaper. The machinery would not affect the wall, because it would be placed upon concrete pieces. In New Zealand butter factories, shafting has been carried on Konkra walls.

113. *To Mr. Blakeley.*—By mixing a material termed pudle with the Konkra, it is made absolutely waterproof. This is considerably used in building. It was used at the Moorefield Race-course, in Sydney.

114. *To Senator Reid.*—Chimneys are usually made of brick. We have a special chimney made of pumice. It is cheaper than brick, and is used in New Zealand. Both brick and pumice chimneys are used in New Zealand. I have not made any inquiries about Konkra chimneys, because, so far, we have concentrated on the material. In Sydney we have used brick chimneys throughout, except in one case where a Konkra chimney was used. Carpenters are used to put up the framework of houses, and any one can nail on the Konkra. The walls can be panelled the same as brick walls. The outside walls can be done in rough-cast or remain smooth and be coloured to suit taste.

115. *To Senator Barnes.*—We obtain the pumice from our own deposits at Wanganui. It is sent here and the slabs made at our factory. We have not built roofs of Konkra, but have used pumice for insulating flat roofs of large city buildings. There is a difficulty in building flat roofs of reinforced concrete, because the heat expands the iron and the roof cracks. We place a layer of pumice over the roof and finish over that with Neufchatel asphalt or three-ply. The pumice acts as an insulator and prevents the penetration of heat. Of course, for roofing, the material would have to be made impervious, so that it would not absorb water, although both tiles and brick absorb water.

116. *To Mr. Cook.*—The Konkra Company has been in operation about fifteen months. We registered in Australia in April, 1923. In regard to insurance risk, the insurance companies in New Zealand have been charging 4s. I think it is possible to get the same rate in Sydney. The rate for weatherboard houses is 7s. 6d. upwards, and for brick houses 2s. 6d. The rate in New Zealand for Konkra houses, with concrete studs, is the same as for brick houses, and I think the insurance companies here would charge the same. They have promised to investigate the matter with a view to reducing the charge. In any case, insurance is a very small item. We, ourselves, will not tender for cottages to be constructed at Canberra, but will secure builders who are prepared to tender. If the Government desired, we should even tender ourselves. I mentioned this to Mr. Murdoch, in Melbourne, some time ago, and I promised to put in prices when tenders were being called at a later date for twenty houses. I have not heard anything since then.