1926-27.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

REPORT

TOGETHER WITH

MINUTES OF EVIDENCE

RELATING TO THE PROPOSED

SELECTION OF A SITE AND ERECTION OF A WHARF AT RABAUL, NEW GUINEA.

Presented pursuant to Statute; ordered to be printed, 14th March, 1927.

[*Cost of Paper*,—Preparation, not given; 820 copies; approximate cost of printing and publishing £56.]

Printed and Published for the GOVERNMENT of the COMMONWEALTH of AUSTRALIA by H. J. GREEN, Government Printer for the State of Victoria.

No. 87.—F.9766.—PRICE 1s. 6D.

MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

(Fifth Committee.)

GEORGE HUGH MACKAY, Esq., M.P., Chairman.

Senate.	*House of Representatives.*
Senator John Barnes.	Robert Cook, Esq., M.P.
Senator Patrick Joseph Lynch.*	The Hon. Henry Gregory, M.P.
Senator Herbert James Mockford Payne.†	Andrew William Lacey, Esq., M.P.
Senator Matthew Reid.	David Charles McGrath, Esq., M.P.
	Alfred Charles Seabrook, Esq., M.P.

* Resigned 30th June, 1926. † Appointed 1st July, 1926.

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EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES.

No. 8 DATED 28TH JANUARY, 1926.

3. PUBLIC WORKS COMMITTEE—REFERENCE OF WORK—WHARF AT RABAUL, NEW GUINEA.—Mr. Marr (Minister representing the Minister for Home and Territories) moved, pursuant to notice—

(1) That, in accordance with the provisions of the *Commonwealth Public Works Committee Act* 1913–1921, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for its investigation and report thereon, i.e., Selection of Site and Construction of Wharf at Rabaul, Territory of New Guinea, and

(2) That the Committee have leave to meet whilst the House is sitting.

Question—put and passed.

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THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

RABAUL WHARF, NEW GUINEA.

REPORT.

THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS, to which the House of Representatives referred, for investigation and report, the question of the selection of a site and the construction of a wharf at Rabaul, Territory of New Guinea, has the honour to report as follows :—

INTRODUCTORY.

1. The Mandated Territory of New Guinea, formerly known as German New Guinea, was captured by Australian forces in 1914, and subsequent to the declaration of peace the Commonwealth received from the League of Nations a Mandate to govern it.

2. In 1919, a Royal Commission was appointed to inquire, amongst other things, into " the condition of the more important public works and the necessity for any further works which will involve substantial expenditure." In the course of their inquiries, the Commissioners investigated the subject of wharfage accommodation at Rabaul, and considered the matter of such importance that they submitted an interim report dealing with that question.

3. In this Report, it was stated that the main wharfage accommodation at Rabaul consisted of a jetty 877 feet long, built on timber piles sheathed with copper, that had been erected by the Norddeutscher-Lloyd Company in 1905. Portion of the floor of the goods shed situated on the deep water end of the jetty was, however, found to be subsiding, and a detailed investigation showed that much damage had been done by the teredo navalis, and that of 460 piles in the wharf, not less than 179 were defective. The Commissioners recommended that, as to put the jetty in repair would involve a large expenditure and the future maintenance costs would be heavy, only temporary repairs should be effected pending the provision of a new wharf. They further recommended that at the earliest date an experienced wharf designer should be sent to Rabaul.

4. In 1920, Mr. A. C. Mackenzie, formerly an engineer in the employ of the Melbourne Harbour Trust, but at that time and since a member of the firm of D'Ebro, Mackenzie & Meldrum, Melbourne, was sent to Rabaul, and he submitted a report in which he recommended :—

(*a*) That the existing N.D.L. wharf be put in a thorough state of repair by the renewal of the defective piles at an estimated cost of £1,500 to £2,000 ;

(*b*) That the whole of the piles in this wharf be covered with half-section Monier pipes, to be made at Rabaul, at an estimated cost of £4,000 ; and

(*c*) That a new coal berth and a general cargo berth with cargo sheds, reclamation, &c., be erected at Rabaul on the eastern foreshore, south of the existing N.D.L. wharf, at an estimated cost of £42,000.

5. The repairs recommended by Mr. Mackenzie were carried out, but in 1923 a fire occurred on the N.D.L. wharf which destroyed the cargo sheds and a considerable portion of the seaward end of the jetty and allowed the contents of the sheds, estimated at 500 tons of cement and about 2,000 tons of general cargo, including machinery, to drop through the jetty into the water.

6. It was then decided to proceed with the erection of a new wharf near the head of the bay to the west of the N.D.L. wharf, and a loan of £36,000 was made available by the Commonwealth Government to the Territory Administration to meet the cost of the work. Plans and specifications were prepared by the Works Director at Rabaul, and tenders were invited towards the end of 1924. The lowest tender was, however, in excess of the money available, and none of the tenders was accepted. The plans and specifications were then amended and modified, and further tenders invited. The lowest of these tenders was also far in excess of the money voted for the work.

There arose a difference of opinion as to the suitability of the new site selected, and as to whether it would not be more economical and better to repair the old wharf, and the Cabinet in 1926 decided to invite the Parliamentary Standing Committee on Public Works to investigate and report in regard to the matter.

PRESENT PROPOSAL.

7. The proposal now submitted for investigation by the Committee aims at the construction of a marginal wharf 600 feet long and 28 feet wide, with a series of six short piers connecting with the shore, to provide a depth along the face of the wharf of 30 feet at low water. It is specified that the piles shall be of ironbark or turpentine sheathed with concrete, the decking of brushbox, and the remainder of the structure of ironbark. At each end of the proposed structure is wharfage accommodation at a lower level for schooners.

8. On the shore adjacent to the wharf it is proposed to erect two sheds—No. 1, designed. to store general cargo, is to be 252 feet long by 60 feet wide, with an extension 24 feet by 60 feet at one end to provide accommodation for a Customs bond store and two offices; No. 2 is to be 252 feet long by 60 feet wide, and is intended wholly for storage of copra. These sheds are to have 6-inch reinforced concrete floors, steel frame work covered with 24-gauge galvanized iron, walls 14 feet high, lined with 6 inch by 2 inch hardwood battens, and to be provided with sliding doors of oregon timber.

ESTIMATED COST.

9. The estimated cost of the proposal as submitted to the Committee is set down at approximately £40,000, and the time fixed for completion two years from date of commencement.

COMMITTEE'S INVESTIGATIONS.

10. The Committee visited Rabaul, inspected the existing wharf and the site proposed for the new wharf, and took evidence from the Administrator and officials of the New Guinea Administration. Evidence was also taken in Melbourne and Sydney from a representative of the Home and Territories Department, the late Director of Works, New Guinea, the Engineer-in-Chief, Sydney Harbour Trust, the Chief Engineer, Department of Works and Railways, the late Chairman, Expropriation Board, the Islands Manager, Burns, Philp & Co., ships' captains, and others. In addition, inspections were made in Brisbane of wharfs in which timber piles cased with different systems of concrete sheathing had been used.

Existing Accommodation.

11. Investigations showed that the existing wharfage accommodation at Rabaul is very primitive and inconvenient. The partially destroyed N.D.L. wharf, close to the centre of the town, is used at times for the discharge of refrigerated cargo and the taking in of water; the Expropriation Board's copra wharf, about 2½ miles to the westward, is a small lightly built structure little more than half the length of overseas boats which use it; and the coal wharf, about 1½ miles to the west of the N.D.L. wharf, consists of two small lightly built jetties which coincide more or less with two hatches of the larger boats using this wharf. Rabaul is the centre of one of the richest portions of the Pacific, and all the evidence received indicated that the shipping business at the port is increasing, and with greater development of the Territory, is likely to continue to increase. Information obtained by the Committee showed that 21 overseas vessels called at Rabaul during the year ended 30th June, 1926, the largest being 6,938 tons gross and having a draught of 25 feet 2 inches.

12. The Committee therefore is unanimously of opinion that urgent necessity exists for the provision of improved wharfage accommodation at Rabaul.

Site.

13. The question of the position to be chosen for the improved wharfage accommodation was one to which the Committee gave considerable thought. Some witnesses contended that no site other than that occupied by the present N.D.L. wharf should be considered, because it is in the most sheltered part of the harbour, close to the centre of the town, and adjacent to the water supply. It was suggested that a jetty as opposed to a wharf offers greater facilities for a vessel berthing or leaving, that a large proportion of the existing structure was not affected by the fire, and that at a comparatively small expenditure it could be reconstructed and give wharfage accommodation sufficient for the next ten or fifteen years.

14. As against this, it was pointed out that—

(*a*) the original structure was 877 feet long by 36 feet wide at the shore end, widening to 60 feet at the seaward end, and would be most uneconomical for the handling of cargo ;

(*b*) it was a serious fire risk and in the event of a fire occurring, only 40 to 60 feet of the end of the shed could be dealt with from the shore side ;

(*c*) the reconstruction would leave a large portion of the old structure whose life is comparatively short, and there would be considerably more maintenance costs ;

(*d*) it is the property of the Custodian, and presumably would have to be purchased ;

(*e*) the estimate of the Director of Public Works for restoring to the old condition is £30,500.

15. The site suggested by the Administration, sometimes referred to as the Malaguna site, although strictly speaking not so far to the west, is almost at the head of Simpson Harbour, and about $1\frac{1}{4}$ miles to the north-west of the old N.D.L. wharf. The advantages claimed for it are :—

(*a*) The land, with the exception of a small portion leased to the Roman Catholic Mission, is the property of the Commonwealth ;

(*b*) When necessity arises, the wharf could be extended to twice the size now proposed ;

(*c*) There is a good depth of water, with an easy approach from the sea ;

(*d*) No erosion or silting is taking place in the locality ;

(*e*) With the sheds on the shore as proposed, ships will be able to work both inward and outward cargo simultaneously, and get a quicker clearance ;

(*f*) Less risk of fire, which, if occurring, could be attacked on a front of 600 feet from the shore end ;

(*g*) Cost of handling cargo would probably be $33\frac{1}{3}$ per cent. to 50 per cent. cheaper than at the old wharf.

16. The disadvantages alleged against the site are :—

(*a*) Greater difficulty in getting vessels alongside and getting away in bad weather ;

(*b*) Slightly more exposed in the south-east season ;

(*c*) Greater distance from the business centre, necessitating longer carriage of imports intended for distribution to the stores and consumers of Rabaul ;

(*d*) Necessity for construction of new road ;

(*e*) Necessity for provision of a water supply.

17. After carefully weighing all the advantages and disadvantages of the two positions, the Committee recommends that the new site suggested by the Administration be agreed to.

The decision arrived at by the Committee in connexion with this matter is shown by the following extract from its Minutes of Proceedings, viz. :—

Mr. Gregory moved—That the site at Malaguna as suggested by the Administration be agreed to.

Seconded by Senator Reid. The Committee divided on the motion.

Ayes (7).	Noes (2).
Senator Payne.	Senator Barnes.
Senator Reid.	Mr. McGrath.
Mr. Cook.	
Mr. Gregory.	
Mr. Lacey.	
Mr. Mackay.	
Mr. Seabrook.	

and so it was resolved in the affirmative.

18. During the course of the inquiry, it was suggested that some expense might be saved by constructing the proposed wharf in two sections each 250 feet long, with a break of 200 feet between them. It was pointed out, however, that such a form of construction would offer some inconvenience in the handling of cargo, and in the event of heavy weather a continuous wharf would provide greater stability and safety. The majority of the Committee, therefore, was not in favour of the suggestion.

The decision arrived at by the Committee in connexion with this matter is shown by the following extract from its Minutes of Proceedings, viz. :—

Mr. McGrath moved—That a continuous wharf 600 feet long as suggested by the Administration be recommended.

Seconded by Mr. Gregory.

Mr. Seabrook moved as an amendment—That twin wharfs each 250 feet long with a 200 feet break between be adopted.

Seconded by Senator Payne.

The Committee divided on the amendment.

Ayes (2).	Noes (7).
Senator Payne.	Senator Barnes.
Mr Seabrook.	Senator Reid.
	Mr. Cook.
	Mr. Gregory.
	Mr. Lacey.
	Mr. Mackay.
	Mr. McGrath.

and so it passed in the negative.

The original motion was then put and carried unanimously.

Material.

19. The specification prepared in connexion with this wharf stipulated that the piles should be of ironbark or turpentine, sheathed with concrete, the decking of brushbox, and the remainder of the structure of ironbark. It was explained in evidence that on account of climatic conditions, dry rot, and the prevalence of white ants, the life of timber in the Territory is short compared with that of timber in Australia, and that these particular classes of timber had been selected on account of their durability in the various positions assigned to them. Inquiries made as to the possibility of obtaining local timber were not encouraging, for while certain local timber, notably the kwila (*afzelia bijuga*), is of excellent quality, it would not be possible to obtain it in the necessary quantities and of the requisite lengths for use as piles. It would be suitable for decking, as it is immune from white ants, but it would probably be difficult to obtain supplies, as there is no organized transport, and the existing timber mills are very small affairs.

20. It was stated in evidence that turpentine has been found in Australia to be the best of our timbers for use as piles in tropical waters, but in New Guinea waters even this timber would have a comparatively short life unless protected against the ravages of the teredo. For this purpose, it was proposed that all piles should be encased in a sheathing of concrete in which case other Australian timbers than turpentine might be found suitable. Two systems of providing this casing were investigated ; the one a spun pipe manufactured by the Hume Pipe Company in lengths, the sections being joined together by an encircling collar ; the other type manufactured on the job as a monolythic mass.

21. Inquiries were made as to the advisability of constructing the whole wharf, or alternately the piles, in reinforced concrete, but the late Director of Works, Rabaul, expressed himself as opposed to the use of concrete on the score of danger of fracture in the event of the occurrence of severe earth tremors which are prevalent in the Territory. On the other hand, Mr. A. C. Mackenzie in his report to the Commonwealth Government recommended " that any new wharfs be constructed in reinforced concrete—suitable sand and stone are available on the site—this class of construction is not readily affected by earthquakes." Furthermore, it was ascertained that reinforced concrete wharfs are extensively used in New Zealand, Japan, and other places subject to earthquakes.

22. Under these circumstances, the Committee is of opinion that careful consideration should be given to the advisability of using this form of construction, and recommends that alternative tenders be called for a timber wharf as proposed, for a wholly reinforced concrete structure and for the erection of a timber wharf with reinforced concrete piles.

The decision arrived at by the Committee in connexion with this matter is shown by the following extract from its Minutes of Proceedings, viz. :—

Mr. Gregory moved—That tenders be called for a timber wharf with timber piles cased in reinforced concrete.

Seconded by Mr. Mackay.

Mr. Seabrook moved as an amendment—

That alternative tenders be called for—

(*a*) The construction of a timber wharf with timber piles cased in reinforced concrete ;
(*b*) The erection of a wholly reinforced concrete structure ; and
(*c*) The erection of a timber wharf with reinforced concrete piles.

Seconded by Senator Payne.

The amendment after discussion became the motion, and was carried unanimously.

23. In view of the fact that previous tenders submitted were so much above the estimated cost of constructing this wharf, it is recommended that if, in the opinion of the Government, the tenders received on this occasion are excessive, the work be carried out departmentally by the Administration.

Sheds.

24. The Committee is in agreement with the proposal that two storage sheds be erected as proposed on the shore adjacent to the wharf. It is recommended that these sheds be constructed with steel frames, 24-gauge galvanized iron roofs and walls, and concrete floors, but that the walls be made 18 feet high instead of 14 feet as proposed.

Water Supply.

25. To preclude the necessity of vessels requiring water having to lay alongside the damaged N.D.L. wharf as at present, the Committee is unanimously of opinion that an adequate water supply should be provided to serve the proposed new wharf, on a gravitation system if possible.

SUMMARY OF RECOMMENDATIONS.

26. Briefly summarized, the recommendations of the Committee are :—

(i) That urgent necessity exists for the provision of improved wharfage accommodation at Rabaul ;

(ii) That the site at Malaguna as suggested by the Administration be adopted ;

(iii) That a continuous wharf 600 feet long as suggested by the Administration be erected ;

(iv) That alternative tenders be called for—

(*a*) The construction of a timber wharf with timber piles sheathed with reinforced concrete ;
(*b*) The erection of a wholly reinforced concrete structure ;
(*c*) The construction of a timber wharf with reinforced concrete piles.

(v) That in the event of tenders received being considered excessive, the work be carried out departmentally by the Administration ;

(vi) That the sheds to be erected be constructed with steel frames, 24-gauge galvanized iron roofs and walls and concrete floors, the walls to be 18 feet high ;

(vii) That a water supply to serve the proposed wharf be installed on a gravitation system if possible.

G. H. MACKAY,
Chairman.

Office of the Parliamentary Standing Committee on Public Works,
Federal Parliament House, Melbourne,
19th February, 1927.

MINUTES OF EVIDENCE.

(Taken at Melbourne.)

WEDNESDAY, 7TH JULY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Payne	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.
Mr. Gregory	

James Reginald Halligan, Acting Clerk-in-Charge of the Territories Branch, Department of Home and Territories, sworn and examined.

1. *To the Chairman.*—I know Rabaul personally, having been there on two occasions. On the first occasion I was there for six months, and last year for two months. Rabaul is situated in what was formerly German New Guinea. The Territory was captured by Australian Forces in 1914, and subsequently the Commonwealth received from the League of Nations a mandate to govern it. The area of the mandated territory is about 91,000 square miles. The white population totals, approximately, 1,600 persons. The Asiatics number, roughly, 1,400, and the native population—partly enumerated and partly estimated—about 350,000. The natives of portions of the Territory are not absolutely under control. The coastal districts on the mainland of New Guinea are under control, but the interior has not been fully explored. The first inquiries into the question of wharfage at Rabaul were made by a royal commission, consisting of Sir Hubert Murray and Messrs. Atlee Hunt and W. H. Lucas, that visited the Territory in 1919 to inquire generally into the form of administration there, and to suggest the form of government that should be adopted when Australia took over the mandate of the Territory. Included in the matters into which those gentlemen inquired was that of wharfage accommodation at Rabaul. On that subject they submitted a separate report, in which they made a number of recommendations. The conclusions at which they arrived were as follows:—

Your Commissioners therefore recommend that at the earliest possible date an experienced wharf designer should be sent to Rabaul to settle plans—

(1) For dealing with the present jetty;

(2) for the construction of a wharf or wharfs at Malaguna for coal and general merchandise.

Without in any way attempting to impose their views on the expert to be sent, they submit for his consideration the following suggestions:—

(1) That, as to put the present jetty in repair will cost large sums, and the future maintenance costs will be heavy, no substantial expenditure on it should be incurred.

(2) That, as wharfage accommodation must be provided, repairs intended to last for a comparatively brief period only should be undertaken. This will give the necessary time for building a new wharf. These repairs might consist only of the temporary reinforcement of the weakest parts by means of extra piles driven on each side of the jetty carrying stout transverse girders to support the weight of the superstructure, &c. (Such piles and girders of local hardwoods are understood to be already available at Rabaul.)

(3) That when a new permanent wharf is built the existing Norddeutscher-Lloyd jetty should be cut away for about 390 feet and a small T-end constructed to serve as a local wharf.

(4) That temporary coal storage be provided at Malaguna which might be of the following character:—Two strong pile dolphins (tripod) of local piles and shore mooring posts to hold a ship of 2,000-3,000 tons safely in position; then centrally a light landing stage strong enough to safely carry the rails and loaded coal trucks, to be built of local piles and timber, tarred, &c., to last from eighteen months to two years.

(5) That two wharfs at Malaguna should be provided separated by about 200 feet. There is no need for a continuous wharf, as it is only the working parts of ships which need to be provided for. One of these wharfs to occupy the site of the temporary wharf referred to in (4) above.

(6) That each of these wharfs should be about 250 feet long and built on concrete encased piles parallel to the shore line, and connected therewith by two gangways each about 30 feet wide.

(7) That a long massive sea-wall of reinforced concrete is not desirable, as it would probably be affected by earthquakes, for which reason the structures generally should be as elastic as possible.

(8) That a space between the shore and the wharf be left for the present with a view to it being reclaimed subsequently.

(9) That ample storage accommodation be erected on the land as near the wharfs as possible.

At the time that the commission visited the Territory there were five wharfs in Rabaul, consisting of a large pier 877 feet in length, referred to as the Norddeutscher-Lloyd wharf, which was built in 1905, a coal wharf at Matupi, and three small wharfs, the property of private companies that were situated round the harbour. As a result of the recommendations that were made by this commission, the coal wharf at Matupi was abandoned, and the Norddeutscher-Lloyd wharf was repaired in the way that it suggested. A wharf designer was sent from Melbourne to Rabaul to report upon the whole of the wharfage facilities at the port. He was Mr. A. C. Mackenzie, formerly an engineer in the employ of the Melbourne Harbour Trust, but at that time and since a member of the firm of D'Ebro, Mackenzie, and Meldrum, Melbourne. He went to the Territory in 1920, and submitted the following report:—

T. Trumble, Esq., Secretary,
Defence Department, Melbourne.

Sir,—

In reference to the arrangement made by the Hon. G. Swinburne on behalf of the Acting Minister of Defence, namely, that a member of our firm should visit Rabaul by the first available steamer and report upon the necessary repairs to the existing N.D.L. wharf, and as to what additional wharfage accommodation would, in our opinion, be necessary to meet the present and prospective demands at Rabaul.

No doubt you are aware that our departure from Sydney was delayed owing to the shipping strike, and instead of the s.s. *Marsina* leaving Sydney on 15th January, she did not leave until 1st March, arriving at Rabaul during the night of 13th March.

As we wished to inspect certain wharf work in Brisbane, which had a bearing upon the class of construction which would be the most suitable for Rabaul, we proceeded to Brisbane by train, and spent two days inspecting the reinforced concrete wharfs, and other wharfs, where the piles had been protected some five years ago, by half section Monier pipes, and in a number of cases by mass concrete; both of these methods have given satisfaction in the Port of Brisbane, the work being in good order at the time of our visit.

As we considered it desirable to inspect a reinforced concrete wharf which had been recently constructed and had been subjected to an earthquake, and as such an example existed at Macambo, Solomon Island, we availed ourselves of an opportunity which presented itself of returning to Melbourne, via Macambo; this wharf is certainly not in a satisfactory state of repair, a number of the girders being broken, and the concrete in a good many places is peeling off the steel reinforcement, the cause of these defects is overloading and lack of experience in the design and construction of this class of work.

Repairs to N.D.L. Wharf, Rabaul.

In reference to the necessary urgent repairs to the wharf at Rabaul, which was originally constructed in 1906 by the Norddeutscher-Lloyd Company, the accompanying plan, specification, and report, addressed to His Excellency the Administrator, sets out the urgent repairs required, and a method of executing them, which avoids the necessity of removing and replacing portions of the existing cargo shed, headstocks, girders, and decking which are in excellent order, consideration being given to curtail expenditure upon the repairs recommended, and yet execute them in a substantial manner, so that they will form part of any future improvements to the structure in the event of its being decided to retain this wharf permanently. The estimated cost of the urgent repairs which we have recommended is from £1,500 to £2,000, as against the work recommended by the Administrator's Department which they estimated would cost from £8,000 to £12,000. In the event of its being decided to retain the wharf as a permanent structure, the whole of the piles should, in about six years' time, be protected with half section concrete pipes; we anticipate that the present copper sheathing which is now fourteen years old will, by that time, have served its useful life.

In the event of this work being carried out we estimate the cost at £4,000.

Photographs are attached showing piles in the Brisbane River which have been protected by half section concrete pipes and mass concrete.

Photos are also attached of piles withdrawn from the Rabaul wharf, it will be noted that the copper is in good order, and that the timber, where it had been covered with copper, is perfectly sound to within 1 foot of the base of the pile, at which point it had been eaten off by Teredo, the damage to the defective piles is entirely due to the original builders stopping the copper above the sea bed at distances varying up to 5 feet, leaving the timber unprotected against the attack of Teredo. During our stay in Rabaul the work of renewing the defective piles, estimated to cost up to £2,000, was put in hand under our supervision, and before leaving we were satisfied that the Administrator's repairing staff thoroughly understood the nature of the work which they had to carry out.

Coal Wharf, Matupi.

The existing coal wharf is situated on the island of Matupi, 5 miles from Rabaul. The wharf is of light construction and only has a frontage of 52 feet, the piles used in this wharf are the cocoa-nut palm, which require constant renewing; on the foreshore, at the back of the wharf, are three sheds which will hold about 2,000 tons of coal, a light tramway laid on the ground level connects the wharf with the sheds, in order to stack the coal it has to be shovelled from the ground. The wharf is situated in a half-moon-shaped bay of about 300 feet radius, and, although the water is deep, it is a very awkward place for even a 2,000-ton vessel to berth at. The whole equipment is antiquated, dilapidated, and is located in a most inconvenient position, there is no doubt that new and more up-to-date accommodation is most urgently required.

The location of a suitable site for a new coal wharf, and the question as to whether the existing N.D.L wharf, at Rabaul, is to be permanently maintained depends, primarily upon the future expansion of trade necessitating additional berthage, upon this subject your Commissioners reported as follows:—

The prospects of the expansion of trade in the port have an important bearing on the subject. At present Rabaul is the only port of call of the overseas steamers. All goods from Australia are discharged there, and subsequently circulated through the territory by the local steamer service, similarly all the copra from every part is gathered into Rabaul by the same means for oversea shipment. When the normal conditions are restored it is possible that Australian steamers may again call as they did formerly at Kaewieng, Maron, and, perhaps other places, to ship copra and discharge stores, &c., and so save double handlings and charges.

If this is done it will obviously reduce considerably the amount of business to be transacted in Rabaul and lessen the requirements of that port in the way of wharf and storage accommodation.

Your Commissioners are unable to express any opinion as to whether or not such changes will be made, but in any event, seeing that Rabaul itself is the centre of a district which now produces half the exportable commodities of the Territory, and that these are certain to increase substantially in the near future we are of the opinion that the port will always be the chief trade centre, and must be supplied with wharfage capable of accommodating vessels of substantial size and giving them quick despatch.

We would point out that, among other matters having an important influence upon fixing Rabaul as the chief centre of imports and exports are the following:—

Simpson Harbour is centrally situated in regard to the island trade routes north, south, east, and west; the harbour of some 1,200 acres in extent, is well sheltered, and ample depth, practically no dredging is required to accommodate the largest vessels afloat; it, therefore, readily complies with the requirements of the Dominions Royal Commission, which recently visited Australia and recommended that a modern port should provide for a depth of 40 feet, the entrance to Simpson Harbour has over 330 feet, and the harbour itself varies in depths from 200 feet at the Bee Hives, which are its southern limit, to the 40 feet required within easy reach of the foreshore. Although no lights are available, vessels have no difficulty in entering at night. When it is remembered that only 10 per cent. of the European and Australian ports on the trade routes to Australia have a natural depth of 40 feet, it must be conceded that Rabaul, as far as natural advantages are concerned, ranks among the first ports of the world.

As the Territory of which Rabaul is the chief port is somewhat larger than Victoria, and as the development of its vast natural resources have hardly been scratched, the certainty of rapid expansion during the next 50 years must be anticipated.

If out-ports, such as Kaewieng, &c., are also to be maintained for oversea vesssls, the question arises as to how capital is to be provided for the construction and maintenance of suitable berths at numerous out-ports, we would point out that the chief source of harbour revenue is derived from charges levied upon imports for which the port of Rabaul is the chief centre, the out-ports could, therefore, only derive sufficient revenue by increasing the present export duty upon copra, which is at present £1 per ton.

We would also point out that the experience of the Australian coast is that oversea vessels will not call at out-ports for the reception or delivery of a parcel of less than 500 tons, and that the consignee finds that it is to his advantage to centralize upon the chief port of shipment in order to take advantage of cheap rates for parcels and increased facilities for chartering.

As the outcome of our harbour experience we would hazard the prediction that the development of the port of Rabaul will not be adversely influenced by the shipping at any of the adjoining out-ports, and, therefore, any scheme of port improvements should be on comprehensive lines, the development of which can proceed as occasion arises during the next 50 years or more.

Simpson Harbour, with the exception of the entrance, is surrounded with hills varying in height from 600 to 2,247 feet. Generally speaking, deep water approaches closer to the foreshore along the western side of the harbour than it does along the eastern side; on the other hand, there is less flat land available for building along the western foreshore than there is along the northern and eastern side; this fact requires serious consideration, and the question arises as to whether the interests of the community would be served better by placing new shipping facilities on the western foreshore where the available space for the expansion of the township is more limited than it is at the present wharf and township site which are on the eastern foreshore. In this connexion it should be pointed out that, although native labour is fairly plentiful, it costs, including wages, keep, and quarters, approximately, 3s. per boy per day, and as about four natives are required to do the work of a European, the cost of handling a ton of cargo is a considerable item.

The handling of cargo on the N.D.L. wharf is difficult owing to the width between the wharf face and the cargo shed being 10 feet only, whereas it should be at least 20 feet wide and have two lines of 2-ft. gauge track upon each side instead of the present single track.

Exclusive of the coal berth, which is at Matupi, and which is inaccessible for general cargo, the port of Rabaul is at present equipped with one pier only, which provides two berths, each of which is 380 feet in length, the depth of water at the shore end being 18 feet, and at the sea end 55 feet. Storage is provided along the centre of this pier by a cargo shed 300 feet by 40, which is insufficient for the trade. At least one additional berth and cargo shed is required at the present time to deal with the imports and exports, a new wharf with a suitable shed is also urgently required for the accommodation of coal. We would point out that your Commissioners recommend that similar additional accommodation be provided, and suggest that a suitable site would be at Malaguna, which is on the western foreshore, their selection of this site appears to have been influenced to a certain extent as they understood that the existing pier was in such a bad state that the cost of putting it in thorough repair would be more than the structure was worth, the greater depth of water adjoining the foreshore also appears to have influenced their preference for Malaguna as a site for the proposed new berths.

Upon inspecting the existing N.D.L. wharf we found that it is in excellent order with the exception of certain piles which we estimate will cost some £2,000 to replace, and a further £1,000 to make the structure permanent; in the event of this being done the value of this pier estimated at the cost of a new structure of similar dimensions, with cargo shed, would be some £18,000, which precludes the idea of scrapping this structure and fixes the shipping centre for imports and exports on the eastern foreshore adjacent to the existing settlement. As it would be inconvenient to have two centres for the shipping of imports and exports, and as there is no engineering difficulty or exceptional expense in constructing suitable berths with an ample depth of water on the eastern foreshore we would recommend that a new general cargo berth be constructed to the south of the existing pier.

The question of a site for the proposed new coal berth depends upon the maximum storage required if it is the intention to provide for the limited storage which is now available, viz., 2,000 to 3,000 tons, we are of the opinion that the berth and storage should also be located on the eastern foreshore adjoining the existing N.D.L. wharf, and the proposed new general cargo berth; by so doing vessels with general cargo, which either have to discharge coal or take in bunker coal, would save time, as it would only be necessary to warp them into the required position, also as the storage shed can be placed within 20 feet of the wharf face, the time and cost of discharging or bunkering would be reduced, and coal would be generally more accessible for domestic requirements.

On the other hand, if storage is required for a very much larger quantity of coal it would possibly be better to locate the coal berth and coal storage sheds on the western foreshore at Malaguna, as shown on plan B. It will be noticed that the storage sheds at this site cannot be placed nearer than 110 feet from the wharf face without considerably increasing the capital cost, and that it would be necessary to truck all the coal to and from the storage sheds, vessels requiring bunkers coal would have to be moved from the east to the west side of the harbour, whereas at the site adjacent to the existing pier we have no doubt that, in a number of cases, coal could be supplied by trucks without moving the vessel; furthermore, coal stored at Malaguna for domestic purposes would have to be carted at least 1 mile. Provision could be made on the eastern foreshore for storing a large quantity of coal in excess of the 2,000-3,000 tons mentioned, but this is not recommended as it would possibly interfere with the future port development.

The estimated cost of a wharf 300 feet long by 20 feet wide, with approaches, storage shed, tracks, &c., at Malaguna is	£14,000
New general cargo berth, shed, reclamation, &c., at Rabaul	22,000
Total	£36,000
The estimated cost of a coal and general cargo berths, sheds, reclamation, &c., adjacent to the existing pier on the eastern foreshore at Rabaul is ..	£42,000

It is recommended that any new wharfs be constructed in reinforced concrete—suitable sand and stone are available on the site, this class of construction is not readily affected by earthquakes.

In conclusion, we would recommend that the existing N.D.L. wharf be put in a thorough state of repair—

(1) By the renewal of the defective piles, which work is already in hand at the estimated cost of from £1,500 to £2,000.

(2) That the whole of the piles in this wharf be covered with half section Monier pipes to be made at Rabaul at the estimated cost of £4,000.

(3) That a new coal berth and a general cargo berth with cargo sheds, reclamation, &c., as shown on plan A be erected at Rabaul on the eastern foreshore south of the existing N.D.L. wharf, at the estimated cost of £42,000.

We have the honour to be,

Yours faithfully,

(Signed) A. C. MACKENZIE, Inst. C.E.
(D'EBRO, MACKENZIE & MELDRUM.)

The next development following Mr. Mackenzie's visit was that the Norddeutscher-Lloyd wharf was repaired. The repairs recommended by Mr. Mackenzie were carried out. In place of the wharf at Matupi a new wharf was constructed at Malaguna for the purpose of handling coal. That brings us to January, 1923, when the Norddeutscher-Lloyd wharf was partially destroyed by fire. After its destruction the question of providing harbour facilities was thoroughly gone into. The only facilities then were the small coal wharf which had to be used for general merchandise, both inward and outward. Estimates were prepared by the New Guinea Administration as to the cost of building a wharf. That led up to the preparation of the present plans. The wharfs came under the Works Department, and Mr. Fowler, who was Works Director at Rabaul, had a hand in the preparation of the plans. He was responsible for the plans now before the committee. They were prepared by the Works Department. Mr. Fowler's services are to terminate on the 8th July. His position has been abolished for the reason that it is considered to be no longer justified. The main boats trading to Rabaul are those belonging to Burns, Philp and Company. In addition, a number of casual boats call there. I have prepared a list showing the boats which have called there since the 1st of July, 1923. Among them are the following:—

Name.	Nationality.	Gross Tonnage.	Draught.
Eudunda (*Mangola*) ..	British ..	3,358	16 ft. (about)
Marsina	„ ..	1,932	19 ft. 3 in.
Mataram	„ ..	3,273	22 ft. 4 in.
Melusia	„ ..	1,989	19 ft. 6 in.
Morinda	„ ..	1,971	16 ft. 3 in.
Calulu	Japanese ..	4,256	
Canadian Planter ..	British ..	5,399	25 ft.
Canadian Traveller ..	„ ..	5,455	25 ft. 2 in.
Canadian Trooper ..	„ ..	3,099	21 ft. 5 in.
Clan Macquarie ..	„ ..	6,938	
Kalfarli	— ..	6,580	

Since it was announced in 1923 that the new wharf would be built at Malaguna the advancement of the town has been in that direction. Malaguna is about 2½ miles from the site of the Norddutscher-Lloyd wharf. I am acquainted with the site of the proposed wharf. So far as I am aware, only one site has been suggested. Objections have been raised to the proposed site by local residents and also by captains of boats trading there. In addition, the Administrator has reported on the question of the site. The department requested Burns, Philp and Company to ascertain the views of their captains regarding the suitability of the sites of present wharf—that one that has been burnt—and the proposed wharf at Malaguna. The following are extracts from the reports of the captains:—

Captain D. J. Williams, master s.s. *Melusia*, reported—

This trip of the above steamer has confirmed my previous opinion, inasmuch as it has fully demonstrated the unsuitability of erecting a wharf for the berthing of steamers during the south-east season at Malaguna.

In a later report Captain Williams said—

I desire to advise you that in my opinion, the building of this wharf at Malaguna will make it difficult for a vessel to berth or get away from the wharf during the south-east season, as the vessel is practically broadside on.

Captain A. Donaldson reported—

I consider the position a bad one for a foreshore jetty, as the prevailing wind being south-east, blows right broadside on to it. This makes it very hard for berthing ships without bumping the jetty, also it is bad for vessels getting away from it. . . . . If the present town jetty was extended in a north-westerly direction, I consider it would be much more satisfactory, and also cost considerably less money.

In his report Captain J. MacInnes, master s.s. *Mataram*, said—

I am of the opinion that the old wharf site is preferable to the new one. First, the water is smooth all the year round. It is closer to the business centres of the town. It is easy for a ship to approach or depart from either night or day. The present wharf at Malaguna is exposed to the south-east wind, and is a very awkward place to get away from when the wind is blowing on to the wharf. This does not happen frequently. . . . . In conclusion, there is very little fault to be found with the proposed site.

Captain G. E. Williams, master s.s. *Morinda*, reported—

Regarding wharves in Rabaul, in my opinion the foreshore wharf suggested on Malaguna side of harbour, is far preferable.

In a lengthy statement, Captain G. I. Griffiths set out his view of the position; but he expressed no opinion regarding the merits of the two sites.

The reasons advanced by the Administration for constructing a new wharf at Malaguna are—

(1) There is deep water 20 yards from the shore sufficient to accommodate the largest vessels;

(2) The wharf could be built parallel to the shore, thus giving more width and necessitating shorter piles;

(3) The area around the old wharf is continuously silting up, thus necessitating extensions of the wharf or dredges. There is no scour at Malaguna;
(4) A large percentage of the imports go to China Town, and the commercial firms in the vicinity, and a wharf at Malaguna would be as near to China Town as the old wharf;
(5) Provision can be made at the new wharf for inward and outward cargo sheds. This cannot be done at the old wharf;
(6) If the old wharf were repaired, widened and extended, there would still be a "bottle neck" at the land end of it;
(7) The construction of a new wharf will cost less than repairs to the old one.

Certain firms in the vicinity of the old wharf object to the proposal to construct a new wharf at Malaguna, and urge that the old one be repaired for the following reasons:—

(*a*) The new wharf at Malaguna will be too far from the commercial centre;
(*b*) It will necessitate haulage from Malaguna, and thus increase prices;
(*c*) Difficulty will be experienced by masters of vessels in putting out from the new wharf when the wind is blowing into Malaguna.

The tenders received for this work were greatly in excess of the department's estimate and the amount voted for the work. Probably 95 per cent. of the total exports from Rabaul consists of copra. The following table sets out the exports of copra from the whole of the Territory, not only from Rabaul:—

1913	14,000	tons
1918	21,000	,,
1920-21	23,735	,,
1921-22	25,894	,,
1922-23	32,648	,,
1923-24	35,000	,,
1924-25	40,000	,,

The total number of vessels which called at Rabaul, and their net tonnage were as under:—

Year.	Number of Vessels.	Net Tonnage.
1921-22 ..	79 ..	100,515
1922-23 ..	73 ..	131,649
1923-24 ..	64 ..	135,788
1924-25 ..	87 ..	166,500

The question of security for expenditure incurred in mandated territories has been dealt with by the League of Nations. The principle laid down makes it clear that the mandatory power would not lose anything it had put into a mandated territory. Dealing with "Loans, advances, and investments of public and private capital in mandated territories," the Council of the League of Nations reported that it had agreed on the following principles:—

(*a*) That the cessation or transfer of a mandate cannot take place unless the Council has been assured in advance that the financial obligations regularly assumed by the former mandatory power will be carried out, and that all rights regularly acquired under the administration of the former mandatory power shall be respected; and
(*b*) that when this change has been effected, the council will continue to use all its influence to ensure the fulfilment of these obligations.

I understand that timber suitable for wharf construction is not available in Rabaul, and will have to be procured from Australia.

2. *To Senator Reid.*—The figures that I have given in regard to exports relate to the period 1913 to 30th June, 1925, during portion of which time the Expropriation Board was in operation in the Territory. As a matter of fact, the Expropriation Board is still operating; it is only within the last month or so that it has been selling the plantations. It is very difficult for me to say whether the exports are likely to increase with the properties in private hands. I cannot state whether that is the view of the department.

3. *To Mr. Seabrook.*—Copra is responsible for 95 per cent. of the exports. There is also a certain quantity of cocoa, sea shells and trepang.

4. *To Mr. Gregory.*—I do not think that any rubber is exported.

5. *To Mr. Seabrook.*—I consider that it is necessary for a wharf to be provided. The present wharf is very small. During the south-east season the vessels would be lying broadside on to the prevailing winds, and they would blow straight into the ship. I understand that ships have no difficulty in getting in and out of the harbour. They do not require the assistance of tugs. Small schooners call at places which are not visited by Burns, Philp's boats, and take the copra to Rabaul, where it is shipped for oversea markets. The big boats take the copra direct to England. I do not know whether it is the regular practice, but I can say that some of the big boats call at Kavieng and Madang as well as at Rabaul. There is a wharf at both of those places, but it is not so big as this is proposed to be.

6. *To Mr. Lacey.*—I do not know that any organized attempt is being made by the local residents and the shipmasters to prevent the construction of the wharf on the proposed site. Since the main wharf was burned, most of the general merchandise has been handled at the wharf that was built in 1920 at Malaguna for handling coal.

7. *To Senator Payne.*—I cannot recall any definite complaint having been made by the captain of a vessel of damage having been caused or difficulty having been experienced at Rabaul. Captain McInnes, in one portion of his report, stated that, in his opinion, the old wharf site was preferable to the new one, but in his concluding remarks he said that very little fault could be found with the proposed site. Whilst I was in Rabaul I did not notice any particular severity in the south-east trade winds. I understand that on one occasion the *Morinda* had difficulty in getting out from the present coal wharf, and the *Mataram,* which was in port at the time, had to assist her. I believe it is generally admitted that the north-west winds are stronger than the south-east. I do not know that the department has ever considered the possibility of expansion taking place in the cultivation of tropical commodities with the properties under private ownership. I am not aware whether the Expropriation Board has done more than maintain the coco-nut plantations that were planted by the former owners. I should say that coming into bearing of the coco-nut trees was responsible for the substantial increase in the export of copra. The Expropriation Board has had control of plantations since 1920. I believe that a coconut palm requires about seven years to reach the stage of commercial production. It may be reasonable to anticipate that those portions of the expropriated properties which hitherto have not been planted will eventually be brought under cultivation. In addition to that, further Crown lands will probably be taken up by settlers who go to the Territory. I believe it was Mr. Mackenzie who expressed the view that production must increase; it was not expressed on behalf of the department.

8. *To Mr. Cook.*—I understand that the complaints of the captains were based upon their view that difficulty would be experienced in getting away from the proposed wharf when the south-east trade winds were blowing. The proposed wharf is to have a timber decking, and timber piles encased in concrete pipes. As a layman, I consider that the building of the wharf is warranted. I have no knowledge of wharf construction or shipping. On my first visit to the Territory the main wharf was being used, but when I visited it on the second occasion that wharf had been destroyed.

9. *To Mr. Gregory.*—I shall try to obtain a chart of the harbour. There is a meteorological station at Rabaul, and it could probably supply records over a period of years. It sends returns to the Meteorological

Bureau in Melbourne. If they are not complete enough for the purposes of the committee, they could probably be supplemented at Rabaul. The department here is not able to supply figures showing the inward and outward tonnage, but I have no doubt that that information could be obtained at Rabaul. If I find that we have those records, I shall furnish the committee with the particulars.

(Taken at Melbourne.)

THURSDAY, 8TH JULY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Richard Dempster Patton, Sub-Accountant's Office, British Imperial Oil Company, sworn and examined.

10. *To the Chairman.*—I have spent four years in the New Guinea service. For the first two years I was workshops accountant to the Expropriation Board, and subsequently I was chief clerk in the Public Works Department. I had nothing to do with the designing of the proposed wharf, but I was engaged in taking out quantities and calculating prices for it. The plans were forwarded to the Home and Territories Department. In my opinion, the wharf will not meet local requirements, because, in the first place, the site is unsuitable. The old wharf, part of which was burnt, belonged to the Germans, and was taken over by the Commonwealth. There is also a coal wharf at Malaguna. This is a light structure, but it is used at the present time for cargo and general purposes. In my opinion, the old wharf occupies the most suitable site for the general purposes of the town, because it is close to the business centre. The new site is about 1¾ miles distant. I do not know why the new site was selected. Considerable opposition to it has been expressed by the masters of vessels trading there. They presented a petition asking that the old site should be used, because it provides safer berthing. In the season, when the south-easterlies prevail—that is, between May and November—the new wharf will be broadside on to the wind. On one occasion a vessel was blown on to the beach at that spot. There is no progress association or similar public body at Rabaul. I have had a good deal to do with the shipping business at Rabaul. There is not much silt, because the water is deep a short distance from the shore. The current is very strong at times. There are certain passages that deep-sea steamers must take, and great care has to be exercised. There is plenty of water in the harbour, but sand banks and coral reefs are found. I do not suggest that ships experience any particular difficulty in entering the harbour if the navigators are familiar with the locality, but there are no lighthouses in the Territory. Most of the navigators, of course, are fairly well acquainted with the coast. So far as I am aware, no wrecks or serious accidents of any importance have occurred. Boats have been blown close to the beach, but they have managed to save themselves by dropping their anchors. Occasionally two steamers arrive at Rabaul simultaneously, and I think that the new wharf provides sufficient accommodation for two vessels. If private enterprise is encouraged by the Administration, shipping should improve; but if it is kept under, as it has been in the last five years, there will never be any considerable progress in trade. The policy when I was there was to keep the private man down. I am referring to general business, because it is really the business man that brings shipping to the place. One of the drawbacks when I was there was that a private man could not obtain a grant of land in the town, and he was not allowed to tender for leases. Another resident and I, for instance, proposed to establish a furniture and cabinet-making business. We could not obtain a site anywhere near the business centre. We could have secured land 3 or 4 miles out of the town; but, as that would have made the undertaking too expensive, we abandoned it. One reason why we could not get land in the business quarter was that no titles were available at that time. Most of the central portions of the town were held on long leases. The block I wanted was Crown land controlled by the Administration. The leases in practically the pick of the town were obtained from the Germans. I do not think that the idea in selecting the site of the new wharf was to get away from that influence. The main reason, I believe, was that the shore approach to the old wharf is very narrow, but I think that by means of a little engineering the difficulty could be obviated. The old wharf was about 400 or 500 feet long with about 70 feet depth of water at the end. In my opinion, shipping had less difficulty in approaching it than it will experience in approaching the new wharf. Townsville is about 1,000 miles from Rabaul, and Sydney between 1,800 and 1,900 miles distant. Plenty of timber for decking purposes is available at Rabaul, but suitable piles could not be obtained locally. Durable piles would have to be procured from Australia. Coco-nut piles are suitable for light structures only. So far as I am aware, the teredo and other marine pests do not attack piles at Rabaul. Coco-nut piles have been used as bumpers since about 1919, and they are still in service. At the present time, all the shipping is done at the coal wharf. There is only sufficient accommodation at the old wharf for the unloading of one hatch. The portion that was not destroyed by fire is in good order. The difficulty would be to remove the débris from the fire. Hundreds of tons of rice fell into the water. The lower parts of the burnt piles would have to be removed, but if there were any way of overcoming that difficulty I think that the old wharf, with some few improvements to its approach, would be infinitely more satisfactory and serviceable than the proposed new wharf. The engineer's estimate of the cost is, I understand, £36,000, although, when I worked out the quantities, I arrived at an estimate of £52,000.

11. *To Mr. Seabrook.*—There is a great depth of water a short distance from the shore at the site of the new wharf. If the wharf were run out as a jetty the effect of the south-easterly seas would be minimized, but it would be impracticable to obtain piles long enough. Three hundred feet from the shore the depth would be from 70 to 100 feet, and 500 feet out the depth would be about 120 feet. The old site would undoubtedly suit the great majority of the residents, because it would be convenient to the centre of the town. The depth where the débris from the fire is deposited is from 40 to 60 feet. The burnt portions of the piles could easily be removed, but the difficulty would be to shift the stuff at the bottom. Among the débris are four or five motor cars and two or three schooners' engines. A dredge could possibly shift the mass of pulp formed by the rice. With an experienced engineer in charge of a dredge there probably would not be much difficulty, but the only means of doing that kind of work at present is by the one diver who is there. A dredge could not be taken up there without great expense, and coal would have to be taken for it. The rise and fall of the tide is between 3 and 4 feet. There is nearly always a boat of some description in the harbour. Most of the oversea boats anchor in the harbour and load from lighters, but it would be an advantage to them to have a wharf that they could pull into. The rice was brought from Australia. Copra is practically the only product exported. It is grown in different places, but concentrated in one place for loading by small schooners. The idea of having such a long wharf is to accommodate two vessels at the one time. If there was room for only one vessel and a copra boat was loading when the *Matoram* or one of

the other passenger boats came in it would have to pull out, and that would be expensive to the copra people. I do not think it advisable to build the two sheds on the site shown on the plan. I would suggest that they be built partly on the wharf. There is only a depth of 8 feet of ground at the proposed site, and I should not like to risk 1,000 tons of my copra on it. If a bore were put down there you could get fresh water at 8 feet. One of the sheds would be quite sufficient to hold all the copra that would be there at a given time. It would be an advantage to bulld two smaller sheds party on the wharf, but not in the middle of the wharf, for it is proposed to run a main road right down the centre of it. I would advise the use of turpentine piles from New South Wales, but all the decking and other timber could be obtained locally.

12. *To Mr. Lacey.*—There would be no complaints by the ship masters if the wharf were built on the old site. As a matter of fact they are all strongly in favour of it, and, I think, are unanimous in opposing the proposed new site. The burnt part of the old wharf is about 150 to 200 feet. There is only about 300 feet of the old wharf left. The wharf was full at the time of the fire. Three ships had come in one after the other during the Christmas season, and all the stuff that they brought was on the wharf. No attempt has been made to shift anything since then. It is only about twelve months ago that a diver went down to investigate. Speaking from past experience, and from what I know of the place, I am of the opinion that the proposed sheds are too large. Smaller sheds could be built, and if developments occurred they could be extended, or receiving dépôts could be built elsewhere. I left Rabaul last October. At that time there was a general complaint about the proposed new site, though it may have been caused by one or two ship masters. There is only a handful of people there, and if a complaint is made it generally goes the round. If the wharf is built on the new site the stores in the town would have to cart their merchandise about a mile and a half, and as all the carting is done by the natives the prospects are not bright. I should not like to trust too much glassware to them, for if a package gets heavy they never argue about letting it down. For instance, if any one were buying a piano and it was being carried from the wharf, and the natives at one end thought it was getting a bit heavy, they would not hesitate to drop it. I would advise building the wharf on the old site and taking in the Government stores, so that the approach could be improved. The road from the old wharf runs right past the post-office. I think there would be ample room for storing copra if the Government stores were taken in, and a tram line could be run from the wharf to the two main stores in the town, which are within 200 yards of the wharf.

13. *To Senator Payne.*—Chinatown is perhaps the main business centre. The new jetty would be about half a mile from there. The old jetty is about half a mile away. The principal public buildings in Rabaul are near the old wharf. They are the Government offices and stores, which are right at the end of the wharf, the New Guinea Company offices, and Burns, Philp offices are about 120 or 130 yards away, the Carpenter and Company's store is another 100 yards further on. All of them and the Commonwealth Bank, the Treasury, and the main hotel, are within a half-mile radius of the wharf. The width of the approach to the old wharf is about 66 feet. I think it could be widened by taking in the Government store. The old road could then be used for vehicular traffic and the cargo traffic could go in by the store. The old wharf was wider at one end than at the other. I would suggest making it of uniform width. The old part could be left entirely for foot passengers, while the tram lines could be run down the new part. No oversea vessels are using the old wharf for loading copra. But if they require to take in water, it is necessary for them to come alongside the old wharf, because the water is pumped from the ice-works near at hand. Carpenter and Company have a hulk on which they load the copra and take it out into the harbour to lighter on to the ships. The rest of the copra is loaded from the Expropriation Board's premises, on which there is a private wharf. Recently the *Matarram* has been using the Malaguna coal wharf for unloading merchandise. It is necessary to have a store in which to place perishable commodities. I know that a number of the Expropriation Board's properties have been sold recently, but even with the advent of the new owners I think it unlikely that there will be any increase for the next four or five years in the amount of copra produced. Most of the properties are in very bad condition, and some years will have to be spent in cleaning out the old coco-nuts and putting in new. It takes six or seven years to bring a coco-nut into bearing.

14. *To Mr. Cook.*—The estimate of £36,000 for the new wharf was made by the Director of Works, but I do not consider it any guide at all. That is my candid opinion. The £300 job which I said cost £1,200 was carried out by the Department by day labour. The labour was contracted for, the Department supplying the material. There is practically no system in operation there. Before I took up the position of chief clerk I spent three or four days with the Public Works Department officers in Melbourne getting information as to systems, with the object of applying them up there; but when I got there the Director of Works said that they were no good to him, and none was officially used. A job that is estimated to cost £5 under present conditions might easily cost £20. I took out the quantities for this wharf over two years ago, and estimated that it would cost £52,000 instead of £36,000. I understand that the lowest tender put in was £56,000. I was chief clerk of the Public Works Department there for 21 months, and for two years previous I was with the Expropriation Board. I claim to have a fair knowledge of the situation, and I am of the opinion that the old site is the best one for the wharf; but it would be expensive to clear the débris away from it. The end of that wharf ran into between 50 and 60 feet of water. Most of the holdings on the island are between 5 and 10 acres. A large holding would be between 200 and 300 acres. One man can comfortably work 50 acres, in my opinion. The wharf is on Crown land. You have to take what labour you can get for any work that has to be done. The natives please themselves about working. The labour problem may possibly be a big item in connexion with this wharf. The population of Rabaul comprises 350 whites, 1,700 Chinese, and I do not know how many natives. Malays are the only people engaged on public works for the Expropriation Board. Generally speaking, most of the Government labour is prison labour. Burns, Philp, and Company is the only shipping firm that trades there, although Carpenter and Company have agencies for one or two other shipping lines. All I know as to the difficulty of shifting the débris from the end of the old whaf is what the diver told me. He said it would cost some thousands of pounds to shift it. I suggest that a dredge with grappling irons could be used to drag it out into deep water. It would probably cost between £15,000 and £20,000 to shift it. If a dredge were taken there for the work it would need coal, which would cost about £5 a ton. I consider the old site superior in every way to the new one.

15. *To Mr. Gregory.*—I am not an engineer. I suppose the machinery that is lying at the bottom of the sea at the end of the old wharf could be hauled out by steel hawsers, but I think it would be better to lay hold of it with grappling irons and drag it out into deep water. It might be necessary to drag it a mile or a mile and a half. The bottom of the harbour is really the crater of an old volcano. The biggest draft of any boat that pulled into the old wharf was 24 feet. The new wharf is really on the site of an old native cemetery. The old wharf was sheltered from the trade

winds by the headland, but the new wharf, which is to the west, would not be sheltered in any way. So far as I know the teredo is not unusually bad in those waters. I think it is not nearly as destructive as in the Queensland waters. I know of coco-nut piles that have been down twelve or fourteen years and are still all right. I think turpentine piles would stand the conditions much better than coco-nut piles. The piles are driven through 8 feet of sandy clay sub-soil into rock. There is no timber in New Guinea suitable for piles, but there is plenty that would be quite all right for decking. The white ants are bad there, but hardwood can be treated for them. The buildings in the town are of wood, and were built by the Germans. They are protected against white ants by galvanized-iron plates. Although they are in a neglected condition and badly need repairs and painting, the timbers in them are in pretty good condition. The site of the new wharf is about a mile and a half from the old one. There is flat country for about 200 yards behind the wharf, and then you can go straight up a mountain for 2,000 feet. There is only a limited narrow strip of level ground around the harbour and the mountains rise straight up from it. It would cost more to handle goods from the new wharf than it did from the old. My only objection to rebuilding the wharf on the old site is that it would be expensive to clear away the débris from the burnt end of it. About 1,000 feet out from the shore on the site of the old wharf you run into water 20 fathoms deep. It would be quite all right to run a wharf along parallel with the coast on the site of the old wharf instead of running a jetty out into the sea, but that would not be possible on the new site.

16. *To Mr. McGrath.*—Really no tenders were called for work done by day labour which I have referred to as costing so much. What happens is that departmental officers interview two or three Chinese to find out what they will do a particular job for, and then give it to one of them. It is all Asiatic labour. There is no white artisan labour at all. In building this wharf practically only Asiatics and natives would be employed. In one way it is quite fair to blame the Administration for the present unsatisfactory conditions, but in another it is not. I think they should have some system that would improve things, but they will never be able to get over the difficulty of working with Asiatic labour. I was not decrying the Administration, but simply arguing that it should improve its methods. The old wharf repaired would be infinitely better than a new wharf on the new site.

17. *To Senator Barnes.*—There is nearly always one boat in the harbour. The boats are navigated, generally speaking, by officers who are well acquainted with the conditions. It would be dangerous to allow the old broken-off piles to remain where they are, for divers who need to go down would probably get into serious difficulty with their paraphernalia.

18. *To Senator Reid.*—There is a good width in the channel. The coral reef and sand banks are not a serious hindrance to shipping. I understand that the committee that inquired into the fire at the old wharf decided that it was caused by an act of God. The conditions are very difficult up there. One day a Collector of Customs, while walking along the wharf, saw a native sitting on a stack of benzine smoking a cigarette. He smacked him across the head and told him to get off the wharf and not smoke near benzine. He was fined £5 for abusing the nigger. Copra must be continually under cover. Sheds are absolutely necessary on the wharf. The present wharf runs out like a pier. There would be no particular difficulty in building a wharf broadside across the burnt end of it, but a broadside wharf would not be satisfactory on the new site. There is room for the town to expand around the site of the old wharf, and it might develop towards the site of the new wharf, though a wharf on the new site would be worn out long before the centre of settlement was adjacent to it. The cost of motor cartage in New Guinea is about 1s. 3d. a mile. If everything had to be carted from the site of the new wharf into the town there would be a big increase in the cost of living there. I suppose the Chinese stores do more trade in the aggregate than the other stores in Rabaul. There are many more Chinese storekeepers than there are white, and they do practically all the business with their own people as well as some with the white population. The local residents are rather sceptical about the possibility of development in the islands. I know that things have been abnormal since the war, but under normal conditions I cannot see that very great developments are likely to occur. A little cotton and tobacco could be grown, but the principal product will always be copra. Sugar could not be grown there. I think the Government would be justified in spending up to £50,000 in building a wharf. The work should not be controlled by the local Administration, but by some other outside authority. Of course, the local Administration would have to handle the labour, but it would be advisable for the rest of the work to be controlled from outside.

(Taken at Melbourne.)

TUESDAY, 13TH JULY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook

Samuel Henry Milne Fowler, late Director of Works, New Guinea, sworn and examined.

19. *To the Chairman.*—I occupied the position of Director of Works for three years; my appointment terminated on the 8th of this month. I was trained as a civil engineer for municipal works. I served in engineering shops and qualified as a marine engineer. I passed the Victorian examination for municipal engineer and surveyor, and the Board of Trade examination for an extra-chief engineer. I was employed by Pearsons, the London contractors. Later I worked on jobs at Coatzacoalcos, in Mexico, and at Para, in Brazil. At the latter place I was marine superintendent in charge of dredging and reclamation plant. I was dredging engineer at Coatzacoalcos Harbour. We were also building a steel wharf, with screw piles and timber decking. At Para we were building concrete quays, pulling up old wharfs, and doing reclamation and channel work generally. After that I went to British Columbia, and there did experimental work in connexion with irrigation. I came to Australia and worked for a few months with the Irrigation Department here. I then was employed for three months by Trench and Moran, and worked on the Melton weir. I resigned to study for the municipal examination. I went to Rutherglen, designing and building reinforced concrete bridges. I have carried out various other works. I am responsible for the design of the proposed wharf at Rabaul. The plans were prepared by me. I could not say whether they have yet been approved by the Public Works Department at Melbourne, but they were approved by Sir George Buchanan. Tenders were called on those plans. Perhaps it would be better if I gave the history of the scheme. In 1919, a commission consisting of Judge Murray, Mr. Atlee Hunt, and Mr. Lucas, went to Rabaul. There was at that time a controversy respecting the best place for the wharf, and the site chosen by the commission was either that which I have selected, or further out, more or less where the present temporary structure is. When I arrived at Rabaul, the Administrator asked me to examine the old N. D. L. wharf, to see whether it would be better to repair it, or to build a new wharf on a fresh

site. That was in June, 1923. The old wharf is from 800 to 900 feet in length, but has a bottle neck of over 400 feet. There was also a shed on the wharf. The trouble is that there is insufficient accommodation. In that shed was stored all the outgoing and incoming cargoes, consisting of copra, kerosene, petrol, and, in fact, everything. It caught fire a few weeks after the insurance had been taken off. There was a dispute between the Expropriation Board and the Administration respecting the ownership of the wharf. The Board claimed that the Administration had resumed it, and therefore stopped the insurance. At any rate the wharf was burned, and the question arose of rebuilding it, or of choosing a fresh site for a wharf. The problem was, who owned the wharf. As soon as I arrived at Rabaul I asked that that question should be decided, but it was always postponed. I wished it to be referred to the Attorney-General's Department. Finally I proposed to purchase the wharf and so force a decision as to its ownership. The negotiations went on for months. Eventually the Expropriation Board, without prejudice, accepted £4,000 for the wharf, but nothing further was done in the matter. That was about eighteen months ago. I based my estimates on local information. I found that it would cost very nearly as much to repair the old structure as to build a new one, with the opportunity of an extension later. There are several objections to the old structure. There is a silting up of sand, not only at the wharf, but at least for half a mile on either side of it. If that area were to be dredged it would be a costly item. In 1918 a big earthquake occurred, and a number of piles were snapped off short. They had previously been eaten away by the teredo at the mudline. The wharf consequently subsided. It had to be lifted up and the broken piles repaired by means of concrete pipes, which were filled in with concrete and packed with bags also filled with concrete. Before any work could be done in the way of reconstruction, all that work would have to be scrapped, because it would be useless to attempt to build a structure on piles which were practically resting on nothing. The first problem would be, of course, to restore the broken piles, and the second to clear the bottom of débris. There must be on the bottom at least 500 tons of concrete, and about 2,000 tons of general cargo, such as machinery and other materials. It would probably cost from £2,000 to £5,000 to clear that debris before any work could be proceeded with. Thirdly, the difference in cost would not differ very much. Probably an additional 25 per cent. or 30 per cent. would obtain an up-to-date structure. Fourthly, it would be impossible to get proper accommodation, because there is insufficient room on the pier. If the wharf were reconstructed, and a fire occurred, we should be in exactly the same position as we were before. The whole structure would be lost, and with the miscellaneous cargo that is handled on it, there is a likelihood of a fire at any time. Another trouble is that the shed occupies practically the whole width of the wharf, and there is really no room for handling cargo at all. There is a space of about 4 feet between the shed and the edge of the wharf, and this presents great difficulty in storing cargo in the shed when only unskilled labour is available. The next trouble is that the lead from the centre of the shed to the shoreline is about 700 feet, for which distance a tram-line is laid. That line leads to the New Guinea Company's stores, and what is now the Public Works Department store, and also, at one time, to the top of the hill at Naminula. All cargo at one time was taken to those two places. When the tram-line was first constructed, the Chinese had to purchase their materials from the stores, but now they are allowed to import direct. The change of trading methods has resulted in the tram-line being used by only the New Guinea Company's stores. I believe Burns Philp use it to a certain extent, but not much, because their premises are adjacent to the wharf. The bulk of the cargo is now taken away in lorries, mostly to Chinatown. Chinatown would not be a mile from the wharf, and would be about the same distance from the site of the proposed wharf. The new site would be just as convenient as the old site for trading interests; in fact it would be more convenient, because the lorries could be taken right alongside the wharf, whereas, with the old wharf there is the trouble of taking the cargo down the bottle neck. I am responsible for selecting the new site. It is about a mile and a quarter from the N. D. L. wharf. With the proposed wharf, vessels could get within practically 100 feet of the shore. It is deep water, the shallowest part alongside the wharf, without any dredging, being about 23 feet. A little dredging would be necessary. The approach to the proposed wharf is fairly uniform. It is a good site, because vessels loading copra for W. R. Carpenter and Company often lie off there. I know that certain skippers object to the scheme, but they do so more or less on principle. I have examined the site practically under all conditions, and there is nothing about it that one might take exception to. There is another wharf to the south-west, which is called the " Mission Wharf," or H.S.A.G. Wharf. It is only a small structure. The Expropriation Board controls it now, and has recently rebuilt it. It is used as a copra wharf. A copra shed is also there. The board proposes building another shed and another wharf there. There is a good approach to the wharf, but that point is not only exposed, but has a tendency to scour. There is a good depth of water. There is 35 feet of water at the end of the N.D.L. pier, the shallowest part, where the ships lie, being from 16 to 17 feet. Out another 100 feet the depth is 50 feet. It is therefore practically impossible to extend the wharf seaward. The first advantage of the proposed site of the new wharf is that most of the land belongs to the Government. A small portion is on lease to the Roman Catholic Mission for another ten or twelve years. What is known as the Royal and Dow property belongs to the Expropriation Board. We can extend along the face of this property from Komini's boundary Komini is a Japanese ship-builder, and his property is also leased from the Government. The proposed wharf could be extended from Komini's property to Royal and Dow's property, a distance approximately of 1,200 feet. From Komini's towards the town the water begins to shallow, that is, going in the direction of the old wharf. We could probably extend for another 100 yards in deep water. The site of the proposed wharf is approximately 100 feet from the beach. The wharf will be 600 feet in length, with a width of 28 feet at the narrowest point. There are a series of short piers connecting with sheds on shore. There is also room for extension. The land slopes from the level of the water. The highest point above water level near Royal and Dow's property is 26 feet, and at Komini's property 12 feet. It will be necessary to make roads. The land is practically the same as the surrounding country. The advantage of the proposed wharf is that it would be extended to any length up to another 500 or 600 feet without any difficulty at all. There is plenty of water, and a good approach from the sea. Soundings were taken at low water, and show that the shallowest part is about 23 feet. It is proposed to dredge to 30 feet. Few of the ships that visit Rabaul draw more than from 22 to 25 feet. At one time the American battleship *Milwaukee* came alongside the old wharf for water, but, as a rule, such vessels have not a tremendous draught. Eventually, I believe that the coal wharf will be used by the oil interests, or else the coal will be stored at some other place on the frontage near the suggested site, with a runway from the end of the wharf into a shed on the shore. By having two tracks, one overhead and one on the ground level, there would be no difficulty in storing the coal in a shed; in fact, much of the present labour could be dispensed with. By placing a couple of dolphins in line with the proposed wharf it would be possible, if shed No. 2 were used for copra purposes entirely, for an

oversea vessel alongside the wharf to load from the extreme end of the shed into the forward hold by simply sliding back along the dolphins, which would serve as an extension to the wharf. The piers running into the shed could be covered over, and at some future date conveyor belts installed for loading copra direct into ships' holds. That would be very useful in wet weather. Should one of the oil companies care to install a fuel tank for crude oil, there would be plenty of space for it on the site. The only fresh water obtainable, other than rainwater, is at the falls of the botanical gardens. There is a small fall of water to the rear of the site, about three-quarters of a mile away, but I do not think that it could be relied upon. I have never heard of the wells that have been sunk near this site running dry. The only water supply that can be relied upon is from the wells. I have had the well water tested, and it is all right.

20. *To Mr. Gregory.*—The site of the old wharf suffers from the same disability. Water is obtainable there from the gardens falls when they are in flood. Water is also pumped every day from a well. If necessary, the roofs of the sheds could be used as a water catchment. Probably from now to November there would not be enough rain to fill water tanks. For vessels we should have to rely on the water from the wells, but tank water could be used as an auxiliary supply.

21. *To the Chairman.*—We have only one well on the site of the old wharf. On the old site the water supply is not so good, being about 5 tons a day. The wells are pumped dry, and then allowed to re-fill. There is ample water at the proposed site. When digging down there is no possible hope of going more than two or three feet below water level, because wells cannot be baled dry. On the old site any of the wells can be baled dry at any time. The disadvantages of the new site are minor ones. Right through the centre of the site of No. 1 shed is an old creek bed, but there will be no difficulty in diverting it. It would be better diverted near the wharf on the far side of the road. because it would be taken along practically in a straight line. The creek is more or less parallel to the wharf, but takes a turn to the site of the proposed wharf. It can easily be carried further along and brought down to the edge of Komini's property, to the east of the wharf, and then it would run south. That diversion could be made at little expense, and was taken into account in the design. There was at one time a cemetery on the site, but I cannot tell the exact location. It has since been removed. It was very shallow, and would not make any difference to the water supply. What was of much more serious consequence was the sanitary dépôt at the foot of the hill. When Dr. Cilento first went to Rabaul I drew his attention to that matter. He found that that dépôt was likely to pollute the future water supply, and at the earliest opportunity he had it shifted. Then I raised the question of testing the water adjacent to the site of the proposed wharf, and Dr. Cilento informed me that it was all right and showed no sign of contamination. One of the disadvantages of the proposed site is that people have got into the habit of going elsewhere. There is also a general belief that the new wharf will not be on the proposed site, but at Malaguna, where the present coal wharf is. From the point of view of transportation, I cannot see that the proposed site has any disadvantage. It has rather an overwhelming advantage. Objections have been raised to the proposed site by masters of vessels that trade with Rabaul, on account of its exposure to the south-east winds. I believe that about four years ago one of Burns, Philp's boats was lying at what is now the Board's wharf at Malaguna, and the skipper tried to get away during a south-east breeze. He got into a fix and nearly lost his boat. But, apart from that, he had no right to leave the wharf while the south-east gale was blowing. Since then a mooring buoy has been put down to enable boats to be hauled from the side of the wharf, but I have never yet seen it used by the Burns, Philp boats. The proposed site is not nearly so exposed as the wharf at Malaguna. Matupi is the protecting point, and the wind comes across from there in a south-easterly direction. The mission wharf at Malaguna is the last place to obtain protection from that point. The south-east wind will have no appreciable effect on shipping at the proposed site. As an evidence of this, I might say that the coal wharf at Malaguna was built of the lightest of material. The piles are coco-nut trees, which are usually not more than 10 inches in diameter. The head stocks are 8-in. by 6-in. timbers, and the stringers are 6in. by 4-in. The decking is of 1½-in. timber.

22. *To Senator Reid.*—A straight coco-nut tree does not drive badly, but, as a rule, the trees are bent, and therefore care must be taken in driving them. They spring a lot. That wharf was never built for handling general cargo, but last year between 17,000 and 20,000 tons passed over it. Alongside of it is what is known as the schooner wharf. When I first went to Rabaul that wharf was used for boats of about 40 feet in length. Its piles are the same as those in the adjacent wharf, but the general construction is considerably lighter. The end portion of from 40 to 45 feet in length was added, and made slightly heavier, much the same as the other except that 3-inch decking was substituted. The coal wharf has been in general use for three years, and practically every vessel coming to the port has lain alongside it. I have never heard of a vessel, either berthing or leaving, being delayed on account of the wind. If the south-east wind were as bad as some state, that structure would have gone to pieces long ago. The coal wharf is more exposed than the proposed site of the new wharf.

23. *To the Chairman.*—I obtained from the Customs Department particulars of what stowage accommodation was required, and it was decided that accommodation for 2,000 tons of copra was necessary. Each of the sheds will hold 2,000 tons without any difficulty. As a matter of fact, by stacking right up to the roof, another 500 tons could be stored in each. No. 1 shed has a cargo space of 252 feet x 60 feet. There is an extension of 24 feet x 60 feet at the end of it, to be used as the Customs bond store, and two offices, one a Customs office and the other a shipping office. The intention is to use this shed for general cargo. There should be no trouble in storing 2,000 tons in it. No. 2 shed is 252 feet x 60 feet. It will have a capacity of 2,000 tons, and will be used entirely for copra purposes. If closely stacked, it will be possible to store 3,000 tons of copra, but in that case there would be very little space left in it. The floor of the shed is to be raised 4 feet above the level of the roadway, so that lorries can back up against it either for loading or unloading purposes. Cargo will be landed on the wharf, passed into the shed, and loaded through opposite doors on to lorries on the roadway. That will obviate a lot of lifting. The general trade does not require lorries going on the wharf. They might go on occasionally, and provision has been made for that, by a ramp at the end of the shed. The raising of the shed meant the erection of a wall of some description, and a rubble wall has been decided upon, with stone or earth filling, whichever is available. The intention is to use dredged material for this purpose, because it is the cheapest method of filling. The floor will be of 6-inch concrete, reinforced with B.R.C. fabric. Stewart and Lloyd's construction, or similar construction was specified for the sheds. Tenderers were at liberty to submit any other designs that they wished. The idea was to obtain the best tender. I made inquiries and found that the cheapest construction was Stewart and Lloyds. They are pipe manufacturers, but one of their special lines is steel pipe trusses for the framework of sheds. The sheds would be covered with 24-gauge galvanized iron. Provision was also made for lining the sheds with 6-in. x 2-in. hardwood battens.

24. *To Senator Reid.*—In the shed construction, the uprights will be pipes to which will be bolted angles. The ironwork will be bolted on with hook bolts. That

is the standard practice. The inside lining of 6-in. x 2-in. would also be bolted on. The roof would be of 24-gauge galvanized iron.

25. *To Senator Payne.*—No provision is made for treating the iron.

26. *To the Chairman.*—The sliding doors will be of oregon timber. The original design provided for sheds on the wharf, practically the same as in Melbourne, but I understand that the Minister asked that they should be placed on the shore on account of the danger of fire. There is not much difference in the cost. The foundation for the sheds is good. I know exactly what it is. At Malaguna the sheds are erected on a similar foundation, and no difficulty has been experienced there. The bottom for a foot or two is sandy loam, but beyond that, sand. By putting down a ¾-in. rod one might get bottom at 3 feet, but in exceptional cases, by driving and redrawing, with two men working, we have got down to about 12 feet. There is a definite raft of sand, which will undoubtedly carry the load that will be placed upon it. It might be asked whether the sheds should not be brought out further. They are designed to be about 12 feet from the water's edge. The proposed wharf has a frontage of about 600 feet by 28 feet. In designing it I had to decide how close we could get in shore to get the depth without too much dredging. The soundings taken were fairly uniform, but before taking them I made a compass survey at every 50 feet, and it was in close agreement with the original. Dredging would, of course, be necessary. No proper dredge is there, and we must make primitive arrangements for that work. My intention was to use the present pile-driver, by fitting it with a suction pump of probably 10-inch or 12-inch diameter. It would be quite satisfactory for the work to be done. Furthermore, in the event of any future sign of silting up, which I do not think will happen, it would be a simple matter to re-dredge and dump the silt into deep water. There is 35 feet of water at less than 100 feet from the face of the wharf. The bottom slopes away to a depth of from 60 to 100 feet. One of the objections to the proposed site was the presence of a reef, but the persons using that objection omitted to state that there were 10 fathoms of water above it. The reef is more likely to protect rather than endanger the wharf. In the construction of the wharf, the first consideration was the type of piles to be used to withstand the ravages of teredo. I first favoured the use of turpentine piles without sheathing, believing that turpentine was not affected by teredo. But the N. D. L. wharf is constructed of turpentine piles, and they have practically been eaten away in ten years. That caused me to recast my ideas, and meant that whatever pile we used we had to protect it in some form or other. There are four types of piles— timber, protected by concrete or copper sheathing, reinforced concrete, screw steel piles, and cast iron piles. Screw steel piles were considered, but the cost was prohibitive. The more I saw of Rabaul the more I became convinced of the danger of using concrete piles. I do not say that they will not stand, but I am not prepared to accept the responsibility of recommending them for use in the proposed wharf. There is plenty of stone and sand in the vicinity, but the sand is not too good for concrete pile construction. A certain percentage of stone dust would have to be used to make up the deficiency, and the sand would have to be well washed. Plenty of well water is procurable. The sand is not only very coarse, but it has a percentage of pumice in it. I certainly should not recommend it for pile construction. No other sand is available unless coral is used, which, after all, is practically lime. I object to a concrete wharf, not from the point of view of its expense, although the chief engineer of the Melbourne Harbour Trust has told me that it costs approximately twice as much as a timber wharf My objection to the use of concrete piles is due entirely to earthquakes. In 1918, during a big earthquake, the old N. D. L. wharf looked like a snake; a lot of the piles gave way. I know what it is to wake up at night and find the house shaking violently. One can imagine the sudden jar that an earthquake would give to concrete piles in a wharf. No one knows what the movement is, but on occasions earthquakes to me have felt as if somebody had taken me by the shoulders and given me a violent shaking. An earthquake would fracture the concrete pile at the mudline. A diver would not be able to ascertain the damage, but still the pile would be cracked. The steel would become exposed, and it would be only a question of time when it was eaten through, and the wharf would collapse. Practically the same thing has happened at Auckland, except that the causes were slightly different. For that reason I decided upon a timber pile covered with concrete. In Auckland the cause of the concrete pile cracking was the earth pressure at the back, which permitted corrosion of the steel and the ultimate collapse of the wharf. In this case the cause would be the earthquakes. That is my only objection to concrete construction. If the Territory were in a position to experiment, I should say go ahead with concrete construction. The question then was, what timber to use for piles. No timber could be obtained in the Territory in sufficient quantity, or in the lengths required. The saw-mills in the district are not able to supply local needs. A length of 60 feet is necessary for piles, and approximately 100 of that length would be required. The lengths would gradually become shorter. Altogether, about 500 piles would be required. I recommended the use of turpentine piles. Quotations were obtained from both Queensland and New South Wales, and the prices were practically the same. I have had piles deilvered at Madang at 3s. 11d. a foot, plus freight. It cost 6s. 5d. a running foot, for 60-ft. piles delivered at Madang from Sydney. The minimum diameter of the piles would be 12 inches. It is advisable to shoe the piles, although we have never yet struck any hard obstructions. I have put down a lot of test piles. As soon as the monkey hits the pile it sinks 5 feet in the sand, and after that into a fine black sand. The piles would be sunk to a depth of 18 feet, and with a depth of water of 30 feet, about 10 feet of pile would be out of the water, allowing for cutting. That is quite sufficient.

27. *To Senator Payne.*—I also obtained quotations for ironbark piles. As a matter of fact, turpentine piles were the cheapest available.

28. *To the Chairman.*—The only suitable timber in the Territory is quila, which is obtainable in small quantities, but the difficulty of obtaining it precludes its purchase for anything except a small proposition. They could be used for repair work. The best quotation for this timber given to the Expropriation Board for its works is between 9s. and 10s. a foot. In my recommendation to Mr. Clarke, who is in charge of that work, I included the quotations that I had obtained for turpentine piles, the price at that time being about 6s. a foot. On deciding on the timber wharf we took into account that the life of timber in the Territory is short compared with that of timber in Australia. Dry rot attacks it very quickly. This is clearly indicated by the old N. D. L. wharf which, during the last twelve months, has reached an advanced state of decay. That wharf is about 16 years old, and through neglect, nobody admitting its ownership, is decaying rapidly. The white ants do little damage, not so much as the red ants. The decking of the wharf is to be of brush box. The local saw-millers cannot supply local needs. They come along and ask for orders, but if they are asked to supply so much timber for work in hand they cannot do it. In fact, I ordered timber from one man for work which was already begun, and it took twelve months to get delivery. The size of the planking for the proposed wharf is 8-in. x 4-in. The piles will have 12 feet centres. The head stocks will be of ordinary construction, 16-in. x 14-in. I estimate to get enough stiffness

in the construction without any diagonal bracing. Although the bracing shown in the plan is diagonal, it is really horizontal. The walings are 12-in. x 6-in. Leading from the wharf into the sheds are simple piers, about 110 feet long and about 22 feet wide. The timber construction will be about the same as that of the wharf. A rubble wall is provided at the shore end. It will simply be loose rubble packed together, with a concrete toe to stop a certain amount of wash. Its face will be pointed in cement to make it rat-proof. My estimate of the cost of the proposed wharf was practically £40,000. If we did the work ourselves, we estimated it would take two years to complete. At the time the design was made the only labour available was Chinese carpenters and native boys. About half a dozen white men would have to be employed. I preferred calling for tenders for the work. I understand that the tenders called were considered excessive. They were not submitted to me, but were dealt with by the Works and Railways Department. The pile-driver at Rabaul is in good order. There is no dredge available in New Guinea, but before I left there I ordered a Priestman Grab required for special work. Very little dredging would be necessary for this structure. The wharf is calculated to stand 4 cwt. to the square foot, which is quite equal to any emergency. There will be no heavy lifts on the wharf, because no gear will be available, and the ships cannot lift any heavy cargo. The rise and fall of the tide is 2 ft. 9 in., and the tide runs easily. There is no danger of silting at the site. I have had no experience of the Hyde patent for covering piles. I have been to Brisbane, but have not examined the wharfs there. I called for tenders specifying reinforced concrete pipes. The tenders could have included Monier, Hume, the Hyde, or a similar type. The local material for concrete mixing is quite good enough for this work.

29. *To Senator Payne.*—No provision was made in estimate for treating the galvanized iron to be used on the sheds. Some of the early buildings at Rabaul were covered with exceptionally heavy iron, about 22 gauge, and it is, I suppose, as good to-day as when it was put on. A number of other buildings have been roofed with 26 gauge iron, which is not worth putting on. The first time anybody walks on it, it cracks, and in a short time requires replacing on account of becoming rusty. It was proposed to use 24 gauge galvanized iron for the sheds. The danger to the iron, of course, is the sulphur fumes, which are bound to have some effect on it. I was stationed at Rabaul for three years. At present about 20,000 tons of cargo pass over the wharf. The possibility of the development of trade is double or treble the present tonnage. The boats now go to the copra islands and lay off for days collecting cargo. With a modern wharf at Rabaul, it would pay them to bring their copra and stow it in the sheds. This work would be greatly facilitated by conveyor belts, because ships could come alongside the wharf and load 2,000 tons of cargo whether the season was wet or dry. I do not think that the disposal of the plantations by the Expropriation Board will to any extent bring about increased production. The plantation owners must increase their planting in many cases if they are to make good. Any increase of trade on account of that extra planting would depend on whether the plantations were within the Rabaul area. At present copra from New Island is being stored in large quantities at Rabaul. The Expropriation Board has already rebuilt the wharf at Malaguna, and erected a new shed. It contemplates building another wharf and shed. The position is that as soon as it goes out of existence, the wharfs will be put up for sale. But who will buy them? If Burns, Philp, or Carpenters buy them they will certainly not use the proposed wharf if constructed. What would then be done with it? It is singular that I have never heard any complaints from the shippers about the Expropriation Board building its wharfs at the most exposed part of the harbour. I understand that the lowest tender received for this work was £64,000, and the highest £84,000. In addition to making inquiries concerning turpentine and ironbark piles, I inquired about Johnsonwood, which is a Queensland timber, but I was advised not to use it. I made no inquiry about stringybark or blue-gum, except what I have seen about Melbourne. I believe that they are extensively used by the Melbourne Harbour Trust, and have given satisfaction. I do not think it would affect any saving if that type of pile were used. It is impossible to get timber impervious to teredo. It must also be remembered that dry rot in timber sets in very quickly in the Territory. I obtained quotations from Western Australia for Jarrah piles, but the price was prohibitive compared with that of turpentine piles. We would have had to make our own arrangements with the shippers, whereas for the cost of jarrah piles we could land turpentine piles on the site. The New Guinea trade agent at Sydney also made inquiries, but I do not know with whom he communicated. I made inquiries in Queensland, New South Wales and Western Australia. I would not recommend reclaiming land on the site of the present wharf and doing away with the bottle-neck. That site, I know, is silting up. The old wharf could not be repaired economically, because it wants re-decking. It shows signs of decay, and the stringers in some cases would have to be replaced. It would be a waste of money to repair the old wharf.

30. *To Mr. Lacey.*—The piles would have to be driven for a few feet through more or less loose sand. The monkey, at the first blow, would probably drive a pile about 4 feet, and in some cases 5 feet. It would be advisable to shoe the piles, because there is no telling what obstructions might be under the sand. It is not absolutely necessary to shoe the piles. The shoe costs about 6s. 4d. The pile, in any case, would have to be pointed, so that the cost of shoeing would at the outside be 8s. each pile. It would not be possible to construct a new wharf in place of the burnt portion of the old wharf without first clearing the site of debris, because of the impractibility of driving piles to a gauge. A wharf cannot be built out of alignment.

31. *To Mr. Cook.*—The earthquakes at Rabaul are regular, but not always violent. The piles that were snapped by the earthquake had been badly eaten by teredo. This distance between the old wharf and the proposed wharf is about 1¼ miles round the shore. I am quite satisfied that the proposed wharf is the better proposition, because it can be built economically, and will leave room for expansion. Land is also available for shore works. The shippers are for and against the proposal, like they are respecting any other matter. The argument against the proposal is the south-east wind, but that is quite an ordinary thing at Rabaul. Skippers who have been at the port only a few times have exaggerated the danger of the south-west breeze, simply because they have been schooled to do so. That is a sort of thing I have had to put up with. On the other hand, the skippers who have had considerable experience in stevedoring recommend the proposed site. The danger of storms at the proposed site need not be considered. When a sudden squall arises, or when a vessel is going alongside or leaving the wharf, an accident is always possible no matter where the wharf is situated. I have put down test piles to ascertain the foundation. It is very fine black sand. The average depth of driving would be about 18 feet. Some dredging will be required, and the dredged material will all be used for reclamation. The cost of dredging would work out at about 1s. 6d. a yard. I have had considerable experience in dredging work, and I know that there is no difficulty to be experienced at the proposed site in connexion with dredging. I have had experience of concrete piling on bridge and silo work, and of wooden piling in shire bridges. I prefer wooden piles because of their elasticity in case of earthquakes. I should not like to use concrete piles at Rabaul. They could not possibly be used unless sufficient diagonal piles were provided, and the cost of that would be prohibitive. The cement covering would give effective

protection from teredo. Of course, cracks may occur in it because of vessels colliding with the wharf, and this would entail a diver's inspection. Apart from that, there is a diver's inspection every six months, because trouble is often experienced through the propellors of the vessels scouring the sand from the piles. When that happens the only thing to do is to put a mould round the base of the piles and to pour concrete into it. The concrete is put in practically dry and then rammed. The Expropriation Board has control of the construction of their own wharfs. In view of the fact that it is selling the plantations, it should not be allowed to construct further wharfs. The Government should step in and take control of them. The Board is making a big mistake in building another wharf and shed. The wharf could have been complete now under day labour, but by calling tenders the wharf has been delayed. Owing to their excessive cost fresh designs were drawn up and tenders again called, but they were still too high. Another reason for delay is that when the sketch plans were drawn up and estimates made of the work, it was a question of whether the money was available. We thought it was available, but afterwards found that it was not. That went on for twelve months. Tenders were then called, but they were too high. I was present in Melbourne at the time of opening them. We drew up a fresh design. It was decided to purchase the old wharf at £4,000, and to use the material as best we could. We thought that in that way we would decide the ownership of the wharf. It is an eyesore and should be removed. Everybody who goes to Rabaul passes uncomplimentary remarks about it. I gave instructions to begin the dismantling of the old wharf, and to start on the new one, but word came through to stop the work, because the matter had been referred to the League of Nations. It was then decided to call tenders for the work. Had a tender been accepted, it would not have been necessary for the Public Works Committee to make inquiries into this matter. Under the conditions prevailing at the final drawing up of the design, we reckoned that we could do the work at our estimate. A contractor has to consider a great many unforseen contingencies. He has to make allawance for his profit, because he is taking a risk in carrying out work at Rabaul. The Government could obtain native boys for this work without any great expense if it would go to the trouble to get them. There are certain closed areas, but at times they have been opened for one day to enable the Government to recruit boys. We have to use that type of labour. Day labour is not exactly guess work, because we have done other work based on the same figures. But it is a different thing to carry out a work of this size.

32. *To Mr. Gregory.*—The principal features in connexion with the wharf are its construction and the site. I consider that I have had sufficient harbour work experience to enable me to give a sound opinion regarding the safety of the harbour of Rabaul and the danger of the winds prevailing there. Of those who know the conditions, Captain Williams, of Burns, Philp, and Company is the only skipper who is really against the proposed site, and he objects to it on principle. Mr. Rothery, the stevedore who has worked as mate and master with that company, favours the proposed site. He knows as much about stevedoring as anybody in the company. I have also discused the matters with Mr. Greenwood. I know that Burns, Philp, and Company are satisfied with the proposed site from a financial point of view. Their officers like the old wharf, not from a stevedoring point of view, but because they can sit on the verandah and watch the ship working. The old wharf is practically at their front door. The cargoes of Burns, Philp, and Company are practically all handled in lighters, even from the old wharf. So I do not think the old wharf makes a scrap of difference to them, except so far as their personal cargo is concerned. The added facilities at the proposed wharf for loading and unloading would give them a tremendous advantage in the time that their vessels are kept there. The boats are in the harbour seldom less than four days, and with the facilities of the proposed wharf they need not be kept there more than two days. There is great congestion at the coal wharf. One shed is really for coal. When I left, there were from 700 to 800 tons in it, and no room available for cargo. The cargo was being placed on the top of the coal, which was then stacked 10 feet high. In the other shed cargo is stored indiscriminately. Two vessels may arrive together, and the cargo is hurriedly stowed in the shed, and at times it has taken three weeks to take out goods that were stacked at the bottom. The south-east wind blows for about six months of the year. It varies in strength, but the only danger is from a sudden squall. In that case the danger would apply to both sides of the harbour. The old wharf has no protection from the north-west wind. Of course, it might swirl round to a certain extent and affect the proposed site. It is bound to be affected by the south-east wind. During my three years at Rabaul no difficulty was experienced in tying up a vessel alongside the wharf during a south-east wind. Under no circumstances is there a sea like that which is experienced at Port Melbourne. My objection to the use of reinforced concrete piles at Rabaul is solely on account of the earthquakes. The effect of an earthquake cannot be gauged. When a concrete pile is firmly embedded in the wharf and sand, a sudden jar would naturally crack its base. During an earthquake, water is often thrown out of tanks. In some cases tanks are thrown off their stands, and even houses off their pile foundations. Were it not for earthquakes I would strongly recommend the use of concrete piles. The ravages of teredo are certainly greater at Rabaul than in Melbourne. At Rabaul the life of an ordinary unprotected pile is from two to three years. An earthquake would not affect a cement-covered pile to the same extent as a reinforced concrete pile. The concrete covering would go down into the sand sufficiently far to enable it to act like a hinge. The teredo does not bore into the sand. We have allowed three feet of pipe in the sand to guard against the danger of scouring by steamers' propellers. Teredo cannot live in the sand. There is always a diver at Rabaul. The depth of water at the proposed wharf is 23 or 24 feet at low tide. The vessels sometimes draw 25 feet when they are loaded, so that a little dredging is necessary. When I first went to the Territory I reported on the harbour of Kavieng, which was considered unsafe for Burns, Philp boats drawing from 16 feet to 18 feet. I recommended blowing away the coral reef there. That was done, at a cost of £150, and the harbour was deepened to 19 feet at the shallowest point. Since then, as the Haines line calls at Port Pirie to load concentrates, and goes to the islands to obtain an additional cargo of copra, the depth of water at Kavieng has been found to be insufficient. I suggested several improvements, which are now being carried out. Kavieng will never be of much use as a port until a good type of dredge is obtained. Dredging at the proposed site would be a simple matter. We would use a suction dredge, and the filling would be utilized for reclamation. The Expropriation Board has a small suction dredge. The local timbers are not available for the proposed work. The only timber there in any semblance of a forest is the ordinary eucalyptus. I made up the detailed estimate of this work. It may probably be at the Works and Railways Department. Ironbark best withstands dry rot, and if given a coat of preservative its life would be indefinite. A neglected wharf would not last more than ten years. In connexion with the steel wharf that was constructed in Mexico, I saw some of the decking that was removed after having been down for six months, and it was rotten. The steel piles in that wharf were screwed. They were solid, and about 6 inches in diameter. They would cost much more than the proposed type of pile, unless a very good tender for them were received. Turpentine fender piles are provided for the proposed wharf. Of course, wherever the cement covering breaks away

the teredo will be able to work, and the only remedy is to repair the damage. At one time the Expropriation Board built a small wharf. I was asked for an estimate, which I gave, but the Board paid no attention to it. The Board afterwards decided to protect the piles. I pointed out in my recommendation that the estimate did not allow for that work, and therefore the piles would have a life of about two years, and after that the wharf would have to be scrapped. I know that the concrete covering of a lot of the piles in that wharf has cracked. In the proposed wharf it was my intention to fill in the interior of cement covering with sand, but Sir George Buchanan suggested filling it in with concrete. I called for alternate tenders for that work. A concrete filling would not be so flexible as a sand filling in the case of an earthquake. The concrete covering would be above high-water level. The height of the sheds will be about 14 feet. That is the usual practice. I have seen copra stored as high as 12 feet in other sheds. That is about the average height. Ventilators are to be provided in the roof, but they are not shown on the plan. As far as I remember they were specified. In one set of plans submitted a number of skylights were provided. As a matter of fact, it is doubtful whether skylights will be necessary, as the door openings will provide sufficient lighting. It would be possible to obtain 22-gauge galvanized iron for the building, but that is not the ordinary commercial size.

33. *To Senator Reid.*—Galvanized iron does not last very long in the Territory, except the 22-in. gauge, which was used by the Germans in the early stages. In those days galvanized iron was iron. What we get to-day is mostly steel. I suppose that the life of iron is three or four times that of steel. Special galvanized iron can be obtained from firms like Armco, of America. We have to contend with the sulphur fumes from the crater at Rabaul. Their effect upon the iron must be very great. The roofs there are invariably given a coat of red oxide. Everything possible is done to preserve the iron. The face of the wharf is about 120 feet from the shore. The wharf itself will be 28 feet wide. The decking will be of brush box. The gangways from the wharf to the shed could be covered. Dry rot is a fungus which gets on the timber. The timber is never dry, because the atmosphere is so moist. The present pier is rotting away. It has not been down for more than 16 years, but it has been neglected for the past four years. Any one who sees it would be inclined to condemn it. The rubble wall is necessary to raise the floor of the shed to the level of the wharf. It is the cheapest method of providing that facility. The wall will be used really for reclamation purposes. The coal wharf is more exposed to the south-east wind than is the proposed site. Most people, when referring to the south-east wind, make a mountain out of a mole-hill. The creek adjacent to the site overflows only during heavy storms. By diverting it, its course will be made easier. About three and a half years ago, during a storm, the water filled up the roadway with pumice level with the floor of the coal wharf, which was about 3 or 4 feet above the roadway. We cannot provide against cloud-bursts. Most of the water that I have seen running along the creek would go through a 20-inch pipe. The diversion of the creek will be a simple matter. The ships' gear has so far been sufficient to handle the cargo offering. It is not likly that machinery needed for mines will be landed on the wharf, because no vessel can carry an article weighing 50 tons. Even when it is taken to ports adjacent to mining fields, there is no means of getting the machinery ashore. Except at Rabaul, and possibly Kavieng and Madang, any heavy cargo taken to ports must be taken ashore in lighters. If necessary, a crane could be erected on the proposed wharf. There will never be any mining around Rabaul. It is all on the mainland of New Guinea. The doors of the shed are specified in oregon. Of course, they must be painted. When tenders were called I was quite prepared to consider any details submitted by the tenderers, because, after all, the superstructure of a shed is not a great expense, and the contractor is given the opportunity to use timber which he can readily obtain. In designing the wharf I took the future development of Rabaul into consideration. I am quite aware that wharfs can be constructed anywhere. It is all a question of cost. For instance, a tentative scheme was drawn up, which if given effect, would have cost at least £200,000. Rabaul does not want an elaborate wharf at present.

34. *To Mr. Seabrook.*—The depth of water at the proposed site is about 23 feet, and 50 feet out it would be about 30 feet deep. The danger of fire on the wharf is due to the miscellaneous cargo that is stored there. copra is very inflammable. Only recently stringent regulations were imposed in Sydney respecting copra, and I understand that only in certain places is it allowed to be unloaded. In the design I have allowed for two vessels to be alongside the wharf at one time. I do not think that a wharf with a "T" end would permit of two vessels lying alongside at one time, because there would not be sufficient water in-shore to allow vessels to tie up at each side. The ships trading there are about 400 feet in length. The "T" end would extend the wharf only another 50 feet seawards. If sheds and efficient accommodation are to be provided I do not think that anything will be saved by doing away with the rubble wall and constructing a wharf with a "T" end. Provision has to be made for at least 2,000 tons of copra besides general cargo, which consists of almost everything under the sun. I am not taking coal into consideration at all. If provision were to be made only for one berth, it would be a different matter. By extending the structure seaward piles 70 feet long would be required, and they are not easily obtainable. The present design is the better proposition. If economy were to be the consideration I should suggest building one section of the design. The tubing uprights for the shed would have 12-ft. centres. The angles are bolted to them, and the galvanized iron is put on to hooked bolts. Timber will be used for the lining, the size being 6 x 2. Iron purlins will be used. I did not supply tenderers with scheduled quantities of the whole of the work. Most of the information was on the plans. I know that two firms who tendered sent a representative to Rabaul to view the proposed site. My estimate of the work is £40,000. Under certain circumstances, I believe it would be cheaper to carry out the wharf by day labour instead of by contract, providing that those carrying it out were given an absolutely free hand, and were able to obtain labour and material when required. The labour at Rabaul is coloured. The labour conditions in the Territory have changed even during the last twelve months. The disposal of the plantations will absorb labour, and there will consequently be less labour available for this work. The carpenters will very likely be employed on the plantations, and, therefore, probably ten white men will have to be employed on the wharf. At the time the estimate was made I considered we should carry out the work for £40,000. I checked everything with my wharf construction foreman.

(*Taken at Melbourne.*)

WEDNESDAY, 14TH JULY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Payne	Mr. McGrath
Senator Reid	Mr. Seabroook.
Mr. Gregory	

Edward Featherstone Phibbs, Chief Collector of Customs for the Mandated Territory of New Guinea, sworn and examined.

35. *To the Chairman.*—I have resided in Rabaul since February, 1915. I am acquainted with the site

of the suggested wharf. It provides room for expansion at a later date. It could be extended for about 1,000 feet, which should be enough to meet the requirements for many years to come. There is deep water at the site, and it has the additional advantage that the wharf can be built parallel to the sea. The short distance from the side of the ship to the shore will reduce the expenses of loading. Copra comprises the bulk of the outward trade. The only people who have complained of the new wharf site are the captains of the Burns, Philp line of steamers, who object to it because it is somewhat exposed to the south-east weather. The Expropriation Board has a wharf in the same vicinity—it is even more exposed to the weather—yet big overseas vessels of twice the tonnage of those of Burns, Philp, and Company have berthed there without difficulty during the past three years. No complaints have been received from the captains of those vessels. For the handling of outward cargo the new site is well situated, although it is not so good as the old wharf for the inward trade. Chinatown is the principal trading centre. Its distance from the new wharf is about the same as from the old wharf. There is a road leading to the new wharf, but it would require to be properly made. The old wharf is practically on the main road. The construction of a new road to the new wharf would not be expensive. That wharf would be more convenient for sea traffic than is the old wharf. One disadvantage of the old site is that the wharf there cannot be extended. When the Germans built it they apparently had no idea that the trade of the island would develop as it has done. During the first year of my residence at Rabaul 17,000 tons of copra were exported; last year the amount was 40,000 tons. Within the next three or four years it is anticipated that the export of copra will amount to 60,000 tons. At the old site not more than 3,000 tons of copra could be stored, because the wharf would not carry it. As boats now call and take away 6,000 tons at one loading, a shed with a capacity of 6,000 tons of copra is required. I do not recommend that the old wharf be reconditioned, or a new wharf built in the same vicinity. The new site is more economical, from the point of view of upkeep and cheap handling. I have seen the plans of the suggested structure, but not lately. Two sheds with a capacity of 2,000 tons each will be sufficient for the present, but, in view of the development which is anticipated, they would soon require to be extended. I have not with me the figures showing the volume of inward trade, but at Rabaul particulars covering the last nine or ten years are available. The construction of a wharf at the new site should bring additional business to Rabaul. At present copra comes to Rabaul from over 200 plantations. It arrives in small schooners or steamers, and is placed in the Board's concentration dépôt at Malaguna. It is then sold in lots of from 1,600 to 2,000 tons, and shipped. The sale of properties by the Board should result in from 150 to 200 independent planters becoming established in the Territory. Their copra would have to be shipped from Rabaul, and consequently greater shed accommodation will be necessary. If better shed accommodation were provided, small growers would be able to store their copra until a sufficient quantity had accumulated to command a better price than they could obtain for small lots. Berthing charges for boats at Rabaul are £10 for the first 24 hours, and £5 for the second and subsequent 24 hours. In addition, a charge of 1s. a ton is levied on all cargo passing over the wharf, both inward and outward. The revenue derived from the wharf—approximately £3,000 per annum—should be sufficient to pay the interest on the cost of a good wharf. If a shed were constructed for the storage of copra, an additional charge of 6d. or 1s. a ton could be made for storage. I am of the opinion that the development in trade will be such that the revenue will be sufficient to meet both it and the sinking fund. The most expensive part of shipping is demurrage. A boat like the *Mataram* costs about £150 a day for demurrage. If we can provide facilities to enable a vessel to be loaded in three instead of seven days, it would be possible to raise the berthing charges from £10 to £20 a day, without loss to the shipping companies. In shipping, quick dispatch is everything. The old shed did not permit of quick dispatch. I approve of the suggestion that the sheds should be built on the shore. That would permit copra to enter them from both the land and the water. The shed on the old wharf was situated about 500 feet from the land, necessitating the copra being transhipped into trucks before loading. Copra sometimes lies in the shed for a month before it is shipped. To provide sufficient accommodation for both inward and outward cargo, the shed accommodation should be sufficient for at least 4,000 tons of goods. Outward cargo does not take up so much space as does inward cargo, for the reason that the former is practically all copra, whereas the inward cargo comprises miscellaneous goods, which would require to be spread out more than the copra. It might be possible to store 1,500 tons of copra in the space required for 1,000 tons of general cargo. Most of the houses at Rabaul are made of wood. Some difficulty is experienced because of white ants, but they are not worse than in some parts of Australia. The houses are built on piles set on cement blocks. Between the timber and the cement a piece of tin is placed. The piles are subjected to periodical inspection. I consider the plans for the proposed new wharf to be suitable. A wharf 600 feet in length should be sufficient for the present. On two or three occasions only have more than one boat required berthing accommodation at one time. The provision of sufficient wharfing accommodation for two boats is simply a matter of cost. I should not advise a length of more than 600 feet at present. The wharf could be extended if required. The new site provides a sufficient depth and breadth of water for manœuvring big boats. Fresh water would have to be obtained from the hills at the back.

36. *To Mr. Lacey.*—When I said that the accommodation would have to be extended in the near future, I referred to the sheds only, not to the wharf. I consider that 600 feet of wharfage should be sufficient for the next four or five years. The shed accommodation suggested would not be sufficient for more than two years. There is ample room at the new site for extending the shed accommodation. Copra arrives at the wharf in bags. About 80 to 85 cubic feet, or 16 bags, represents a ton. The objection to the site of the proposed new wharf is probably due to the captains' desire to get the easiest berthing. The only objection has come from Burns, Philps' captains. Masters of oversea vessels, British, Norwegian, French, and Dutch, have raised no objection, although their vessels are much larger. For the handling of cargo, the new wharf would be preferable to the old one. The floor of the shed is practically level with the wharf; at one end it is raised about 1 foot to prevent the trolleys from running over. Ultimately, I hope that conveyors for handling goods will be installed. Although coloured labour is cheap, per man, it is expensive. The natives do not work like Chinamen or white men. They do not work well for more than two hours each day.

37. *To Senator Barnes.*—The new wharf would enable incoming goods to be loaded from the shed to motors. If the old wharf were repaired, incoming goods would have to be taken from the shed in trucks and then transhipped to motor lorries. Storage is charged on all goods kept in the shed over eight days. That is in addition to the 1s. per ton charged on all goods crossing the wharf.

38. *To Senator Payne.*—When I said that the estimated revenue was £3,000 per annum, I meant that that would be the case immediately the wharf was constructed. The increased output of copra, which is estimated to reach 60,000 tons by 1933, would mean additional revenue. The removal of the duty on many of the things grown in the Mandated Territory should

lead to the growing of cocoa and other commodities. I do not think that the existence of the duties prevented produce grown in the Mandated Territory from being exported to Australia. Although the Germans experimented with the growing of many different things, they gave them up. No experimental work has been done since then. The nuts grown in the territory take so long to grow that I do not think there is any likelihood of developments in that direction. The decreased output of cocoa during recent years is due to no one experienced in curing it being available. No steps have been taken since the remission of the duties to extend the cocoa plantations. I think that there is a possibility of private planters growing many things not now grown, including kapok. I think that the presence of additional private planters will mean additional areas being placed under cultivation. The Board has done no developmental work. The proposed wharf is about 2,000 yards from Chinatown and the other business centres. Burns, Philps' store is close to the old wharf. Their opposition to the new wharf may be influenced by that fact. Development at Rabaul can only extend in the direction of the new wharf. During my residence at Rabaul, I have not known of great difficulty being experienced in berthing steamers at Malaguna. Matupi should afford the new wharf a fair amount of shelter from the south-east winds. Occasionally these winds are high during the day, but vessels generally berth about 6 o'clock in the morning or late in the afternoon. The wind dies off as the sun goes down, and does not spring up again until after sunrise.

39. *To Mr. Gregory.*—Objections have been raised by Burns, Philp and Company to the proposed site on account of the south-east winds, but no overseas companies have objected on that ground. The site offers no disadvantages in the matter of approaching the wharf. I do not think that any overseas captain would have the slightest objection to berthing there. Practically all the shipping in and out at Rabaul has been through my hands since early in 1915. I do not see why the height of the storage sheds should be limited to 14 feet. Copra bags do not weigh more than 150 lb. each, and when they have to be stacked to a fair height the bags are stepped so that the boys can step with ease up to the top of the stack. I think it would be wise to increase the storage capacity of the sheds at the outset, because it would be cheaper to do so. An addition of 4 feet or 6 feet in height and width would increase the storage capacity considerably. The storage charge is 1s. per ton per week. That was the charge on the old wharf. We have no storage capacity at the present time. The advantage of providing storage for the copra is that the traders who have small vessels can bring in their copra in small quantities, store it, insure it, obtain an advance on it, and have it ready for immediate shipment by the overseas boats. If a trader can store 50 tons or 100 tons he can get a much better price from the firms. If he is continually bringing in small quantities, they are weighed and store warrants are issued to him. The trader takes these store warrants to the merchants and sells them. The Expropriation Board is quite big enough to look after itself. It is our responsibility to put everything we can in the way of the small man, so that he may make as big a net profit as possible. It is very seldom that we have two large vessels at Rabaul at the one time. Wharfage accommodation for one vessel at a time should be quite sufficient. The country lends itself to any extension of the wharf. We have had vessels coming into Rabaul drawing 30 feet. Many vessels which arrive there to pick up copra have alerady loaded 2,000 or 3,000 tons of concentrates at Port Pirie. These concentrates stow very heavily. They do not fill the boat up, but they put her well down to the plimsoll mark. It is not the practice of these vessels to coal at Rabaul. The only coal supplies we carry there are for the Government vessels. We have no facilities for coaling the overseas vessels, and, in any case, the cost of bringing coal to Rabaul would be too heavy to enable that to be done. It ought to be possible to provide an efficient water supply, not only for the vessels but also for fire protection. There is plenty of water to be obtained. The only way in which we can develop the Mandated Territory is by making it cheap for vessels to call at Rabaul. It is our aim to get cheap freights and to give boats quick dispatch so that they may be induced to call for cargo. The Board wharf is about the same size as the coal wharf. It has a shed on it, but I do not think it is likely to come into competition with the proposed new wharf. The vessels that would use the new wharf would hardly go out of their way to make use of the shed on the Board's wharf. I do not know much about the various qualities of the timbers of the Mandated Territory, but I know that one timber which has been used for decking the coal wharf rots very quickly when it is exposed to the sun. It has to be coated with preservatives every two or three months, because it opens up when the sun beats down on it. The cost of the upkeep of a timber wharf is very heavy. All the decking of the old wharf has gone by now. I think that we, without making excessive charges, can pay interest and sinking fund on the capital expenditure involved in building a new wharf. If we can give quick dispatch to the steamers there is no reason why we should not do so.

40. *To Senator Reid.*—Hitherto, there has been no trouble in regard to the depth of water at the old wharf, but as the land shallows towards the end of that wharf some of the bigger vessels have had to berth their No. 1 and No. 2 holds only, and possibly their No. 3 hold. The coal wharf will not take vessels drawing more than 25 feet. The new wharf will take vessels at any time, whether it is high tide or low tide. It will be no higher than the old wharf, where provision was made for schooners. We had jetties on either side alongside which the schooners could lay and discharge their copra on to a platform. I understand that the same arrangement will apply in building the new wharf so that every provision will be made for the small schooners or launches bringing in small quantities of copra. The bags will all be man-handled. I am quite sure that the persons who bring in the small quantities of copra will make use of the storage facilities. At first there should be a storage capacity for at least 4,000 tons of copra alone, and about 1,500 tons for incoming general cargo. This remains as a rule in the shed for anything up to five days. There is a little transhipment cargo. The leading firms generally take this cargo to their own stores and then bring it back again to the wharf for re-shipment. The private plantations import a quantity of goods for themselves and those goods generally are removed from the shed within a few days. We are exporting 40,000 tons of copra this year. The output of the plantations managed by the Expropriation Board is increasing every year. Very few of the plantations have as yet reached their full bearing capacity. It is not correct to say that there has been no real supervision over the plantations for some years, and that they are more or less overgrown with weeds. Some of the men who have been working for the Expropriation Board have done their work very well, and some of the plantations have increased their output, although others have gone back. During the first year of the operations of the Board there was a slackening off in output, but during the last eighteen months the trade has picked up considerably. As a matter of fact, the output from the Board's plantations has been increased this year by nearly 2,000 tons. I am quite sure that the export of copra from the Mandated Territory will increase considerably, but the trees that will be planted by the new men will not be productive for at least ten years after planting. There has been no serious attempt in the Territory to go in for anything but copra and cocoa-beans. Some people have tried cotton, but it has failed except in one or two places. Cotton can be grown easily enough, but on account of the climate it

is difficult to harvest it. It must be harvested when the weather is dry. I understand that in the localities suitable for growing it the rainfall is such that you can never guarantee that the weather will be dry. When the cotton blossoms it is spoilt if rain gets into the pods, but, unfortunately, up there the cotton always blossoms in the wet season. Beautiful sugar can be grown on the mainland of New Guinea, where there are hundreds of thousands of acres of suitable land. The Germans experimented with it in their time. The natives of New Guinea smoke a tobacco which they grow themselves. In fact, they trade in it. Tobacco means money to them. It could be grown for export, but the trouble is to find the market. In my opinion, it could compete very favorably with Sumatra tobacco. The people in the Mandated Territory, however, have only one idea, and that is to grow coco-nuts. We have endeavoured to persuade them to try something else, but so far no one has taken the trouble to open up other industries. I think that the wharf, if it is not too expensive to construct, will pay on the copra trade only. A wharf costing £60,000 should earn interest and sinking fund. We have no cyclones at Rabaul. We are out of the cyclone belt there. There is no danger of the sheds on the wharf being blown away. The Chinese houses are all built of packing-cases and galvanized iron, and they have never yet been blown away. The trouble is that we have very heavy rain there. Sometimes we have as much as 8 inches or 10 inches a day.

41. *To Mr. Seabrook.*—Copra is shipped from Rabaul throughout the whole of the year. Our two worst months are February and March, which are in the height of the north-west season, when the small boats do not care to venture out. The coco-nut crop is not an annual one. The tree that is planted in June will bear fruit in June. As the trees are planted steadily throughout the year, there is a steady crop all the year round. At the beginning of this year we had an oil boat and a southern boat at Rabaul at the same time, but it is only about once a year that we have two big vessels there at the same time. The cargo is handled by boys out of the sheds to the ship's sling. For that reason, we are anxious to have the sheds as close as possible to the ship's side in order to minimize the carrying. The suggested width of 28 feet should give ample facilities for loading vessels. We often have a large vessel and a small vessel at Rabaul at the same time. For that reason, we require a jetty at least 600 feet long, capable of accommodating a 400-ft. vessel and a 200-ft. vessel at the same time. I would not favour the building of a wharf 100 feet wide with a T-end, giving a frontage of 250 feet and allowing smaller vessels to lie at either side. It would mean a bigger carry, and that is what we want to avoid. We never have two copra boats loading at the one time. No vessel will call for cargo unless it is guaranteed at least 2,000 or 3,000 tons of loading. The ships are loaded as quickly as the boys can carry the goods to them. I hope, however, that conveyors will be installed later. Sometimes from 250 to 300 boys are engaged in loading a vessel. With the installation of conveyors, boys would only be required for stacking the goods in the holds under white supervision.

42. *To Mr. McGrath.*—The present conditions at Rabaul are unsatisfactory to shippers. The export of copra in 1912 was about 8,000 or 9,000 tons. I think that the Committee would be wise to take into consideration the question of the employment of coloured labour in the construction of the new wharf. Rabaul supplies only a small portion of the world's copra requirements. India, Sumatra, Borneo, West Africa, and Ceylon also produce large quantities. My reason for advocating that the shed should be as near as possible to the wharf is to reduce the cost of loading. It now costs up to 7s. a ton to load copra at Rabaul, whereas in New York, which is possibly one of the most expensive harbours in the world, oil is loaded for 2s. a ton. I do not know the charges made for loading copra at the other islands.

43. *To the Chairman.*—Although I was not actually consulted by Mr. Fowler or the officers of the Public Works Department regarding the preparation of these plans, I gave them my ideas as to what was required in the way of wharfage and storage accommodation. In providing for shed accommodation, I think that an attempt was made to keep the cost within the amount likely to be granted for the purpose. My Department controls the waterfront at Rabaul. It would be necessary for any persons desiring to construct another wharf to obtain the Department's permission before doing so. If we were providing proper facilities, such permission would not be granted. It would not be asked for. Earthquakes at Rabaul have not caused a great deal of damage. The New Guinea Company has a large building there on a concrete base, and it has not shifted. A tank half full of water on a concrete stand is hardly a fair comparison with a wharf, when considering the effect of earthquakes. The firm of Carpenters, who are not in the habit of wasting money, are building a reinforced concrete structure at Rabaul.

44. *To Mr. Lacey.*—There is no danger from copra sweating if packed to a considerable height. In the old shed it was sometimes stored as high as 20 feet. I have not seen the latest portable appliances for loading wheat.

(Taken at Melbourne.)

WEDNESDAY, 21st JULY, 1926.

Present:

Mr. Mackay, Chairman;

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook

Charles Edward Lane-Poole, Forester, Commonwealth Forestry Adviser, sworn and examined.

45. *To the Chairman.*—I am aware that the Committee is inquiring into the proposed construction of a new wharf at Rabaul. Recently, on behalf of the Commonwealth Government, I made an examination of the timber resources of Papua and New Guinea. My investigation convinced me that no untreated timber there will resist the teredo. The kwila, the botanical name for which is *Afzelia bijuga,* is a hardwood, but it differs in character from our well-known Australian hardwoods. It belongs to the leguminous family, whilst Australian hardwoods, with the exception of the acacia, belong to the myrtle family, so there is no comparison between the two timbers. From the point of view of durability it equals the best of our hardwoods, such as the red ironbark in the eastern States and the jarrah in Western Australia. It would be satisfactory for decking purposes, but I am afraid it would be difficult to get sufficient of it for piles as it does not grow to any height. I saw some long kwila piles at Lavongai, otherwise known as New Hanover, but it would be exceedingly difficult to get sufficient for piles for the proposed work at Rabaul. There is no organization for pile getting in New Guinea such as we have in Queensland and New South Wales for the turpentine piles. It would be necessary to arrange a contract with a white man in Rabaul, who would have to employ native labour, which, being entirely inexperienced, would prove costly and difficult. Pile getting on a large scale has never been attempted in New Guinea. It has always been more profitable to get timber from the south. I am not in a position to say what it would cost to get suitable timber for piles out of the forests in New Guinea. Certainly I should not like to be called upon to organize the native labour at Lavongai for the purpose of getting

out several hundred piles of any length. Lavongai is about three days' sail by schooner from Rabaul. The entire absence of roads or bridges, as well as the absence of any organization of labour, will render pile getting difficult and costly. I am acquainted with the Wide Bay district on the south coast of New Britain. The Kokopo mission station at Kornidol has used that forest timber, *Eucalyptus Naudiniana*, for wharf deck construction. In my report furnished to the Government last year I stated that, in the case of kasi kasi, I had been shown piles which had been for twelve years in harbour works and were still sound, and that I had also been shown others riddled with ship-worm after three years. The timber does not grow to any size, so probably it would be difficult to get any piles longer than from 20 to 25 feet and from 12 to 14 inches in diameter. White ants are worse at Rabaul than anywhere else within my knowledge. One species that has done a great deal of damage does not require contact with the ground. It flies in and attacks timber in the upper stories of a building. When first I was told by the missionaries about this species of white ant I was inclined to disbelieve what I had heard, but curiously enough at the Pan-Pacific Conference, held in Sydney in 1923, a Japanese scientist from Formosa gave a most interesting paper on this particular termite. He stated that special precautions had to be taken by the Japanese Government to preserve the third story in the building as a research laboratory. He added that he had made investigations into the properties of oil distilled from Australian ant-resistant hardwoods, and had produced from the Murray cypress pine a synthetic oil which when applied to timber rendered it immune from attack by white ants. The kwila, the *Pterocarpus indicus* and the *Eucalyptus Naudiniana* are also white-ant resistant. The missionaries were not always careful in the selection of timbers for their buildings. Consequently certain timbers which were not white-ant resistant were eaten out after a few years, whilst others were perfectly sound. The life of softwoods used in a building is about two years. I should say that it would be perfectly safe to use any of the hardwood timber that is being cut by the mission at Kokopo for the proposed copra sheds. In my report I state that all harbour work should be sheathed with metal, however durable the timbers are said to be, and that in New Guinea waters the sooner that permanent stone and concrete are substituted the better. I spent about two and a half years in Papua and New Guinea, and I had some experience of earthquake shocks there. They were not serious during that time, but I saw houses that had been shaken from their props, and I had other evidence of the violence of earthquake shocks in the huge land slides. I have no knowledge of engineering, and therefore I cannot offer any opinion as to the relative merits of concrete or timber piles for wharf construction. In my report I deplore the continual destruction of big timber in New Guinea for harbour works during the last few years. Kwila is suitable for the decking of wharfs, and if sheathed it is the best available timber for piles, but, as I have already said, the lack of organization will render pile getting expensive and difficult. There are four or five saw-mills in New Guinea. If the mill mentioned as having been started at Wide Bay is in operation, it will make the sixth mill, but they are all small plants, cutting at the most about 2,000 feet a day. No timber is exported from New Guinea, but prior to the war kwila was exported, as an experiment I believe, for use as decking for German warships. I have no knowledge of local timbers being used for deep wharfs, but it is used for shallow river wharfs. There is no means of transport in the bush. Any timber cut for harbour works must be pulled out somehow. The mills have their own wooden tramways and their own wharfs. It would be difficult to build up an organization similar to that under which Australian saw-mills are operating. Generally speaking, the saw-mills are conducted as adjuncts to mission stations, and the timber is cut for the erection of mission buildings. There are, I think, only two mills conducted as so-called commercial ventures, but I should say that it would not pay to attempt to pick the eyes out of a forest. This has been done to a certain extent in the eucalypt forest in New Britain, which had been practically depleted for mission stations. That is the only instance of a pure forest which it has been commercially profitable to mill. On page 23 of my report there appears a table showing the approximate number of trees to the acre in the northern division. Only in one place did I get kwila in anything approaching pure stands. In Papua kwila is known as melila, and in this forest it averages about three trees to the acre. The average cubic contents of each tree is 80 cubic feet to the tree, or 242 cubic feet to the acre. I should say that the saw-mill at Wide Bay, if it is operating, could supply decking for the proposed wharf at Rabaul, but none of the saw-mills as at present organized could supply piles. An entirely new organization would have to be built up. Probably a contractor in Rabaul would attempt to get the timber, but I have no idea how he would arrive at his price.

46. *To Senator Barnes.*—The teredo attacks the piles usually at the top and all the way down between wind and water. I have no knowledge of the timber that was used for the construction of a wharf that was burnt. Melila has been used for ordinary purposes ever since New Guinea has been under the influence of white people. That is all I can say as to its life. It is as durable as any of the best Australian hardwoods such as jarrah or red ironbark.

47. *To Senator Payne.*—The eucalypts growing in the forest at Wide Bay are pale in colour, and would be described by the average bush man as similar to the Australian mountain ash. It is nearer to that type than the close-grained karri. If properly sheathed it could be used for piling, and I think a sufficient number of piles could be obtained for the proposed wharf. There is another eucalypt in the Korindal district, but whether it would be suitable in salt water is another question. The Wide Bay forest area is about two hours' distance by steam from Rabaul. The shipping facilities were very poor when I was there. There is a bad bar. Small boats come in with provisions for the Government police station. There is no other means of transport. The timber area in New Hanover is on the seaboard, but there again the shipping facilities are bad. In the event of it being considered desirable to obtain local timber for the decking, I think that it would be possible to obtain supplies from the three mills which are operating in the Territory. There is a mill on the north-west point of New Guinea, another at Korindal, and a third at Wide Bay. The Kokopo Mission's mill is at Korindal, on the other side of the island from the mission station.

48. *To Mr. Cook.*—The best local timber for wharf construction is the kwila. I do not know its life under water. Piles of kwila could be obtained at Lavongai at a price. The difficulty in obtaining supplies is that there is no organization; and probably a contractor who, in good faith, entered into a contract to supply timber would find himself unable to fulfil it. If protected from teredo kwila would stand in the water. Imported piles would be cheaper than piles of kwila, because they could be obtained from an organized industry. Kwila compares with turpentine for quality. In the event of tenders being invited, local individuals might submit offers, but I doubt whether any firm would do so. I have no knowledge of wharf construction other than arranging for timber supplies for wharfs. All native labour in New Guinea is day

labour. When working under white supervision their work is satisfactory. I saw a team of bullocks at Finsch Hafen Mission Mill. Otherwise the timber is brought to the mill on wooden tram lines, the power being supplied by natives who push and pull the timber. The team at Finsch Hafen Mission Mill was an experiment. I do not know how it worked out. I consider turpentine to be the best Australian timber for resisting teredo in temperate waters. In tropical waters no timber is proof against teredo. All piles in tropical waters must be sheathed. There is no possibility of immunizing timber against teredo. Sheathing is the only possible barrier. Timber is attacked by fungus between wind and water, and by teredo under the water. Timber must resist both to be satisfactory. Kwila, turpentine, and jarrah will resist the attacks of fungus, but none of them will resist teredo under water. Unfortunately, the teredo does not eat the wood, and therefore it is impossible to deal with teredo by poisoning. It has two tubes projecting into the sea, one of which it uses for sucking in infusoria from the sea. That is its only food. Unlike the white ant and the timber borer, which live on the wood, the teredo merely enters the wood to make a home. To destroy the teredo, it would be necessary to poison the water around the pile, which, of course, is out of the question. The Americans have a means of dealing with the teredo which ought to be tried here. They inject creosote into soft wood piles. These soft wood piles will absorb large quantities of creosote, thus rendering the wood so sticky that the teredo, which has at the top of its head a couple of shells which it uses as an auger, cannot bore into it. Apart from that means of dealing with the teredo, sheathing is the only successful way of combating it. I know of no substantial structures in New Guinea made of local wood. All the piles that I have seen there were of imported timber.

49. *To Senator Reid.*—I have noticed no evidence of dry rot in the piles in New Guinea. Dry rot is more prevalent in the tropics than in more temperate climates, because the continual damp of the tropics induces fungus to become attached to the timber. Where local timber has been used, it has proved satisfactory. Imported timber also has given satisfaction. Only the most durable timbers are imported. Local timber is slightly cheaper than imported timber. Local timber supplies are situated a few hours' steam on either side of Rabaul. The timber could not be brought overland. At Korindal, there is a wharf, The other private mill also has a wharf. I do not know what facilities exist at Wide Bay as operations commenced there after I left New Guinea. In the event of local timber being used for decking, I anticipate that there will be no difficulty in keeping up supplies to meet requirements. Native labour is used in hauling the timbers to the tram line. With native labour costing only 8d. a day, mechanical appliances do not pay. The Committee must remember that everything in New Guinea is very primitive. When I said that there were only three trees to the acre, I referred to kwila. It is cut with the other timber growing alongside. Horses and cattle, particularly the latter, stand the New Guinea climate well. The bullocks there are mostly Javanese cattle, with hump backs. Australian cattle do well in Papua, which has a similar climate to that of New Guinea. I do not know the life history of the New Guinea white ant, but it has not permanent wings. When working in the wood it has no wings. It enters the timber very surreptitiously, the only evidence of its presence being a slight sinking of the timber. An examination, however, might reveal that the inside had been eaten out leaving only a shell remaining. The detection of white ants in timber is very difficult. The missionaries paint the timber with kerosene and other insecticides, but it is almost a hopeless task. If I were constructing the wharf, I should obtain the piles from Australia and use local timber for the decking.

50. *To Mr. Seabrook.*—The kwila grows chiefly in low-lying country, but not necessarily swamp country. It is a slow growing, hard timber. On page 92 of my report, there is a full description of the tree. A tree with a girth of 8 feet, a 50-ft. bole, and 80 feet length over-all, is an average size. I saw many trees exceeding 80 feet in height. The sap of the kwila is very shallow, about 1½ inch only. It is a sound, hard timber, which is used throughout New Guinea.

51. *To Mr. Gregory.*—Nothing but kwila is used for the posts on which the houses are erected. In New Guinea, kwila is used for the same purposes that jarrah is used in Western Australia, or red iron bark in New South Wales. It would be suitable for decking. It is immune to white ants. I do not think that an inherently durable wood like jarrah would be affected by continued rain or tropical warmth so long as it was open to the air. It would be satisfactory for decking at Rabaul. I have had experience of the effects of teredo in New Guinea. The trouble is very much greater there than at Fremantle. At one time, jarrah was thought to be immune to teredo. That was when there was not sufficient teredo in Fremantle to eat it, but later it was discovered that it was not immune. The teredo at Fremantle cannot be compared with the teredo at Rabaul, where boats and canoes have to be taken from the water every day to save them from attack. Turpentine is more resistant to teredo than many other woods, but it is not immune. No timber would be immune to teredo in the tropical waters of Rabaul. Whatever timber is used for piles there, would require sheathing.

52. *To Senator Payne.*—I see no reason why jarrah piles should not be as suitable as turpentine piles at Rabaul. I do not think that stringybark would be so satisfactory. Stringybark is subject to rot between wind and water in the tropics. Timber requires to be very durable to withstand dry rot near the water line, where it is sometimes under and sometimes above water.

(Taken at Sydney.)

TUESDAY, 5th OCTOBER, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Arthur John Debenham, Engineer in Chief, Sydney Harbour Trust, sworn and examined.

53. *To the Chairman.*—I have been with the Sydney Harbour Trust since 1911, first as assistant engineer in charge of wharf construction, then with an interval of war service as principal assistant engineer, and finally as engineer in chief since the beginning of September last. I have not had experience of wharf construction outside of Australia. I have had an opportunity of cursorily examining the plans of the proposed wharf at Rabaul, but I have no knowledge of the local conditions. The design differs materially from that of the wharfs mostly built by the Sydney Harbour Trust. It is what we term a marginal wharf supported by small jetties coming off from the shore. Assuming that the site is fairly protected and the jetties are of reasonable size, this structure should be satisfactory, but in the absence of full details and knowledge of local conditions I hesitate to express an opinion. On looking at the plan I notice that the wharf is 24 feet wide and is backed by six jetties. We have no wharf just like that because we can get the depth of water we require close

to the land. Our marginal wharfs are usually from 36 to 48 feet in width. Immediately at the back is the bank, and the shed stands either on the reclaimed land or partly on the reclaimed land and partly on the wharf. I do not see what would be gained by extending the wharf and making a T-end. The average length of the piles we use is about 65 feet and they go up to 85 feet, but we have difficulty in getting them over 70 feet in length. We prefer turpentine piles. Next to them comes brush box; all the others are far less durable unless protected. The prices fluctuate; for shorter lengths from 30 to 35 feet we pay about 2s. 2d. per foot, and for 50 to 60 feet lengths we are paying about 3s. per foot. For greater lengths we pay up to 5s. 6d. per foot. We do not sheath the piles except in rare cases. We have adopted concrete sheathing in several instances, and so far it has been successful. It was first tried in 1912. The Hyde process has been explained to me, but I do not think it is better than our own method. It is a system for sheathing the piles of a wharf already in position. Any sound Australian timber could be used instead of turpentine, if it is obtainable at a cheaper rate, provided the sheathing is done to a sufficient depth. Most of our Australian timbers are able to resist decay to a considerable extent. Apart from the expense I have no objection to the concreting of piles in order to preserve the timber. For the proposed wharf at Rabaul I should not prefer concrete construction to timber. Up to the present the Sydney Harbour Trust has not adopted straight-out concrete construction for wharfs, because we are not entirely satisfied that it is a better method than that now adopted. In order to be economical a concrete wharf would have to last much longer than a wooden one. If we can get a timber wharf to last 35 years which we regard as their life, the probabilities are that at the end of that period the requirements of shipping will have so changed that the wharfs will have become obsolete and it will be necessary to rebuild them. I have had no experience of earthquake countries. For roughly ten or fifteen years reinforced concrete construction has been adopted in Auckland and Wellington, where earthquakes frequently occur. Evidently New Zealand is satisfied with that method. I have seen steel wharfs in England, but they are expensive. Their cost is probably not the only reason why they have not been adopted in Australia. We favour timber construction in Sydney, and where marine insects are bad we adopt concrete casing in preference to reinforced concrete piles. We have not used metal coverings for a long time. We abandoned that method in 1911 or 1912. Since then, except in one or two special cases, we have not used metal. Whether the debris consisting of about 2,000 tons of general cargo could be removed from the site of the old wharf at Rabaul depends very largely on the machinery available. You inform me that the debris consists of rice, cement in bags, motor cars, and broken piles. A good deal of the work would probably have to be done by divers, and it would undoubtedly be an expensive job. On the other hand, it might be possible to insert new piles on that site without having to remove the whole of the debris. I have no criticism to offer as to cost of the proposed jetty. Our standard specification for piles is not less than 12 inches at the toe and not less than 18 inches at the head. There would be no difficulty in obtaining piles 60 feet in length from New South Wales, and I should imagine they could be carried easily on board ship. Numbers of piles of that length are shipped to New Zealand and elsewhere. If it were necessary to charter a special class of vessel it might be more expensive. I regard the proposal as a simple one, but it would be well if the pipes around the piles were carried to a greater depth than is shown on the plan, because you disturb the natural conditions by dredging in front of the piles. I do not know what currents you are likely to get on account of long blows from special quarters, but I imagine there is a possibility of the sand shifting and exposing the piles below the pipes. If it is a quiet harbour it would be a considerable time before the sandbank would settle down to its natural position of repose. Although you might give the piles 3 feet of cover, the sand might settle down later on and the cover might be diminished or might entirely disappear.

54. *To Mr. Gregory.*— I have had no practical experience of wharf timber in tropical waters. Turpentine is satisfactory in Sydney Harbour without sheathing, but further north it is not so satisfactory. We have made and used a number of reinforced concrete piles. Our first engineer in chief and my immediate predecessor were both reluctant to go in for reinforced concrete piles, not being satisfied that they had proved an unqualified success elsewhere. The late engineer in chief had a trip through England, America and the Continent in 1924, and returned with a stronger prejudice than ever against reinforced concrete. Sheathing with reinforced concrete, however, has been entirely satisfactory. Beyond a few small rust spots no defects have been reported. We use ordinary Monier pipes. The pipes are used in the form of a long cylinder tied together with steel rods, and we lower them down over the piles. We do not use any bracing from pile to pile, but rely on spur piles only, as in the proposal before the committee. In 1914 it cost us nearly £1 per foot for piles, sheathing included. If I were doing a job at Rabaul with Monier pipes I think I would have them made here and shipped to the site. They are made by a special process, and it would be expensive to establish a factory at Rabaul. A fair amount of machinery is required, and the men have to be used to the work. Muntz metal is not satisfactory, because it is now made with electrolytically refined copper, which is less able to resist the corrosive effect of sea water than the old and more pure metal. I should say it would be advisable to place the sheds on solid ground as proposed. If labour is not a serious item at Rabaul, it only means a slightly longer distance to carry the goods. Apart from the labour difficulty, there should be no limit to the height to which copra might be stacked. The sheds might be as high as 25 feet, I should think, if labour were cheap.

55. *To Mr. Cook.*—We find the teredo worse on our north coast than in Sydney Harbour, and I assume that they will be worse still in New Guinea. Unsheathed turpentine does not last as long on the north coast of New South Wales and in Queensland as it does in Sydney Harbour. The piles can be protected by sheathing with concrete cylinders or by impregnating with poisons, but the latter method has been successful only with soft woods in America and on the Continent. A charring process has also been investigated but, while it acts as a deterrent, it is not an absolute safeguard against the teredo. Even turpentine would probably require more protection at Rabaul than in New South Wales. The proposed site seems to me to be rather exposed, but in the absence of a knowledge of local conditions it is difficult for me to express an opinion. If the site is an exposed one the wharf would have to be much stronger than would be necessary in a more sheltered position. New South Wales is the best place from which to obtain turpentine piles. We have tried a few brush box piles which are now about two years old, but judging by experiments made from time to time it looks as if brush box is not as good as turpentine, although far better than other timbers. From the turpentine pile we expect an average life in Sydney of 35 years. Ironbark, on the other hand, only lasts two or three years if unprotected; it may go even more quickly than that. We use brush box because it resists wear better than other woods. It shrinks very quickly, but it resists the abrasive action of traffic better than other timbers on account of its curly grain. For that reason, and for that reason only, we employ brush box for our decking. If you are not going to protect the piles you should use turpentine, but if they are to be protected I should think any good Australian hardwood would be suitable.

56. *To Mr. Gregory.*—Brush box planks shrink about ¾ inch in one year. If there will be no abrasive action on the decking through trucking, I do not see that it would be necessary to use brush box from Australia.

57. *To Mr. Cook.*—If the teredo is bad at Rabaul I should recommend sheathing irrespective of the class of timber employed. I do not think you could get box piles long enough for your purposes. The suitability of concrete piles is certainly worth investigating, but personally I prefer sheathed timber piles. We cling to timber piles, because we can get them cheaply and there is no necessity to go in for more permanent construction. I imagine that sand and stone would be procurable in the vicinity of Rabaul, and it would be necessary to import cement only if concrete construction were adopted. I should recommend a close inquiry as to the amount of shelter afforded at the site of the proposed wharf.

58. *To Mr. Lacey.*—The desirability of using concrete instead of timber is largely a question of the cost of construction. If there was much difference in cost in favour of concrete, I do not know that I would still advocate timber for the proposed wharf. We cannot blind ourselves to the fact that reinforced concrete has been used for a long time in other parts of the world, and possibly the failures that have occurred have been due to bad workmanship or materials. If earthquakes are likely to be experienced at Rabaul, it would undoubtedly be an objection to the use of concrete. Auckland and Wellington are subject to earth tremors, however, and I presume that the wharfs there have not deteriorated badly or the building of them would not be continued. In San Francisco wharfs are built by sinking large concrete cylinders. In other places, such as in the Philippines, cylinders that are bell-shaped at the bottom are humped into the sand for a certain depth and then filled with concrete.

59. *To Mr. McGrath.*—I do not know of any tropical countries where wharfs are being built of timber. In San Francisco most of the wharfs are constructed of reinforced concrete, chiefly on account of the teredo. Creosoted softwood piles are also used there. The action of teredo has been more closely investigated at San Francisco than in any other part of the world. I believe that the majority of the reconstructions are done with reinforced concrete piles or cylinders.

60. *To Senator Payne.*—Our late engineer in chief and his predecessor who reported on the wharfs at Wellington and Auckland found that cracking had occurred and there was corrosion of the steel reinforcement. I presume that the authorities in New Zealand have since found out how to overcome that difficulty. If a sound Australian timber could be obtained in proper lengths at a lower rate than turpentine, or if suitable local timber were available at Rabaul, it would be advisable from the point of view of economical construction to use it, provided it were sheathed. Speaking without knowledge of local conditions, I should say that the old wharf could be replaced.

61. *To Senator Reid.*—The only protection that I would recommend against teredo is sheathing with concrete pipes. Muntz metal would not be effective unless you could rely on officers keeping a close watch on it and renewing it from time to time. As the site appears to be a fairly exposed one the wharf would probably be knocked about unless protected by spring fenders. I recommend that the pipe sheathing be taken down 5 to 6 feet at the back of the wharf, and even a greater distance at the front, the exact depth depending on the slope taken by the sand after the completion of dredging.

62. *To Mr. Seabrook.*—If the wharf is to berth only one vessel at a time I cannot see the necessity to make it 600 feet long. You ask me whether by constructing a T-end it would be possible to do away with practically the whole of the walling. You would still have to put the sheds on shore. I think shipmasters would be very reluctant to berth two boats at one time, one on each side of a T-end. Of course, that would provide an emergency method of berthing if the winds were unfavorable. An illustration of this method is to be found at Neilsen's Park, Sydney Harbour. There should be no difficulty in building on the old site. It might be possible to repair the partially destroyed jetty without having to remove the debris.

(Taken at Sydney.)

WEDNESDAY. 6th OCTOBER, 1926.

Mr. MACKAY, Chairman;

Present:

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Frederick Wallin, Islands Manager, Burns, Philp and Company, sworn and examined.

63. *To the Chairman.*—I am aware of the proposal before the committee and have seen the design of the suggested wharf. There is divided opinion on the question of whether Rabaul should be provided with a wharf or a jetty. Deep-sea navigators like to go straight in to a jetty. Our island ships being smaller, we go into all sorts of nooks throughout the group, and our main worry since the destruction of the old wharf by fire has been the inadequate accommodation on the western side of the harbour. The proposed site is the best that could be secured on that side, being at the extreme head of the bay, and therefore sheltered to a much greater extent than the existing wharfs from the south-east winds that blow for the greater portion of the year. We should be glad of any improvement on the present conditions. The present inconvenience causes us heavy demurrage and delay with stevedoring work. We manage at present by what one might term a scramble. The steamers tie up to the coal wharf, but it is very frail. It is now being used as an ordinary cargo wharf. With out largest vessel the *Montoro*, which is 360 ft. 6 in. long and has a maximum draft of 22 ft. 7 in., we are approaching close to the danger point, because while she may be on an even keel when she goes there, she may be on an uneven keel when she leaves, depending on how the cargo is trimmed. The *Montoro* is about the largest vessel we are likely to use in the Island trade for some years. The big oversea steamer *Hamilton Grange* recently occupied a berth at the Malaguna copra wharf where we are now forced to discharge our cargo by the *Melusia*, owing to the Malaguna coal wharf being under repair. The proposed new wharf would make a third on the western shore. Certain damage was done to the coal wharf by the *Mataram*, but a greater amount of damage was done by the *Rio Claro*, which recently called there. The opportunity is being taken, while repairing the wharf, I understand, to bring it out on a different alignment by extending one of the jetties a little further out. The coal wharf will still be required for the storage of Government coal and other cargo, but it will cease to be a general cargo wharf. You ask me to state the minimum berthing space required at the proposed new wharf. If 300 feet of wharf were constructed immediately the *Montoro* would have an overlap of 30 feet on each side, but if a second vessel were to be accommodated at the same time the whole of the 600 feet would need to be constructed. The trade of Rabaul is rather a divided one. The general wish of the plantation people is to ship as much copra as possible direct without sending it to a concentration point such as the proposed wharf would be. The greatest use to which the new wharf would be put would be for the receipt of inward cargo for Rabaul and the outports of the territory. The object I understand of proposing two sheds is to reserve one for copra and the other for general cargo, but since more than one shed is already

provided at Malaguna, where the bulk of the copra is concentrated, and having regard to the size of the vessels engaged, I suggest that half the length of that proposed should be constructed at the outset. The copra is mostly stored on the Expropriation Board's wharf. Our ships call there to discharge copra which we pick up at the outports for the Expropriation Board. Portion of the outports copra goes to Sydney. When we tendered to the Commonwealth Government we stipulated that we should have at least ballast trim for the ships coming up. Approximately an equal quantity to that would be collected at the outports and discharged at Rabaul. The copra is collected from eight or ten centres. The chief point is Witu and the next would be Maron. The steamer comes alongside at Witu, but there is no wharf as Maron. At Madang there is a wharf at which we call. It has recently been put into respectable working order. I think it is long enough to work two hatches, but that type of wharf is not good enough for Rabaul. Kavieng also has a wharf, and overseas ships of the large type have berthed there, but there is a coral patch in close proximity to the steamer's propeller when she is lying alongside. Naturally the big steamers do not like it. If you wish to provide Rabaul with a wharf that will suffice for fifteen or twenty years, I should suggest one two-thirds the size of the proposed wharf with two jetties smaller in size than those shown in the plan. A fair amount of shipping is done at Rabaul in schooners up to about 20 tons. The berth accommodation proposed for schooners is desirable and sufficient. The proposed depth of 30 feet at the front of the wharf will be ample. The cargoes being handled prior to the burning of the old wharf were not as large as they now are, and up to the time of its destruction it met the needs of existing traffic. If the old wharf were renovated it would be advisable to increase the accommodation previously provided. At the present time it is used only for the discharge of light and urgent cargo which may be stowed, say, in the forward portion of the ship when the vessel calls there to discharge her freezer cargo and to take in water. Only the forward hatch can be worked. I think it is necessary to go back to the genesis of the township of Rabaul. The German Government made a grant to the N.D.L. Company of a certain area of land, which they were free to select, upon which a town could be established, and wharfage accommodation provided. The Germans selected the spot known as the old wharf. I understand that what influenced them in that selection was freedom from the prevailing winds, namely, south-easterly and north-westerly winds. The idea of putting out a jetty was to reduce the frontage to the foreshore so that the damage would be reduced to a minimum in the event of earth tremors or creeps, which are severe at times in the territory. At the foreshore end of the jetty there is an apron made of iron or steel which allows for give and take when earth tremors occur. Another reason for the erection of the jetty in that spot was its proximity to the town which was laid out on the most suitable flat land in that locality. To the westward the land is on the slope and when the tropical rains fall a fair volume of water rushes down. If cargo had to be discharged at the proposed new wharf, carting to the town for a distance of about two miles would be involved, and unless specially constructed vans were employed freezer cargo would be subject to considerable thawing. "Chinatown" is about 1¼ miles from the proposed site and about half a mile from the old wharf. Good material for road making is obtainable and the existing roads are in good order. About half a dozen deep sea vessels call at Rabaul every year and on account of the prevailing winds would prefer the old site, although there should be no insurmountable difficulty in lying up to the proposed wharf. The gangways leading to the sheds appear to me to be suitable. I notice rubble retaining walls are contemplated. It should be remembered that the locality is subject to earth shocks and creeps, and I am wondering whether there should be an apron as in the case of the old wharf. I do not think that two sheds are needed at the present time seeing that the copra is being accommodated elsewhere, but if the Government is going to impose a wharfage charge on all cargo, whether it occupies that wharf or not, it might force copra to the shed at the new wharf. Copra is easily handled in bags and can be stacked up in tiers. It is not economical to make the stacks too high, because it requires an increased number of boys to work the cargo. The more floor space you have the cheaper will be the stevedoring work. If increased accommodation were necessary I should advocate increasing the frontage rather than the height of the walls. Certain local timbers are to be obtained, but they are scattered, and it would be preferable to take timber from Australia. In the event of 60 feet piles being required, they could be shipped from Sydney, the *Mataram* was running up till recently. The *Montoro* is not quite as good a deck ship, but it could carry such piles. Then we have the *Eudunda*, a cargo boat that we purchased from the Commonwealth Government. We quoted the Government one half-penny per inch of the mean girth per running foot which would be 1s. 6d. per foot for a 12 inch pile. A depth of 30 feet at the front of the wharf would be sufficient even for the overseas vessels calling at Rabaul. There should be little or no trouble through siltation. Sufficient labour for the work could be recruited, but any mechanical aid reduces labour costs. Portable conveying rollers are now employed by us at Rabaul. On the old wharf there was a set of tram rails which was continued through the streets to the various warehouses, but I think that broad wheeled portables would be more mobile and more suitable on a good concrete surface.

64. *To Senator Payne.*—It would be quite possible to provide sufficient accommodation by repairing and extending the old wharf. The debris would probably have to be blasted away where it is covered with a coral formation, but with a good monkey most of the piles could be driven through it. If the old wharf were increased in width as well as in length, there should be no serious congestion. Copra will be stored in future at the Expropriation Board's wharf and elsewhere, and there is no urgent need to make provision for its storage at the proposed new wharf. I understand that the Government own the land at the new site. You showed me a list of 21 overseas vessels that called at Rabaul during the year ended 30th June, 1926. I am familiar with the names of all of them, but I was under the impression that there were not so many of them. I stand corrected. The output of the territory will probably reach its peak three or four years hence. If further planting takes place the peak may not be reached so soon. There is scope for the further production of copra in the Mandated Territory.

65. *To Senator Reid.*—The existing wharfs are not suitable for requirements. They are in exposed positions. A new wharf is absolutely necessary. The old site would best suit the town, because it is only a few hundred yards from the business centre, while the new site is about 2 miles distant. Land transport is mostly done by motor lorries. The town is growing westward in the direction of the site of the new wharf, but mostly for residental purposes. The private planters dispose of their copra in the open market, and as the purchases of the properties recently released by the Expropriation Board will be free to please themselves the new wharf would be used to a certain extent. The Board's wharf is in an exposed portion of the harbour, to the south of the proposed site. I do not think there is any chance of the Board using the new wharf. There has been a pause in planting since the taking over of the expropriated properties, but after they have been occupied for some years by the new owners business will expand. Several tropical products are grown in the Territory, but copra will always be the mainstay. Cocoa and a little rubber are grown. The skilled labour required for rubber plantations has to be

imported. Even if local labour were available the opening for rubber would be limited. In my opinion there is nothing to fear from the scour which causes silting on the eastern side.

66. *To Mr. Seabrook.*—A jetty would be preferable to a wharf both for overseas and our own island vessels. If the old wharf were widened and large sheds provided, sufficient accommodation would be available. The old wharf is nearer to the cold stores and from that point of view it would be preferable to repair the old structure.

67. *To Mr. Gregory.*—We do not expect any great development of the export trade in the next eight or ten years. Since the sale of the expropriated properties the inward trade has been steadily maintained, and it should increase in the near future. New Guinea is one of the most promising groups in the Western Pacific and permanent works there are justified. About two-thirds of the cargo exported goes to Europe, and therefore good arrangements should be made both for export and import trade. A central shipping point for copra already exists at Malaguna. Although the shed accommodation is sufficient, the wharf only provides for one hatch. We find it advantageous to keep the copra on board and discharge it at Sydney where we can do the work four times more expeditiously than at Rabaul. The freight from Sydney to London is about on a par with that from Rabaul to London. We give a specially reduced freight from the outports in the Territory to London on a through bill of lading. A good wharf on the site proposed would not attract the bulk of the copra to it. It is a question of the cost of getting the copra there from the different plantations. As long as the Expropriation Board's wharf exists, it will exercise an influence on the copra trade.

68. *To Mr. Cook.*—I should think twice before incurring the heavy expenditure that building on the new site would involve. Personally, I should concentrate on the old jetty. If properly repaired and renovated from time to time, it would meet requirements for twelve or fifteen years so far as general cargo is concerned, but we should still have to go to the other wharfs for copra.

(Taken at Sydney.)

THURSDAY, 7th OCTOBER, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Walter Henry Lucas, formerly Chairman of the Expropriation Board, New Guinea, sworn and examined.

69. *To the Chairman.*—I was Islands Manager for Burns, Philip and Company, until 1920. From May, 1920, until April, 1926, I was Chairman of the Expropriation Board and technical adviser to the Commonwealth for New Guinea. I am aware of the proposal before the Committee, and have seen the design of the suggested wharf. The matter was first gone into publicly by the Royal Commission on New Guinea, of which I was a member, and which sat in 1919. We were asked to give special attention to wharfage at Rabaul, and we presented an interim report dealing with that matter as one of urgency. We recommended that an expert should be sent to New Guinea to go into the subject fully, and we made some suggestions which were drafted by myself. I had practical knowledge of the subject, having had to build wharfs in various parts of the islands. The following were the suggestions of the Commission:—

(1) That, as to put the present jetty in repair will cost large sums and the future maintenance costs will be heavy, no substantial expenditure on it should be incurred.

(2) That, as wharfage accommodation must be provided, repairs intended to last for a comparatively brief period only should be undertaken. This will give the necessary time for building a new wharf. These repairs might consist only of the temporary reinforcement of the weakest parts by means of extra piles driven on each side of the jetty carrying stout transverse girders to support the weight of the superstructure, &c. (Such piles and girders of local hardwoods are understood to be already available at Rabaul.)

(3) That when a new permanent wharf is built the existing Norddeutscher-Lloyd jetty should be cut away for about 390 feet, and a small T-end constructed to serve as a local wharf.

(4) That temporary coal storage be provided at Malaguna, which might be of the following character:—Two strong pile dolphins (tripod) of local piles and shore mooring posts to hold a ship of 2,000-3,000 tons safely in position; then centrally a light landing stage strong enough to safely carry the rails and loaded coal trucks, to be built of local piles and timber, tarred, &c., to last from eighteen months to two years.

(5) The two wharfs at Malaguna should be provided separated about 200 feet. There is no need for a continuous wharf, as it is only the working parts of ships which need to be provided for. One of these wharfs to occupy the site of the temporary wharf referred to in (4) above.

(6) That each of these wharfs should be about 250 feet long, and built on concrete encased piles parallel to the shore line, and connected therewith by two gangways each about 30 feet wide.

(7) That a long massive sea-wall of reinforced concrete is not desirable, as it would probably be affected by earthquakes, for which reason also the structures generally should be as elastic as possible.

(8) That a space between the shore and the wharf be left for the present with a view to it being reclaimed subsequently.

(9) That ample storage accommodation be erected on the land as near the wharfs as possible.

I approve of the proposed site at Malaguna; I helped to select it. The site of the old jetty at Rabaul was chosen by the Germans principally because, in the event of Simpson's Harbour being required as a temporary naval base, the town would be protected by the neighbouring hills from outside attack. For about 500 feet the old jetty was quite useless because of the shallow water. In the early days, when trade was limited, this jetty, with its long bottleneck, answered very well. The shed at the deep end was big enough to carry both the inward cargo and the accumulation of copra that had to be shipped, but long before the destruction of the jetty by fire it was found to be inadequate. The town should have been built at Malaguna. Customs officers and others were opposed to going there because the old jetty was convenient to their offices. The mercantile firms also stated that it was very convenient to their stores, but with the advent of motor lorries an extra distance of ½ a mile or 1 mile is of no consequence once the goods have been loaded. I pointed out that the local roads were so good naturally that if dressed with tar or oil they would be entirely satisfactory. When a temporary coal wharf had to be erected, we recommended Malaguna. The objection was raised by local interests that that site was exposed to the south-east winds, but the fact remains that the H.S.A.G. had a little wharf there until it rotted away, and ships have lain there in all weathers. That site is better sheltered than the exposed parts of the Melbourne and Sydney harbours. Some of the captains argue that if a south-easterly gale were blowing ships could not leave the wharf without the assistance of a tug. Of course, that would happen anywhere if a gale were blowing. Fear was expressed in certain quarters that the construction of a wharf at Malaguna would depreciate the value of the land in Rabaul. My reply was that the land in Rabaul that

was not then the property of the Government was expropriated property, and although we should have to make a refund to the Reparations Commission for it, it would be merely a book entry. I contended that as the port of Rabaul would probably become one of the biggest centres in the Pacific, the sooner the development took place on the healthy wind-swept side of the bay, the better it would be. I pointed out that the natural growth of the port would keep up the value of the land at Rabaul. While Rabaul would remain the official town, with Government offices, stores, &c., Malaguna would naturally become the residential and shipping centre, and the Government, who owned the land, would get the benefit of any increased value. Malaguna has a steep sandy beach with 28 feet of water about 40 feet from the foreshore, therefore, there would be greater depth immediately under the keel of a vessel than at the front of the wharf. When it was proposed that the permanent wharf should be 600 feet long, I pointed out that there would be 200 feet in the centre that would be useless because it would be occupied only by the bows and sterns of the two vessels that could be accommodated. My proposal was that there should be two wharfs, each 250 feet long and 200 feet apart, following the curve of the foreshore. This would give 100 feet more berthing space, and save 100 feet of wharf construction in deep water. The space beween the two wharfs need not be wasted, because it could be used to accommodate schooners and small boats. There should be two ramps sufficiently wide to carry double tramways, and then four hatches could be worked simultaneously. The rise and fall of the tide is only about 3 feet. Any solid construction on that sandy beach would be a waste of money, because it would silt up. One need not build expensive jetties into deeper water than 28 or 30 feet. If a vessel drew so much water that it could not use these 250-foot wharfs, pontoons could be employed between the ships and the wharf. One of my objections to the re-construction of the old jetty is that it would cost £4,000 per annum to maintain. Solid concrete wharfs are unsuitable owing to the danger of damage through earthquakes. The teredo difficulty can be overcome by using hardwood piles and encasing them in concrete. Monolithic construction is suitable only where you have solid rock on which to build. The local timber that is most suitable for wharf building is known as island teak, and botanically known as *Abfzelia*. In New Guinea it is called kwila, in Fiji it is known as veci, and in Papua as melilla. The Germans were testing it out for warship decking to take the place of Burmah teak. This wood was reported on as inferior to Burmah teak, but quite equal to Indian teak. I cannot now say much about the present and prospective production of copra. I believe that when I left the Expropriation Board in 1925, I estimated that when in full bearing the expropriated properties alone would yield about 50,000 tons a year. There would be another 15,000 or 20,000 tons from other plantations and from native copra. When I took over the expropriated estates in 1920 there were about 112,000 acres under coco-nuts, and only 42,000 acres were bearing. The output then was about 25,000 tons a year. Malaguna is flat, breezy, and healthy, being open to the south-east winds but protected from the sea, while Rabaul is a steamy, unhealthy spot, the name itself meaning "a place of mangroves." There is no shortage of water; it is collected by means of tanks.

70. *To Senator Payne.*—The land in the vicinity of the proposed wharf mostly belongs to the Government, but a small quantity is in the hands of a Japanese storekeeper named Komini. There is very little private land at the proposed site except a mission station, and I believe that no great difficulty would be experienced in exchanging that property for land elsewhere. I should say that a coco-nut plantation would be most profitable between the ages of 15 to 40 years. There is plenty of suitable land in the Territory still available for plantations, but the development of the industry depends on the labour problem, and the maintenance of the native population. Present indications are that ample labour is available; the supply has hardly been tapped. Quite recently recruiting has been successfully carried out. Cocoa, coffee, and possibly rice, could be profitably grown, but otherwise I do not anticipate any great development in tropical production.

71. *To Senator Reid.*—Up to April, 1926, the Expropriation Board received all the copra from the estates under its control. The proposed new wharf would be as convenient as the old wharf for the handling of copra. The site recommended by the Royal Commission is suitable for the whole of the copra of the Rabaul district. Whether or not it is used for that purpose depends upon what the shipping companies do, and whether small steamers compete for the trade by shipping direct from the plantations. The Board attempted to accumulate enough copra at Rabaul to make it worth while for an overseas ship to load it there, but it could not store 3,000 tons. Under my proposal, however, it would be possible to store as much copra as desired. If the sheds are placed end on to the jetties, there is no limit to the accommodation that could be provided.

72. *To Mr. Gregory.*—Kwila is distributed throughout the islands, and there should be no difficulty in obtaining more than sufficient. The teredo affects it after a considerable time, but also eats turpentine like cheese. The only safe method is to sheath the piles with Monier piping. The H.S.A.G. wharf is constructed of coconut piles. The tubes were dropped over them after they had been driven into position, and were then filled in solid with concrete. If the piles are protected with concrete it does not matter much what timber is employed. The Monier sheathing was made in the locality. The most important thing is to guard the wharf with fender piles. Practically all the copra goes overseas, the quantity consumed in Australia being negligible. When I was at Rabaul I had to face the problem of whether copra should be taken via Australia as loading for the Australian mail steamers, or shipped direct to Europe. If I shipped it to Europe direct, there was a squeal from the merchants here, while shipment via Australia involved extra expense. It is an axiom that where the copra is sold, there the goods are bought in exchange. The most profitable course to adopt is to ship the copra direct to Europe. Very few tramp steamers up to 10,000 tons go to New Guinea ports; most of the vessels are from 4,000 to 6,000 tons. A 600-ft. wharf would make reasonable provision for two vessels. When I was at Rabaul, roughly, two-thirds of the trade came there. The Board's tendency was to concentrate on Rabaul, Kavieng, and Madang, but the Australian mail steamers called at Witu and other places as well.

73. *To Mr. Lacey.*—If you build any solid structure under the wharfs on sandy shores they always silt up on the lee side. Under my proposal for two 250-ft. wharfs there would be no necessity for dolphins to enable vessels of 4,000 tons to berth. Monolithic construction is unsuitable for Rabaul or any other place where there is a sandy beach. An elastic wharf is required, partly owing to the earthquakes, and partly because of the sandy base. Monier piping is quite sufficient to overcome the teredo difficulty. The concrete casing will last indefinitely unless it is cracked, therefore the fender piles must be kept sound. The local teak or kwila is suitable for both decking and piles, but any wood must be covered below high-water mark to protect it from the teredo. Respecting bark-covered piles, although the bark lasts a long time, and seems to be teredo-proof, the moment bare wood is exposed the work of the teredo begins.

74. *To Mr. Cook.*—The needs of Rabaul warrant an up-to-date wharf, but whether the proposed wharf is an economic proposition, I cannot say offhand. If an

elastic wooden wharf, made teredo-proof by Monier piping, is kept tarred and looked after generally, the ends of sawn timber being covered with copper or lead, it will have a very long life. Any local hardwood piles will answer the purpose if sheathed with concrete.

75. *To Mr. Seabrook.*—It would be a serious mistake to build the rubble wall shown on the plan owing to the danger of silting. There should be no obstruction on the beach. I am quite satisfied that the Malaguna site has been wisely chosen.

(Taken at Sydney.)

FRIDAY, 8th OCTOBER, 1926

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Surtees Rothery, Master Mariner, in charge of s.s. *Marsina*, sworn and examined.

76. *To the Chairman.*—I am acquainted with Rabaul, and am not aware of any currents or shoals that make the harbour difficult for navigation. The site of the proposed new wharf is fairly well sheltered. The objection I have to the site of the old wharf is that it is too sheltered. The heat is terrific, and vessels always try to make the weather side. I was familiar with the old Norddeutscher-Lloyd wharf before it was burnt. There were no great difficulties in getting alongside and unloading cargo. I have not been there for a little over two years. We used to take all our copra from there, and ships also went to Malagunan occasionally. The site of the proposed new wharf should be as suitable as the old site. The cost of upkeep if the old wharf were repaired would be so great that I think it would be a financially sound proposition to construct a wharf on the north-western foreshore as proposed. A wharf along the shore frontage is always advantageous in giving quick despatch of cargo. From a utilitarian point of view you could not improve much upon the wharf at Madang, which was constructed for a very moderate sum. It is composed of two substantial dolphins, each about 40 feet long, with a space of 100 feet between them. The intermediate space is occupied by a small wharf about 2 feet inside the line of the dolphins, and it is suitable for small craft. Overseas vessels, island boats, and schooners go alongside the Madang wharf, and it has proved satisfactory to all concerned. As many as four hatches can discharge there. The depth of water is 22 feet. Most of the island steamers have hatches at the extreme ends of the ship, and the Madang wharf enables cargo to be discharged on to the dolphins, which are about 10 feet out of the water at high tide. The intermediate wharf is 4 feet above high water, and we used to lower our gangway to it to enable passengers to disembark. The shed is about 50 feet from the wharf. I have felt an earth tremor at Rabaul; these are said to be of frequent occurrence. I do not think they would injure a jetty, but a shed of any considerable size would probably be damaged. Lever Brothers have a concrete wharf at the Solomon Islands which must have been constructed for about seven years. So far as I am aware it has not been damaged by earth tremors. Ship-owners prefer going to one central wharf rather than having to pick up cargo from a number of wharfs. I have known three vessels—the *Marsina*, the *Matunga*, and the *Morinda*—to berth at the old jetty at one time. One lay across the end of the wharf, the others mooring one on each side. The copra sheds and the general cargo sheds should be distinct, and as copra is the lighter cargo preference should be given to the general cargo shed so far as proximity to the vessel is concerned. Whether the natives work well depends a good deal on the persons in charge of them. I have not seen conveyors used for the handling of copra, but at Alexishafen I have seen natives load 60 tons an hour. At Witu, where trucks are used, it is a common occurrence to put between 36 and 40 tons an hour into the sheds. We have never experienced difficulty in obtaining native labour.

77. *To Senator Payne.*—If a strong south-easterly were blowing more caution would be required in mooring a vessel at the site of the proposed wharf than at the old jetty. Most of the carting is done by motor trucks, and the extra distance from the town to the new site would be of no great consequence. I do not think copra producers would be handicapped through having to take their produce to the proposed site. So far as the shipping companies are concerned, I think it would be advantageous if the whole of the trade were concentrated at Malaguna. It would probably take a longer time to re-construct the old jetty than build the proposed new wharf. The existing wharfs are in a very frail condition, and up-to-date facilities are urgently required. I have been running to Rabaul for about four and a half years, and, in my opinion, there is reasonable prospect of continued development. From my knowledge of Malaguna I should not suggest the building of a heavy retaining wall. The proposed structure appears to be remarkably substantial, but I would not care to express an opinion regarding its suitability.

78. *To Senator Reid.*—I should prefer the Malagunan site as a place in which to do shipping work, because there would be a breeze throughout the day. The land slopes gently back to the hills, and I think the town will develop in that direction. I prefer a straight front for the whole length of the wharf.

79. *To Mr. Gregory.*—Two wharfs in a line with a space of about 100 feet between them would take less time to construct than a wharf 600 feet long. If two vessels wished to berth at one time, and the wharf was only long enough to take one, demurrage would cost £150 per day for a vessel like the *Marsina*. I should say that it is essential to provide sufficient accommodation at Rabaul for two ships. Two, or, if necessary, more wharfs like that at Madang could be erected at Malaguna. I should say fair-sized dolphins would be quickest and cheapest to build, and be quite as suitable as any other type of wharf. From the point of view of overseas shipping I should say it would be preferable to have one central loading point for the copra.

80. *To Mr. Cook.*—The foreshore of Blanche Bay is heavily planted with copra, and is said to be some of the best soil in New Guinea. In my opinion Rabaul warrants up-to-date shipping facilities. It is immaterial to me what site is chosen, but I should imagine that the proposed site would be most serviceable.

81. *To Mr. Lacey.*—Two wharfs in a line with about 100 feet between them would enable two steamers to berth at the same time. The vessels now employed there are mostly of the island type, and that is why I suggest two dolphins for each end with a small wharf between them for the small vessels. This system should meet local requirement as well as the needs of mariners.

82. *To Senator Payne.*—Rabaul is the port for New Britain, which is the largest island in the Territory. I think that there is as much copra produced in the vicinity of Rabaul as in any other part. Lindenhafen, Kavieng, Witu, Rabaul, and Madang would make ideal centres.

83. *To Mr. Gregory.*—The vessels now employed in the trade draw up to 30 feet of water, and we should provide that depth alongside the wharf. Looking forward to the needs of the next eight or ten years, a 600-ft. wharf should enable two vessels to berth simultaneously.

84. *To Mr. Lacey.*—A site that is too well sheltered would be undesirable as far as loading and unloading are concerned.

The witness withdrew.

David Jones Williams, master mariner, s.s. *Montoro*, sworn and examined.

85. *To the Chairman.*—I have been running to Rabaul since 1915, and I am familiar with the harbour generally. There are no shoals in Simpson's Harbour, but strong south-east and north-west winds are experienced, and these make mooring difficult. On three occasions I have found it impossible to berth at the existing Malaguna wharf on account of the south-easterly winds. On another occasion when I was there in the *Mataram*, I was delayed for a whole day. From 9 in the morning until 6 o'clock at night it blows like fury, and in the south-easterly season you cannot get a lighter alongside. The south-easterlies operate for about four or five months of the year. These winds have just about finished now, and soon the north-westerlies will prevail. We use the old wharf for water only. It is the only place in the group where steamers take water, and in selecting the site for a wharf, water is one of the main factors to consider. I am opposed to the building of a wharf on the proposed site at Malaguna, because there would be great disadvantages in berthing and leaving. No master likes to put his ship on a lee shore; he would have no tugs to help him off. At the old wharf, however, the ship is under command all the time, and no difficulty is experienced in going in or out, because the position is sheltered. My suggestion is that the old wharf should be extended and widened; then three ships could berth there. The supposed cost of removing the debris under the old structure is only talk. The way Rabaul has gone back since the Germans were there is disgraceful. There is not a light to guide mariners at night. Although the wind lulls at night-time, mariners cannot select their time for entering and leaving the harbour. They ought to be able to berth their ships day or night. In my judgment, no site other than that of the old wharf should be considered. The Germans gave the matter every consideration, and came to that opinion. The old wharf could be repaired and made serviceable for ten or twelve years. Some of the piles still appear to be in sound condition. I know that a number of them are sheathed with copper. Silting is said to take place, but I have never noticed it. I have experienced earth tremors in the Islands. On New Year's Day, 1916, when I was master of the *Marsina*, an earth tremor occurred at Rabaul at 1 a.m. The first phase of it was a tidal wave, and the vessel was tossed about considerably. The lifeboat of another vessel lying alongside was smashed against the side of the wharf, and my ship had the paint chafed off on one side owing to the rise and fall of the sea. Piles 60 feet long could be carried by the *Montoro* or the *Mataram* from Australia to Rabaul, if required. Not long ago, I landed twelve 60-ft. piles from the *Mataram*. Since the burning of the old jetty, we have gone to the Expropriation Board's wharf at Malaguna for copra, but I have never had an accident there. Our steamers can go anywhere. The danger I am speaking of would be to overseas vessels. The delay that would be occasioned at a wharf on the western side would cause demurrage, and that would be against the interests of Rabaul. You speak of two wharfs, each 250 feet long, following the curve of the shore, and having a space between them for small schooners; that is a good idea. The dolphins proposed by the last witness are all right, but the method I advocate against all others is the reconstruction and improvement of the old wharf. From a shipmaster's point of view, that is the only place for it.

86. *To Senator Reid.*—In a strong north-westerly, an overseas ship would experience trouble in going alongside a wharf at Malaguna. The land is flat for half a mile, and the hills at the back would not give much protection. There is no particular season for calling for copra; it is picked up all the year round. We see an overseas steamer at Rabaul nearly every time we go there. If the proposed wharf at Malaguna were constructed, a water supply would have to be provided, and this would be fairly costly. At the old wharf, I was able to take in water and load cargo at the same time.

87. *To Mr. Seabrook.*—By re-building and widening the old wharf, the requirements for the next ten or fifteen years could be met. The piles should be encased in concrete pipes on account of the teredo.

88. *To Mr. Gregory.*—Rabaul Harbour is well protected, except from the south-east winds. I do not think that the site of the old wharf could be improved on, even on the same side of the harbour. The town, the water supply, and all other facilities, are immediately at hand. Looking forward to the requiremeints for the next fifteen years, I should say a depth of 24 feet at the front of the wharf would be sufficient.

89. *To Mr. Lacey.*—The debris from the burnt wharf has gone straight down, and it should not hinder the work of repairing the jetty. The *Montoro* draws 24 feet, but I have never required more than 22 feet.

90. *To Senator Barnes.*—The old site suits the town as well as the vessels trading there, and I cannot understand why there should be any interests fighting for the construction of a wharf at Malagunan.

91. *To Mr. McGrath.*—As far as navigation is concerned, everything has deteriorated at Rabaul since the Germans left. There used to be a lighted buoy at the entrance to the harbour, but it has disappeared. A beacon has been provided, but there is no light. Even if the debris had to be removed from the old site, I should still strongly recommend the renovation of the old wharf.

92. *To Senator Payne.*—Some of the overseas ships decline to go alongside the copra wharf. The fact that it is a lee shore often induces them to lie off. I do not think it would be advisable, in the event of it being impossible to repair the old wharf, to select a new site in that vicinity unless it was close alongside the old jetty. If it were decided to build a new wharf immediately to the south of the old pier, there should be no objection to it.

93. *To Senator Reid.*—A buoy would assist a steamer in getting from Malaguna in a south-easterly gale, but you do not want to get a rope around your propeller. Shipmasters do not like buoys. They interfere with navigation at night time.

The witness withdrew.

The Committee adjourned.

(*Taken at Rabaul*).

TUESDAY, 19TH OCTOBER, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Lacey
Senator Reid	Mr McGrath
Mr. Cook	Mr. Seabrook.

Evan Alexander Wisdom, Administrator, Territory of New Guinea, Rabaul, sworn and examined.

94. *To the Chairman.*—I have been Administrator in the Territory of New Guinea since February, 1921. The Territory has been under civil administration since the 9th of May of the same year. The proposal to construct a new wharf at Rabaul arose before civil administration was established, as towards the end of the military administration a rough sketch plan was prepared of a new wharf on a site further to the west of the town than the site at present under consideration, somewhere in the vicinity of what is known as the coal wharf. Nothing, however, was done, as the military administration did not consider itself justified in spending a large sum of money on wharf construction at that time, as there was a certain amount of doubt concerning the Territory until the mandate was issued

by the League of Nations. I believe it was Mr. McKenzie who visited Rabaul to advise the military administration in regard to the condition of the N.D.L. wharf. When I assumed office the necessity for improved wharfage accommodation was still apparent, and it was considered advisable to prepare plans for the construction of a wharf on the site previously selected, the suitability of which was carefully considered. When it was found that the water in the vicinity of the old coal wharf at Matupi, was silting up, and the wharf getting into a state of disrepair, it was decided to construct a new coal wharf on the site on which it now stands. When the N.D.L. wharf was partially destroyed by fire, about three years ago, all the general shipping business was transferred to the coal wharf, and plans were again prepared for a new wharf. The whole matter was given the closest consideration, and it was eventually decided that a new wharf should be constructed on the site now proposed. After the plans and specifications had been prepared, the question of finance had to be considered, and in January, 1924, the Treasurer of the Commonwealth was asked to agree to the loan of £36,000 to meet the cost of constructing a new wharf. Some objections were raised concerning the site by, I believe, Captain Williams, of Burns, Philp, and Company, and the matter was held in abeyance. The letter which I wrote at the time outlining the relative merits of the sites will be found on the file, and in consequence of the recommendation then made, the Minister approved the construction of a new wharf on the site now under consideration. When the plans were sent forward, we were informed that, instead of the proposed wharf costing from £36,000 to £38,000, as anticipated, the tenders received for the work ranged from £62,000 to £81,000. The plans were submitted to Mr. McKenzie, who conferred with Mr. Fowler, the officer then in charge of the Public Works Department in the Territory, who said that the cost of the structure could be reduced by making certain alterations in the plans, but even after this had been done it was found that the costs were greater than the amount proposed to be granted to meet the cost. The whole question was then, I think, referred by the Commonwealth Parliament to the Public Works Committee. The proposed site was selected because it was considered that it would be extremely expensive to build a new wharf on the site of the existing N.D.L. wharf, which was originally 850 feet long, and which would have to be extended another 120 feet to provide a sufficient depth of water for overseas ships. Even if that were done, the difficulties associated with the bottle-neck on the shore end of the wharf would still have to be overcome in order to reach the storage sheds, or heavy construction would be necessary to make the structure sufficiently strong to carry the additional weight of the sheds and their contents if built on the sea end of the jetty. Another important factor in selecting the present site is that in a westerly direction the water becomes deeper. For the information of the committee, I shall read my letter of the 24th of April, 1924, in which I deal with the merits of the sites. I said—

With reference to your radio No. 1132 of 31st March, 1924, and in view of the objections which I understand have been raised to the site chosen for the wharf, the following notes may be useful. I may say I do not know the precise nature of the objections, but gather they relate to the berthing and clearing of ships :—

Old Site.

1. This site is a bottle-neck jetty about 875 feet long.
2. From the point of view of putting ships alongside and getting ships away, it is more in favour with the captains of ships than the new site.
3. It is slightly more sheltered in the south-east winds than the new site, but is more exposed in the north-west season.
4. It is a little nearer the centre of business than the new site.
5. It is very uneconomical from the point of view of handling cargo.
6. It is a trap in case of fire.
7. There is no possibility of proper segregation of cargo with a view to minimizing danger from fire.
8. Only the end of the shed, about 40 to 60 feet, could be dealt with from the land side in case of fire.
9. The reconstruction would leave a large portion of old structure, whose life is comparatively short.
10. It would be comparatively much more expensive to maintain.
11. It is the property of the Custodian, and presumably would have to be purchased.
12. The estimate of the Director of Public Works for restoring to the old condition is £30,500.
13. The cost, therefore, would be £30,500, plus the price to be paid to the Expropriation Board.
14. The Director's of Public Works estimate for the reconstruction so as to give more shed accommodation and allow wheeled traffic on the wharf is about £60,000, plus the price to be paid to the Expropriation Board.

New Site.

1. This provides for a wharf as opposed to the pier.
2. This site, although appearing on the chart to be completely sheltered from the south-east, gets eddies of this wind diverted by the high land on the west side of the bay.
3. The south-east blows theoretically for half the year, but I doubt if there are 10 days out of the 365 when the wind blows strongly enough to affect in the slightest the handling of a ship alongside the wharf.
4. Ships of tonnages up to 5,000 tons have berthed for the last fifteen years at the Malaguna copra wharf, and for the last one and a-half years alongside our coal wharf, both of which are much more exposed than the proposed site. Only once during the last three years have I known a ship in difficulty in getting away, and that was at the copra wharf, during an exceptionally heavy south-easterly squall.
5. The Expropriation Board proposes spending a large sum of money on the reconstruction of the copra wharf on its present site.
6. The following ships have berthed at this wharf easily, although it has been for some time in such a dilapidated state that a slight bump would push it down, and it is impossible to put any strain on springs :—

Mataram	... ...	3,273 tons.
Boram	... ...	3,100 tons.
Trebartha	... ...	4,597 tons.
Treganna	... ...	5,300 tons.
Rinda	... ...	3,820 tons (net).
Min	... ...	4,848 tons.
Tosca (motor)	... ...	3,129 tons.

7. The same drawback exists in regard to the coal wharf, which is a light structure, originally intended for coaling, but which had to be adopted for general use after the main pier was burnt.
8. Any slight difficulty attending the getting away from these wharfs is due to the inability of these ships to use their springs.
9. With a permanent solid structure such as the proposed wharf this difficulty will entirely disappear.
10. Purely from the point of view of berthing and getting away, a pier is no doubt easier than a wharf, but this advantage is so slight in the present case as to be negligible when compared with the great advantages which our proposal will give in accommodation, handling, safety from fire, and cost.
11. The cost of handling alone will be very greatly less, probably from 33⅓ per cent. to 50 per cent. This will mean an immense saving to consignees.
12. Ships, by being able to work inward and outward cargo without moving and simultaneously, will get much quicker clearance and save cost.
13. Our new proposal will also enable cargo to be segregated, and thus copra and other cargo can be dealt with at the one wharf, thereby saving both time and cost in handling.
14. The saving in handling alone, as against that in the case of the pier, will be at least 1s. 6d. a ton—an immense saving annually to consignees and consignors.
15. It is most probable that the disastrous fire which destroyed the old pier and resulted in such heavy loss in goods was due to the spontaneous combustion of copra which was stored in the general shed. At any rate, it will not be wise to in future store copra with other cargo.
16. The whole length of the sheds and wharf being contiguous to the shore, we will be able to attack an outbreak of fire along a front of over 600 feet from the shore end, instead of on a front of about 60 feet as in the case of the pier.
17. The wharf staff, caretaker, &c., can be housed within a few yards of the whole extent of the sheds, together with their fire-fighting apparatus.
18. As a result of these arrangements, insurance will be appreciably less than in the case of the fire, representing a further gain to consignees and incidentally to the Administration.
19. The site chosen is the only one where no erosion or silting up is occurring. This is due to the existence of a protecting reef just off the wharf site, on which there is about 10 fathoms of water, and which affords a natural protection to the wharf site.

20. The proposed site is really the western end of the scheme recommended by Mr. McKenzie, the difference between our scheme and his being that we start at the western end; his starts at the eastern end. No doubt he started at the eastern end because of the existing pier; this having gone, gives a wider choice of site.

21. The new proposal will give more and better accommodation for the money than the restoration of the old pier.

22. There will be no necessity to purchase from the Custodian his rights in the old site and the remains of the pier.

23. The distance from the business centre would at first glance appear a drawback. This is, however, more apparent than real, as the business is steadily moving, as of course it must, towards the west, there being no opportunity the other way except at great expense for compensation.

24. If we consider the distance from the point of view of export, the new site is more favorable than the old; the difference, however, in this respect is slight.

25. From the point of view of imports, the old site is slightly nearer the present business centres. It should, however, be noted that this only applies to goods landed for distribution to the actual stores and consumers in Rabaul, and as far as other imports are concerned the distance makes no difference.

Assuming that the new site is chosen, there are two ways of treating the problem—

(1) a wharf with the sheds on the shore side of the actual wharf (see sketch);
(2) a wharf about 30 feet wide connected with the shore by several short jetties; the sheds on the shore (see sketch).

No. 1 gives a more substantial structure, and is ideal for cheap and rapid handling of cargo.

No. 2 is cheaper as regards construction, but not so much cheaper as might be thought, because of the necessity for concrete flooring to the sheds if built on shore. It will involve less risk in the case of fire, and will be cheaper as regards maintenance. It will, on the other hand, be more costly as regards handling cargo, but not much. Two of the approaches could be cut out; this would save something in construction, but increase cost of handling. On the whole, I favour No. 2. The matter is, however, in your hands now.

As the Matupi plantation at the end of the town on the eastern shores of the bay has recently been sold, and is being subdivided into township allotments, the town of Rabaul will probably develop to some extent in that direction, but any subsequent harbour improvements are likely to be in a westerly direction owing to the greater depth of water. The completion of the coal wharf on the western side of the bay, which, as I have said, has been used for handling general cargo since the partial destruction of the N.D.L. wharf, has led to increased commercial activity in that direction, and the town will undoubtedly extend that way. The land at the rear of the proposed site consists largely of Crown lands. Three blocks have been leased, the particulars of which are as follows:—

—	Area. Ha.	Ares.	Sq.Ms.	Rent per Annum.	Lease Expires.
				£ s. d.	
Ah Tam ..	1	24	58	12 15 2	31.12.1938
Komini ..	1	49	76	8 10 6	31.7.1941
Catholic Mission ..	0	75	0	6 0 0	31.12.1935
				Covers all the Simpson Harbour Leases, viz., the present church site and the site near the new wharf site	

The block shown on the plan at the western end is leased to the Catholic Mission, and consists of Crown lands which could be used for general wharf work purposes. There is no possibility of private speculators obtaining land in the vicinity of the proposed wharf and selling it later at enhanced prices. In most of the leases granted, it is stipulated that they cannot be transferred without the consent of the Administrator, and the transfer control ordinance prevents any lease or mortgage being entered into without the consent of the Administrator. Comparative figures were given in a table attached to my letter of 24th April, 1924. They read—

—	Restoration of Old Pier.	Restoration of Old Pier with Improved Accommodation.	New Wharf at Malaguna.
1. Berthage, in feet ..	600	800	600
2. Number of ships of *Mataram* size	2	2	2
3. Shed accommodation in square feet ..	13,000	28,000	34,000
4. Shed to road, distance in feet	480	480	Nil
5. Facilities for delivery of goods. Number of doors	1	1	10
6. Aggregate of openings for delivery in feet ..	20	20	150
7. Number of sheds ..	1	1	2
8. Facilities for approach in case of fire, in feet ..	36, widening to 60	36, widening to 100	Over 600
9. Estimated cost ..	£30,500 plus price to be paid to Expropriation Board	£62,000 plus price to be paid to Expropriation Board	£36,000

The lowest tender received for the construction of a new wharf in accordance with the plant and specifications was £62,000, and the highest £81,000; but it was considered most unlikely that the contractor who submitted the lowest tender would be able to successfully carry out the work, as, for instance, he stipulated for payment against shipping documents in Sydney for all material shipped to Rabaul for use on the work. If the wharf is constructed on the site proposed, the extra cartage involved will not increase the cost of goods to consumers. The actual cost of handling should be less, as there would be three instead of four handlings. It would be necessary to provide a water supply for meeting the requirements of ships berthed at the new wharf. Our source of supply for this purpose has been a small dam at the back of the town which is capable of supplying water from a small spring, but it has been out of repair since 1923, and since then water has been obtained from the ice works. It is, however, proposed to lay down water pipes from the dam to the new wharf. No estimate of the cost of such work has yet been prepared, but it would not be great, as the water can gravitate to the spot where it is required. The water has been tested on different occasions, and its quality is excellent; it is not subject to contamination in any way. The quantity is not unlimited, but I think there is sufficient available to meet all requirements. It would be necessary to construct a road at the rear of the proposed wharf, and also one to connect with the main road running around the bay. No difficulty would be experienced in handling the frozen cargo over the extra distance to the existing cool store. The present cool storage plant will have to be replaced before long, and new cooling chambers will probably be built near to the wharf. A new building will have to be erected before a new wharf is completed. At present 95 per cent. of our export trade consists of copra, and the possibilty of production in other directions is somewhat indefinite. Shipments of copra from the outports to Rabaul will tend to decrease as development increases in outlying districts at which oversea ships call. Direct shipments of copra is at present made from Rabaul, Kavieng, and Madang. The actual tonnages received from certain centres will tend to decrease, but the general trade of Rabaul should expand. When the operations of the Expropriation Board terminate, the sheds at the copra wharf at present under control of the Board will be disposed of. If the wharf and sheds now under the control of the Expropriation Board were acquired by one of the oil importing companies we would not

be at any disadvantage, as oil would not come over our wharf in any case. All the property of the N.D.L. Company, including the old wharf, has been expropriated, and is, therefore, under the control of the Custodian of Expropriated Properties. I understand that tenders, which are returnable in November, are being called for the purchase of the N.D.L. wharf. Even if that wharf were acquired by outside interests, steps would, of course, be taken to see that it did not compete with any wharf under our control. The facilities available would be such that no other wharf would be attractive to shipping interests. Even if certain consignees considered it in their interests to take delivery of shipments at the old N.D.L. wharf, we have ample power to deal with such a situation. The plans provide for a wharf 600 feet long, all of which length is required. Accommodation must be provided for at least two ships to berth at a time. I should not care to express any opinion concerning the suitability of the timbers to be used in the construction of a new wharf, but I favour the use of local products wherever practicable. In order to combat the teredo, piles have been sheathed with copper, but it has been found that the action of the salt water in conjunction with the sulphurous fumes has destroyed the copper casing. Concrete casing has now been adopted with most satisfactory results. The concrete casing is not reinforced. Exhaustive inquiries have been made by our engineers concerning the suitability of the sand for concrete making, which has been found satisfactory. Earthquakes would possibly fracture reinforced concrete piles. If the proposed work is authorized, I hope it will be undertaken by the Public Works Department at Rabaul. In my opinion the tenders submitted were heavily "loaded," because the tenderers were not fully acquainted with the conditions prevailing in the Territory. After carefully considering the whole project with Mr. Fowler, we are both of the opinion that with the use of native labour the work could be completed at a cost approximating our original estimate. Some skilled labour would have to be obtained, but ample unskilled labour would be available. We have offered £4,000 for the old wharf, which has been tentatively accepted by the Expropriation Board, but owing to the delay that has occurred, the offer cannot be kept open indefinitely. If we could purchase the old wharf at the figure stated, a considerable portion of the timber could be advantageously used in constructing a new wharf. Quite a number of the piles are in good condition, as also is a quantity of the other timber. I have not heard of any local objection to the site of the proposed wharf. The local residents have been notified by advertisement in the Rabaul newspaper that they would have an opportunity of expressing their views concerning this project before the committee, but up to the present I understand they have no intention of doing so. We can, therefore, assume that they have not any strong objections to offer.

95. *To Mr. Gregory.*—So far as I am aware the Naval authorities have not been consulted in connexion with the proposed site. I do not think they would require other than coaling facilities, which will be available. I regard the harbour on which Rabaul is situated as important from a strategical viewpoint. I consider it desirable to confer with the Naval authorities in regard to the proposal. By the use of a tramway provision could be made for coaling naval vessels, which would be easier than by lightering. A second-class cruiser could berth at the coal wharf. It might be difficult to conserve sufficient water at the source of supply to meet the demand in the event of a fire on the wharf, as the country does not lend itself to the construction of a large storage basin. The present dam is only about 14 feet by 10 feet, and is situated in a small gully. The difference in the level is about 200 feet. Copra is, of course, an inflammable product, and in order to combat fire, I favour the use of a fire float, fitted with pumps capable of throwing a good stream of water. No provision has been made for the purchase of a fire float, but I think such an equipment is the most effective means of combating fire on the wharf. As far as I know, only one ship-master has objected to the proposed site. For the information of the committee, I quote the following radiogram which I despatched to Melbourne:—

Your 1104 conversations held with Captains Hillman, Cyril Williams, McInnes, and Griffiths. Two former considered original site suitable new site about one mile nearer town and old pier and similar to original site none of the captains have ever expressed adverse opinions but apparently acquiesced. New site all advantages of old one and in addition free from erosion and handier to business centre. What site do captains favour if site old pier cost construction out of question besides increasing largely cost handling cargo.

Captains Graham, Richardson, and Duncan, all of whom were consulted, favour the site, and Captain Webb, the Harbour Master at Rabaul, strongly supports the proposal. In answer to Captain Williams, who, you have informed me, has said that it would be dangerous for captains of tramp steamers, unacquainted with the port, to berth their vessels at a wharf at a western side of the bay, I quote the following table, showing the ships which have berthed at the different wharfs at Rabaul:—

Date.	Ship.	Tons.		Wharf.
		Registered.	Gross.	
October, 1925	*Teneriffa* ..	2,496	5,655	Copra
November, 1925	*Hambleton Range*	3,580	4,779	Main
March, 1926 ..	*Calulu*	2,631	4,311	Coal and Main
November, 1925	*Kalfarli* ..	4,081	6,579	Copra
January, 1926	*Trefusis* ..	3,229	5,299	Coal and Copra
January, 1926	*West Islip* ..	3,572	5,174	Main
April, 1926 ..	*Commandant Destreman*	1,375	2,275	Copra
April, 1926 ..	*Sheaf Mead* ..	2,689	4,272	Coal and Main
May, 1926 ..	*Eudunda* ..	1,922	3,252	Main

The *Mataram* also berthed at Rabaul on the following dates:—1st August, 1925; 3rd November, 1925; 18th December, 1925; 5th February, 1926; 19th March, 1926; 3rd May, 1926; 13th June, 1926.

I have not heard any competent authority express any adverse comment concerning the suitability of the proposed site. The anchorage is excellent, and tugs are not required. On one occasion the s.s. *Marsina,* I think, had a little trouble in getting away from the copra wharf, and a mooring buoy was placed in position off the coal wharf to which a line could be attached to enable vessels to haul off, but I think it has been used only on two occasions. As a port Rabaul is infinitely better than, say, Fremantle, as, at that port, when a north-westerly is blowing, the assistance of powerful tugs is necessary to berth large steamers. If the work of constructing a wharf were carried out by the Public Works Department, the operations would be in charge of an engineer in the Commonwealth Public Service.

96. *To Senator Payne.*—It would not be necessary to interfere with the leases adjacent to the proposed site to provide access from the main road to the wharf. Komine's lease has not been interfered with in making a 2-chain road. We have the power of resumption at any time, and the cost of resuming, should the occasion arise, would not be great. I consider it necessary to provide extensive accommodation at the proposed new wharf. I do not know what is likely to eventuate, but the proposed accommodation will be insufficient to accommodate the whole of the copra likely to be exported from Rabaul. It is only reasonable to assume that development will increase at the same rate until 1928, when it will remain nearly stationary for the next eight years. The Expropriation Board, which took over the control of the properties in

1920, and which holds 70 per cent. of the plantations, has not done any planting, but the properties planted in 1920 will be in bearing in 1928, and the increase after that will depend upon the activities of private planters. In time planters will turn their attention to the production of other commodities, such as cocoa, the growing of which was undertaken in a small way even before a bounty was available.

97. *To Mr. Cook.*—Of approximately 500,000 acres only about 171,000 acres have been actually planted; that is, apart from the vacant land that can still be taken up, We have enumerated population of over 200,000 natives, and, in addition, an estimated population, which is based more or less upon guesswork, of 150,000 to 160,000. The Expropriation Board has been recruiting its own labour for 70 per cent. of the plantations under its control. The other planters either recruit labour for themselves or through recruiting agents. Chinese and Malays, as well as natives, are employed under white overseers. The training boys receive on plantations naturally increases their efficiency, and the future success of the plantations largely depends upon the native labour available. There are, of course, other factors to be considered, such as scientific cultivation and management, as well as the introduction of capital. At Lindenhafen extensive experiments have been made in connexion with cattle, principally with Herefords from Queensland, and certain experiments have been made with Java cattle and different breeds of Australian cattle which appear to be most successful, particularly as the resultant progeny is practically tick-proof. The number of cattle can be said to be steadily increasing. The proposed wharf and storage accommodation should be sufficient to meet the requirements of the port for a number of years. The further development is expected in a westerly direction, and on the land behind the town. The proposed wharf abuts on one corner of the land we have available and which we can hold for extension to the west. We could also secure Royal's block, and could go even further when other leases expire; the town can be extended towards the present wharf. Cotton has been grown in the Territory, but not in sufficient quantities to show whether it is a commercial proposition. Experiments were made in maize growing with seed obtained from South Africa, but they were not satisfactory. The owners of land in the vicinity of the N.D.L. wharf such as Carpenter and Company, who had purchased the Matupi plantation, would naturally favour the construction of a new wharf on the old site.

98. *To Senator Reed.*—I have not heard of any instances where ships have been delayed in berthing at or leaving the coal wharf owing to strong south-easterly winds. The Expropriation Board has not offered any objection to the construction of a new wharf on the proposed site. The coal imported here is used only at the local ice works and on small vessels, including the Government steamer *Franklin*. No minerals of any importance have been discovered within the immediate locality. I have conferred with the masters of eight vessels concerning the site of the proposed wharf, none of whom have expressed disapproval.

99. *To Mr. Seabrook.*—I was in consultation with Mr. Fowler when the estimates of the cost of the new jetty were prepared. Originally we were under the impression that it would be possible to obtain locally a considerable quantity of the timber required for the work, but it was found that it was impracticable to obtain piles or either sawn or hewn timber in sufficient quantities. Possibly kwila would be suitable, but I do not think it can be obtained in satisfactory lengths at present. The opinion of our engineer at the time, was that piles would have to be imported from Australia. Certain supplies of timber are available at Alexishafen, and in the Baining Ranges, but great difficulty is experienced in obtaining sufficient supplies even for ordinary building purposes. If improved shipping facilities are provided the copra trade of Rabaul will, I think, be centred at a new wharf, particularly if the wharfage dues are reasonable. The stores now at the copra wharf will be unoccupied unless acquired by one of the importing oil companies or some other similar interests.

100. *To Mr. McGrath.*—I do not know of any reason why ship-masters should be opposed to the construction of a wharf on the proposed site. I personally interviewed eight captains, whose opinions I have quoted to-day. It would cost more to increase the length of the N.D.L. wharf by 120 feet and to clean up the debris than to build a new wharf, and even if the old wharf were reconditioned and lengthened the facilities provided would be quite inadequate. If the Territory is to continue to develop modern shipping facilities must be made available. The proceeds from the sale of the N.D.L. wharf will be paid to the Reparations Commission and credited to the German Government. I do not know what price is likely to be obtained for the old wharf, but we considered that it would be a sound proposition to pay £4,000 for the material that is in it. Even if the cost of purchasing, repairing, and extending the old wharf were the same as for building a new structure we would, by using the old wharf, still be faced with the objectionable bottle-neck. During recent years building extensions have been in the direction of the proposed wharf. Carpenter and Company have constructed a large store in that direction, Ah Tam has extended his premises, the Vacuum Oil Company's store is in the vicinity, and half a dozen bungalows have been erected in that direction. When the site of the present N.D.L. wharf was selected it was considered by the Germans, who are not bad judges, to be satisfactory; but I will not say that they are better judges than we are. The N.D.L. wharf was partially destroyed by fire on the 3rd of January, 1923. At that time copra and general cargo was stored in the one shed, and that is one reason why under the proposed new arrangement we intend to store copra, which is inflammable, in a separate shed. The construction of a reinforced concrete wharf was carefully considered, but our engineer was opposed to that form of construction owing to the unsatisfactory quality of the sand available, and the possibility of fractures owing to earthquakes. I have not heard of any local hostility to the proposed site.

101. *To Mr. Lacey.*—The wharfs and small private jetties, which at present serve the requirements of Rabaul, are known as the N.D.L., copra, coal, Burns, Philp and Company, Ah Tam's, Carpenter and Company's, and the New Guinea wharf. They are controlled as under:—

Custodian of Expropriated Property.	Administration.	Private.
Copra.. ..	Coal Wharf	Carpenter and Co.
N.D.L. ..	..	Ah Tam
New Guinea Co.	..	Burns, Philp and Co.

No extensions are being made to any of these wharfs, and, so far as is known, no extensions are contemplated. As vessels have been berthing against some of these wharfs, some of which are of very light construction, without the services of tugs or the use of springs, I do not see why any possible objection can be taken to the proposed site. If a good wharf with modern facilities is made available the tendency will be to concentrate the shipping at one point.

102. *To the Chairman.*—A good deal of copra is handled by coastal steamers. The Crown lands in the vicinity of the proposed site would be held for governmental purposes, and would not be alienated in any way.

103. *To Mr. McGrath.*—When I said that in my opinion I thought that tenders were "loaded," I meant that the contractors had probably made their prices somewhat high when tendering, as the location of the work was 2,000 miles away, and the tenderers may not have been conversant with the conditions of labour and supply of material to be obtained locally. In such a case they might make their prices unnecessarily high to meet contingencies which might never arise.

104. *To Senator Payne.*—I know Mr. Law, who has undertaken important harbour work at Port Melbourne, and who is associated with one of the firms which tendered for the construction of the new wharf, but I could not say if any of the tenderers have had experience in undertaking similar work in tropical countries. One contractor sent a representative to Rabaul to make inquiries concerning the conditions obtaining here. Mr. Fowler was of the opinion that the work could be done departmentally at a price lower than that of the lowest tenderer.

The witness withdrew.

James Herbert John Johnson, Superintendent of Works, Rabaul, sworn and examined.

105. *To the Chairman.*—I was employed by the British Government in Hong Kong as foreman and diving foreman from the end of 1902 to the early part of 1905. Prior to that I was also employed by the British Government at Hong Kong, but not in connexion with wharf construction. I have inspected the plans and specifications of the proposed new wharf at Rabaul, and the design does not differ materially from similar wharfs constructed in other parts of the world. The specifications, which have been carefully prepared, provide all that is necessary to insure the construction of a modern substantial wharf. In Hong Kong, concrete piles and blocks were largely used, and in Western Australia, where I was engaged in wharf work, we used karri and jarrah timbers. I do not favour the use of concrete piles in a country where earth tremors are prevalent, as the piles are likely to crack, which would necessitate them being pulled. I have been a resident in the Territory of New Guinea for about nine and a half years, and during that time have experienced some fairly severe earth shocks, which would have had a serious effect upon concrete piles. If a concrete pile is fractured, the working of the wharf gradually opens up the cracks until the piles become dangerous and have to be pulled. I did not have anything to do with the casing of the piles supporting the Expropriation Board's wharf, although the work was done whilst I was here. The Board had the use of some of our plant, and whilst the divers were there, I directed them to examine the piles which were driven and the decking place over them before they had been cased. An iron casing was placed around the piles, which was fastened with fly nuts and the casing then loaded. When the casing is placed over piles in the proper way, the divers dig around the foot of the pile to enable the casing to become well embedded in the sand. Unless this precaution is taken, the teredo gets underneath and very soon commences to destroy the piles. The sand and gravel available is suitable for the manufacture of concrete pipes, which are not reinforced, which we have used at Malaguna and Madang. If the proposed work were authorized the piles would be covered with concrete pipes, tongued and grooved in, say, four sections, and then filled in. I do not know the price of similar casing in Australia, but the approximate cost of those we have manufactured is 3s. 6d. per foot run. Very little local timber of value for wharf construction purposes is available in the Territory. I have been through practically the whole of the settled portion of the Territory, including Buka and Baining, where there is fairly good quila, but it is difficult to get anything over 40 feet in length. Anything over 24 inches is too heavy, and if it is to be cased, it should not be over 18 inches. If the piles are to be cased they need not be of turpentine timber. There is a coarse-grained timber in the Baining Ranges 80 to 90 feet in length, only 18 inches at the heel, and the head running away to a small diameter very quickly. When repairing the wharf at Rabaul and at Kavieng, and also when constructing a new wharf at Madang, local timber was obtained without going very far into the bush. The transport of such timber is, however, difficult, as it has to be hauled long distances. It costs 8s. 3d. a foot for all lengths, whereas we are at present purchasing turpentine in all sizes at about 6s. 2½d. a foot landed at Rabaul. I consider it desirable to import turpentine from Australia for carrying out the proposed work. Piles imported from Australia could be thrown overboard into shallow water, and then par-buckled into position. For general planking purposes, timber 8 inches by 4 inches would be of a suitable size. The retaining wall would be constructed on the low-water mark and the land behind it reclaimed to provide the necessary support for the goods sheds. The distance from the high-water mark of the shed is 24 feet, and from the high-water mark to the top of the wall 7 ft. 3 in. Certain filling will have to be done to secure the foundations of the sheds. The material required for constructing the retaining wall would be obtained from a quarry containing good basalt with a hard close grain. The joints in the walls should be properly cemented in order to keep out rats and other pests. Ample water would be available at the proposed site. The use of a small pump may be necessary in order to lift a small quantity of sand to the back of the wall, and a little dredging will have to be done at the western end of the wharf. It is most unlikely that any further dredging would have to be done for many years. The plans and specifications of the sheds proposed to be constructed meet with my approval, and the accommodation to be provided should be sufficient for at least the next ten years.

106. *To Senator Payne.*—Portion of the timber required for construction purposes could be obtained locally if the necessary plant was available to get it out. About 100 miles down the coast there is a good clump of suitable timber that is to be worked by a company now in course of being formed, but the small quantity available is not really worth scratching for. The timber required for this work should be imported from Australia. Some of the eucalypt timber would be suitable for piles if cased with concrete. I have studied the whole position most carefully, and consider the proposed site the only good one available. There is a small reef off the western end of the proposed wharf, but it cannot in any way endanger shipping. The Matapi point protects the wharf from south-east winds, which, however, are never of sufficient strength to cause any serious trouble to shipping. I am personally acquainted with the masters of many of the vessels which have visited Rabaul, and I have only known one officer to complain concerning the conditions here. The *Indiana*, a vessel of 7,000 tons, berthed at Rabaul without any difficulty at all. Vessels coming here are usually flying light, and are consequently more difficult to handle. At low water the depth of water at the copra wharf is 18 feet at the western end, and 24 feet at the eastern end. If a shipmaster, unacquainted with the port, needs assistance, the harbourmaster, Captain Webb, can take charge of a vessel when he is available, but in his absence an officer of the Customs Department boards the vessel, and advises the master concerning the berthing of his ship. Many overseas vessels have berthed at Rabaul without the assistance of the harbourmaster.

107. *To Mr. Cook.*—I do not anticipate experiencing any difficulty in obtaining the necessary native labour when once the work is commenced. The native labour is not as efficient as in the past, as we have not the control over the native which we had a few years ago. For the information of the committee, I quote my letter of

the 13th of August, 1926, to the Administrator concerning the labour required for the construction of a new wharf. It reads—

Territory of New Guinea,
Public Works Branch,
Rabaul, 30th August, 1926

RABAUL WHARF.

For your information I am submitting herewith the personnel that will be required if the proposed new wharf is carried on with :—

(*a*) *European*—
1 officer in charge of works.
1 man to take charge of the floating pile machine.
1 officer to take charge of the hand pile machine.
1 officer in quarry.
1 officer to generally supervise placing of material.
1 clerk, storekeeper, and timekeeper.

(*b*) *Asiatic*—
1 foreman carpenter.
1 second foreman.
12 Chinese carpenters.
2 engineers.
1 blacksmith.
1 boatswain.
2 divers, if concrete casing is used.
2 tenders, if concrete casing is used.

(*c*) *Native*—

	B/boys.	Labourers.
9 for floating pile machine ...	1	8
9 for hand pile machine ...	1	8
20 quarrying	1	19
12 carpenters	—	12
17 transporting tip-trucks ...	1	16
17 working pile yard	1	16
13 making road approaches ...	1	12
2 with blacksmith	—	2
26 flying gang	2	24
12 allow 10 per cent. sick ...	—	12
	8	129

This allowing for a wharf as per plan to be built on proposed site.

(Sgd.) J. H. J. JOHNSON, Superintendent of Works.

In considering the employment of native labour, an allowance of 10 per cent. must be made for sickness under normal conditions. Private contractors would be able to obtain the services of similar labour. I believe that 50 per cent. to 70 per cent. of the undamaged piles in the old N.D.L. wharf could be used in building a new structure. The timber in the N.D.L. wharf was imported by the Germans, some from New Zealand, and cost, I understand, about £62,000. Some of the piles in the N.D.L. wharf, which have been driven to a depth of 12 feet and 13 feet, have been pulled, and are in excellent condition. Only 25 per cent. of the iron work in the old jetty would be of use, and very few of the beams and girders could be utilized. If sufficient money were available, it would be advantageous to erect a couple of dolphins, say, 100 feet away from the end of the wharf, at a cost of about £200 each, to which a vessel which was working only one hatch could be moored, and thus allow more room at the wharf for another vessel working more than one hatch. Such dolphins would also be of assistance to vessels when berthing. The coal wharf has been completed for five and a half years, and the only accident of which I have any knowledge was when the *Mataram* hit the wharf heavily with her stern when berthing; but that was not due to the weather.

108. *To Senator Reid.*—The rise and fall of the tide here is from 2 feet 9 inches to 3 feet. There is very little movement in the sea bottom. The small reef in the vicinity of the proposed new wharf, to which I referred, beneficially affects the depth of water in that locality. On the site of the coal wharf there has been a scour of 30 feet in 20 years. When the proposed sheds were fully stocked with cargo there would be 10,000 tons in each, and it would be inadvisable to erect them on piles. The ground has to have time to set, and until that has been done the sheds could not be used. The bottom would be obtained for the concrete walls by sinking 3 feet, when 18 inches of hard sand gravel is reached. I cannot see how we could do very much without a retaining wall.

109. *To Mr. Seabrook.*—I do not think the cost of acquiring the timber in the old wharf would approximate the amount required to purchase new material. If we removed the material we required it would not be necessary to clear the bottom of the sea of the debris now there. The timber which was useless for our requirements would be sold for firewood. About 25 per cent. of the ironwork in the N.D.L. wharf, which was built in 1908, could be used. I have used many hundredweights of dog-spikes used in the wharf, and there is still a large quantity that could still be removed by one boy at the rate of 3 cwt. a day. They are easily straightened, and with cheap labour the cost of rethreading bolts is justified. I do not favor continuing the wharf through to form a support for the goods sheds. I have been here for nine and a half years, and am convinced that the sand does not move sufficiently to interfere with a retaining wall, which I consider absolutely necessary. Mr. Fowler's estimate of the cost of constructing such a wall was £2,300, which, I think, is fairly reliable. I have not given consideration to the question of erecting two wharfs of 250 feet each, with an intervening space of 300 feet between them to accommodate small trading vessels, and thus allow two vessels to expeditiously discharge at the same time. Provision has already been made in the plan for a berth to accommodate small vessels. Berthing space for small craft on the lines you suggest is unnecessary unless the weather is particularly bad, which is most unusual here. Such a proposal, if adopted, would also mean rendering of little use 300 feet of land behind the wharf, and, although you say it would save the cost of wharf construction, I do not like the idea. I do not think we have had a south-east blow during the last four years. The average velocity of the wind at Rabaul is about 7 miles an hour in bad weather. Conditions here are exceptionally favorable, and if a master of a vessel cannot handle his ship carefully and expeditiously in almost any weather, he is of no use to his owners. Ship masters who complain of lee shores at Rabaul are looking for something to grumble about. The proposed site is, I think, ideal, and any adverse reports the committee has received concerning the danger and inconvenience in berthing vessels in a fresh south-easterly are without foundation. We have a pile-driver here which could be hired if the work were undertaken by a private contractor.

110. *To Mr. McGrath.*—I am of the opinion that the Department could build a wharf at a much lower rate than the prices submitted by outside contractors. The damage to Komine's shipbuilding yard was caused by a cloud-burst a little to the west of the site on which his works are situated. I have never heard of his property being affected by earthquakes. I have had experience in harbour works in China, and I have also seen in Manila reinforced concrete piles 120 feet long, costing £130 each. The wharfs in Manila are excellent, one of which is capable of berthing three vessels, and cost £130,000. I have also seen some splendid wharf work at Kobe. In Yokohama, which suffered so much from the great earthquake, large buildings, up to nine stories, are being constructed of reinforced concrete, and in Manila and Kobe it is true wharfs are being built with reinforced concrete.

111. *To Mr. Lacey.*—If the old wharf were purchased, the Administrator would decide whether the debris on the sea bottom would have to be cleared. I should like the construction of the proposed wharf to be undertaken departmentally, and have the opportunity of obtaining what material was required from the old N.D.L. wharf at the price at which it has been offered. If a reinforced concrete structure were favoured, material, including suitable sand, would have to be imported.

112. *To Mr. Gregory.*—River sand is not available in this locality. Mr. Bernaise, an engineer representing the Engineering Construction Company, sent samples of sand south for testing purposes, which, I understand, were found to be suitable for concrete

work; but sand suitable for reinforced concrete construction would have to be imported. I have not experienced any failures in connexion with concrete casing work known at Rabaul and Madang. The cased piles are placed in such a way that a ship bumping heavily against the wharf cannot fracture them. A supply of water could be obtained from the foot of the hills at the back, and gravitated to the wharf. I understand the level has not been taken, but such a work could be easily done.

The witness withdrew.

The committee adjourned.

(Taken at Rabaul.)

WEDNESDAY, 20TH OCTOBER, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Lacey
Senator Reid	Mr. McGrath.

Charles John Royston Webb, Harbourmaster, Rabaul, sworn and examined.

113. *To the Chairman.*—I have occupied the position of harbourmaster at Rabaul for fifteen months. Prior to that I was engaged in the handling of ships. I am also marine surveyor for the Territory and master of the Government steamer *Franklin,* in which I have travelled over 11,000 miles around the coast of the Territory of New Guinea. I also act in the capacity of pilot when shipmasters unacquainted with the port require assistance. I have never experienced the slightest trouble in berthing ships, and the difficulties occasioned by south-easterly winds which have been mentioned by some are, in my opinion, negligible. From a shipmaster's point of view, weather conditions here are as near ideal as it is possible to get anywhere in the world. I have not known of ships to experience the slightest trouble in berthing or leaving the wharf, and if they have it is due to the carelessness of those in control. I have heard the views expressed by the commanders of the steamers of the Burns, Philp Line, but if I were to offer to assist them in berthing the vessels in their charge they would be annoyed. The only complaint made by the masters of overseas ships is that owing to the lack of modern facilities they cannot get their work done as expeditiously as they desire. It is not compulsory to obtain the services of a pilot, but during the last twelve months I have berthed, perhaps, six ships. I have taken ships from the anchorage to the wharf, and on two occasions have been down to the entrance to the bay to take charge of ships, anchor them for quarantine purposes, and then berth them at the wharf. I did not have any difficulty in berthing a vessel at the copra wharf for the first time. About 24 overseas boats visit Rabaul every year. I have handled only five or six, but have gone aboard others in order to supply the master with an up-to-date chart, and to give the depth of water. The last vessel which I handled was the *Hambleton Range,* which is now in port, and which was here nine months ago. She discharged 6,000 or 7,000 tons of cargo, and was drawing a fair amount of water. When I handled her I do not think she had previously visited Rabaul. That vessel is now in charge of another captain, who did not make any complaint concerning the port, and is, in fact, rather keen about the place. I loaned him one of my marked charts for use in entering Kavieng, to which port he is proceeding, and which is an exceedingly difficult place to navigate. The south-easterly trade winds blows from about the end of May until the end of September or the middle of October. The prevailing trade wind here can only be regarded as a gentle breeze. The eastern side of the bay in the vicinity of the township is very sheltered, and whatever wind there is is broken by Matapi Point. We never get any rough weather in the bay. I know the site of the proposed new wharf, and should say that it is very little more exposed than the N.D.L. wharf. The most exposed portion of the harbour is on the western side in the vicinity of the copra wharf. The coal wharf is slightly less exposed, and by the time the site of the proposed new wharf is reached there is, perhaps, a little more shelter. I prefer berthing at a wharf rather than at a jetty, especially in this case, as the prevailing breeze would assist berthing. In a strong wind a jetty may be of advantage, but we never get strong winds here. Under ordinary conditions I find it easier to berth the *Franklin* alongside the coal wharf than at the jetty, but at either place the difficulties are negligible. I have never heard any complaints made concerning the difficulty in berthing at Rabaul. It would be of great advantage to supply all the requirements of vessels at the one wharf by providing for discharging and loading to proceed simultaneously, which at present is rather impracticable. About one-third of the ships visiting Rabaul take in water here; some of them carry from 300 to 400 tons of fresh water in double-bottomed tanks. The last ship's captain, with whom I discussed the proposed new wharf, was Captain Fisher, of the *Kalulu,* who is very much in favour of the new site. The question of harbour lights was also discussed, and it is generally recognized that if the trade of the port is to develop, lights must be provided, and suitable wharfage accommodation made available, otherwise some vessels will give the port a wide berth. The safe berthing of ships should be considered, perhaps, before the immediate requirements of the townspeople, because if shipping is not protected trade will diminish, development will be retarded, and the whole community suffer. I have been held up in Port Phillip Bay for three days owing to bad weather, and although we have no tugs here such a thing, of course, is unknown. We have several small motor boats, but they are not sufficiently powerful to use for towing purposes. The berthing facilities could be improved by using a tug. A buoy, which was placed in position some time ago to assist in berthing of ships, has now been moved to a more convenient spot. Originally it was anchored between the copra wharf and the coal wharf in order to serve both, but in that position it was not really of much use. A wharf 600 feet long should serve the purpose, but the erection of a dolphin at each end would be of assistance, as it would enable a vessel working only one hatch to haul off and make more room at the wharf. The depth of water is satisfactory all over the harbour except close in at the eastern end, as from 8 to 10 fathoms of water can easily be obtained; but running down towards the beehive the depth is so great that it is difficult to get soundings. The water shallows a little in the vicinity of the proposed site. I have been told that there is a small reef in the vicinity of the proposed wharf, over which the water shoals from 18 to 20 fathoms to 13 and 10 fathoms in some places. I do not know whether that would have the effect of preventing siltation, but probably it would assist in diverting the current away from the proposed wharf, and also avoid siltation and erosion. The current in the bay is of little consequence, as its movement is slow. It proceeds around the western side of the bay past the copra and coal wharf, and goes out to the east. The eastern side of the bay is silting up. If a depth of 24 feet is provided at low water it should be ample for big ships, but I should favour a little greater depth in order to accommodate larger ships with a big draught which may come here to top up. At times vessels come from Australia loaded with ore or concentrates drawing from 24 to 25 feet of water, and it would appear that provision should be made for berthing vessels drawing, say, 27 to 28 feet. No dredging plant is available in Rabaul. I am not in favour of the old N.D.L. wharf being extended or

widened, as that would be uneconomical. It is an old type of wharf, and even if were repaired the expeditious handling of cargo would be interfered with owing to the difficulty in handling it both ways. The use of tramways on a narrow neck leads to congestion. If the wharf were constructed on the proposed site the extra distance to be traversed would be of little consequence. I have closely studied the whole situation, and cannot suggest a more suitable site than that under consideration.

114. *To Senator Reid.*—I cannot recall an instance where overseas ships have been delayed at Rabaul while I have been here. On one occasion the *Hambleton Range* decided to wait until morning before berthing, but she could easily have done so if the master had so desired. A captain whose vessel was berthed at Malaguna might wait until daylight before leaving, but that would be merely to suit his convenience; it is exceedingly unlikely that any such delay would be caused by weather. A wharf on the proposed site would be more sheltered from the north-west monsoon which blows for three or four months in the year, and is very often accompanied by rain and wind squalls. These as a rule are of short duration. The new site would be safer in that way, because it is protected by the North Daughter.

115. *To Mr. Seabrook.*—I prefer a continuous wharf to two wharfs each 250 feet long with a space of 300 feet between the two frontages. The erection of a dolphin off each end of the wharf would be an advantage. A space of 250 feet would take in three or four hatches, and therefore 600 feet should provide sufficient accommodation for two ships. I understand wharfage accommodation is to be provided for small craft such as schooners, which, if they came alongside at the last moment, could load direct into the ship. I believe a wharf of the type proposed is the most suitable. More accommodation would be required for outgoing cargo than for incoming cargo, and therefore it may be necessary to provide a larger shed for the former.

116. *To Mr. Gregory.*—I understood the sheds to be erected on the wharf were of the same size. Probably it would be better to have one shed divided into two, as it is undesirable to store copra with food stuffs. Notwithstanding what Captain Williams has said, I still maintain that the site of the proposed wharf is not dangerous. If overseas ships require piloting I am, when here, willing to bring them in. As the buoy, which we have in position, will not be used by one vessel in a dozen, it shows that the port is not the desperately dangerous place that some would suggest. The buoy has been available to ships leaving the copra or coal wharf, but it has seldom been used. Coal could be supplied to vessels of the Navy at the proposed wharf by running a tramline from an adjacent coal depot. Rabaul is in my opinion the most suitable site for a port in the Territory of New Guinea, and by the construction of a new wharf as proposed it would obviate the necessity of the naval authorities building a wharf of their own. It is, of course, essential to have a water supply at the wharf for use for supplying ships and to assist in extinguishing a fire. The erection of tanks to provide the necessary gravitation would enable water to be supplied at the rate of 50 to 100 tons an hour, whereas, under the present system, only 8 to 10 tons can be supplied hourly.

117. *To Senator Payne.*—I consider it impracticable to construct a satisfactory wharf to the east of the old N.D.L. wharf, as the cost of connecting deep-water berths with the foreshore would be prohibitive. The construction of a wharf on the site proposed would be of advantage to the shipping interests, and of general benefit to the people of Rabaul. Last year the trade winds were a little stronger than usual, but the south-east trade winds usually die away at sunset. I cannot see that this port posseses any disadvantages, and the natural facilities are far superior to anything to be found in any of the other ports in the Territory, none of which is ever likely to be a serious competitor of Rabaul. There are two wharfs at Madang, as well as a small schooner wharf on a lower level. I prefer one wharf to two small wharfs 250 feet in length, especially for the transhipment of cargo. An effective tramway system could not be used on a double wharf and, moreover, various complications and delays would arise under such a system.

118. *To the Chairman.*—If the Expropriation Board wharf were sold to private interests I could not say whether it would come into competition with the proposed new wharf. If ships berthed at some of the other wharfs we would lose wharfage and berthage fees; but I understand the facilities of the new structure would be such that ship-masters would, in their own interests, prefer to use it. The Chief Collector of Customs controls the department in which I am engaged. If a person or company wished to construct a private wharf application would be made in the first instance to the Administrator, who would refer the application to the Chief Collector of Customs for investigation and report. A sun light visible for 7 miles will shortly be installed at Matapi Point, the foundations for which are already in position, and another light, which is to be installed on Cape Gazelle is on order. Later, a third light will be erected on the north coast, for which provision has already been made.

The witness withdrew.

Edward Featherstone Phibbs, Chief Collector of Customs for the Territory of New Guinea, Rabaul, sworn and examined.

119. *To the Chairman.*—For the information of the committee I now submit the following particulars concerning the passengers carried from Australian ports to ports within the Territory of New Guinea, also the total tonnages received from Australia and other countries during the same period.

PASSENGERS CARRIED FROM AUSTRALIAN PORTS TO PORTS WITHIN THE TERRITORY.

Years 1923-24, 1924-25, 1925-26 ... ... Total 3,031

PASSENGERS CARRIED FROM PORTS WITHIN THE TERRITORY TO AUSTRALIAN PORTS.

Years 1923-24, 1924-25, 1925-26 ... ... Total 2,714

PASSENGERS CARRIED FROM OTHER THAN AUSTRALIAN PORTS TO PORTS WITHIN THE TERRITORY.

Years 1923-24, 1924-25, 1925-26 ... ... Total 1,242

PASSENGERS CARRIED FROM PORTS WITHIN THE TERRITORY TO OTHER THAN AUSTRALIAN PORTS.

Years 1923-24, 1924-25, 1925-26 ... ... Total 1,207

CARGO TONNAGES.

		Tons.
1924-25—		
From Australia—		
General, 15,673 / Coal, 1,064	... ...	16,737
Other countries	... ...	5,059
	Total	21,796
1925-26—		
From Australia—		
General, 15,454 / Coal, 1,453	... ...	16,907
Other countries	... ...	6,352
	Total	23,259
1924-25—		
To Australia	... ...	11,500
Other countries	... ...	28,297
	Total	39,797
1925-26—		
To Australia	... ...	16,549
Other countries	... ...	30,044
	Total	46,593

It is anticipated that the export tonnage will increase annually and our exports in four years' time are estimated to reach 50,000 tons. The first year's exports from this Territory represented 14,000 tons, and the quantity has been increasing yearly. A number of plantations planted during the military administration are now coming into bearing. From the end of 1914 to the time when the plantations were expropriated, the Germans were making a lot of money which they could not then send out of the country, and this they spent in further planting. Between 1915 and 1921 extensive areas were planted, and these are now reaching productivity. The old wharf, which was constructed over fifteen years ago, became quite inadequate, as it would not carry more than 3,000 tons, and if the structure had not been partially destroyed arrangements would have had to be made for storing cargo on the shore. It would be impracticable to extend the old wharf to the length required, as the depth of water would be too great for the piles. We would not have increased the width of the wharf, because it had begun to drop with the weight, and consequently it had to be reconditioned. Most of the copra consignments which reach Rabaul come by schooner or other small craft from Kavieng, and a small proportion which is locally produced comes by road. No other wharf is likely to come into competition with the proposed new wharf. The Expropriation Board's wharf will not last very long and would have to be rebuilt before it would be of much use. If the N.D.L. wharfs were purchased by private interests, it could be used for storage purposes, but not as a wharf for inward cargo. We could not allow general cargo, liable to Customs duties, to be stored all over the place. The control of wharfs is the responsibility of the Customs Department. Ships would be more or less compelled to use a new wharf, as that would be the one at which all the principal cargoes would be handled. If £60,000 were spent in building a new wharf to meet our requirements, the annual interest charge at 6 per cent. would be £3,600. If a sinking fund were established to wipe off the liability an annual contribution of £12,000 would have to paid for 50 years, thus making an annual charge of £3,600 for interest and £12,000 as a contribution towards the sinking fund, or an annual liability of £4,800. The estimated annual receipts for storage would be £3,500, and for wharfage and berthage £3,000, or an annual income of £6,500. The revenue last year for storage and berthing from the Kavieng wharf, which is smaller, but the only other wharf where cargo is stored, was £2,875, as against a revenue of the old wharf at Rabaul of £2,230. If Kavieng, with a small wharf, the capacity of which has been increased since last October, can obtain a revenue of £2,875, we should be able to collect £3,500 annually at Rabaul for storage. I understand the Expropriation Board bring in from some of their out-stations an average of 300 tons of copra a week. The Board is handling 27,000 tons of copra and 18,800 tons of other goods, or a total of 45,800 tons. Fully three-fifths of the copra is produced by the Expropriation Board, most of which has been stored at Rabaul and Kavieng, and as the plantations extend, storage accommodation will have to be supplied to meet the requirements of planters. Storage charges in Australia are on a sliding scale, but here we have a fixed rate of 1s. a ton all round, which I consider reasonable. I prefer the site originally selected at Malaguna to the proposed site, as I consider there is more room for expansion than in the vicinity of the new site now under consideration. If the old wharf were to be rebuilt it would be capable of handling only the trade that was done ten years ago, instead of being able to accommodate the traffic that will be offering ten years hence. Wharfage facilities are provided at Kavieng and Madang, but these ports are not likely to develop to any great extent, as they are considered to be bad ports to enter and leave. Kavieng is particularly treacherous, and shipmasters would much prefer to go to Rabaul, which port will always be the centre of trade between Australia, Papua, and the Solomon Islands. Vessels from Port Moresby call here as also do vessels from China, bringing sacks, rice, &c., for transhipment to Papua and the Solomon Islands.

120. *To Senator Reid.*—Our Customs revenue has increased from £50,000 to £140,000, which figure it reached last year. It has been steadily increasing each year, and as capital is attracted to the Territory, production of other than copra will be undertaken. The importations are not likely to increase to any great extent until the white population is larger; but exports will, I hope, always continue to increase. The quantity of imported goods used by the natives is very small. The settling down of portion of the old wharf was caused by the copper casing becoming detached from the piles and allowing the teredo to attack them, so that when a vessel bumped the wharf the piles became fractured and at low water naturally settled down.

121. *To Mr. McGrath.*—The figures relative to this Territory's trade with Australia prior to 1914 were all destroyed by the Germans. The trade was, however, small, as every endeavour was made to encourage German trade; all fresh fruit and vegetables, for instance, being obtained from eastern countries and not from the Commonwealth.

122. *To Mr. Lacey.*—We can only compel ships to use our wharf when they have bonded cargo under our control.

123. *To. Mr. Gregory.*—If the Expropriation Board sold its wharf to private interests, and copra exporters desired to ship from it, we could not prevent them from shipping from what would be a private wharf. We could impose charges in such a way that all copra shipments would be concentrated at the one wharf. We charge an export duty of 25s. a ton on copra. The storage charge is 1s. a ton and wharfage is also 1s. a ton, and the purchaser of the copra wharf who shipped from there would avoid those charges. The depreciation on the proposed wharf and storage accommodation will not be very great, and I think my figures are sufficiently high to meet the position. I consider the undertaking a payable proposition under present conditions, and, of course, when the Territory is further developed, the financial position will be even better. The revenue to be obtained from supplying water to the ships would not amount to more than £500 a year, as water is obtainable in Australia at 6d. to 1s. a ton, whereas 5s. a ton is charged here.

124. *To Senator Payne.*—The sinking fund proposed will wipe off the capital expenditure in 50 years. The question of whether the liability could be liquidated in a shorter period by investing the amount placed to the credit of the sinking fund, is one which would have to be considered by the Treasurer.

125. *To Mr. Cook.*—Cotton does not thrive in this Territory, but cocoa, kapok, and other tropical products are at present being grown on a small scale. I have not made a comparison between our wharfage rates and those in operation in Australia, but our berthing rates for ships is £10 for the first day and £5 for the second and each subsequent day. Our Customs duties amount to approximately 10 per cent. on almost everything, and are imposed only for revenue purposes. Agricultural implements, anchors, and &c., are on the free list. We could increase our Customs duties, but that is thought to be undesirable. A revenue of £140,000 a year is fairly substantial. Our aim has been to keep down the cost of production. We could easily double our revenue by further taxing the people, but that is not desired.

The witness withdrew.

The Committee adjourned.

(Taken at Sydney.)

FRIDAY, 12TH NOVEMBER, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Reid	Mr. Lacey
Senator Payne	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Lieutenant Horace John Harold Thompson, Department of the Navy, Sydney, sworn and examined.

126. *To the Chairman.*—I appear before the Committee under instructions from the Captain Superintendent, Sydney. I understand this Committee is considering a proposal to construct a wharf at Rabaul 600 feet long in water 24 feet deep, which is to be dredged to 30 feet, and that you are anxious to know whether any special provision would be necessary to accommodate vessels of the Royal Australian Navy. The approximate dimensions of the vessels under the control of the Australian Naval authorities, including the cruisers now under construction, is 600 feet long, beam 68 feet, and draught 20 feet. I am unable to give the Committee any information beyond the dimensions of the ships. I do not know of any difficulty experienced by vessels of the fleet which now visit the principal ports in Australia. The work of berthing a cruiser, for instance, would not be more difficult than in berthing any other vessel of a similar size.

127. *To Mr. Gregory.*—I have not received any instructions concerning whether any special provision would have to be made for the accommodation of naval vessels at Rabaul. I do not know of any one in the Department of the Navy having inspected the plans.

128. *To Senator Reid.*—I have not heard the question of the construction of a new wharf at Rabaul discussed by the officers of the Department. I was instructed to give all the information I could concerning the dimensions of the ships likely to use wharfage accommodation at Rabaul. I have no information as to whether a naval depot is ever likely to be established there.

129. *To Mr. McGrath.*—I have been in the service of the Navy for fourteen years. The only information I am in a position to give is that which I have already tendered concerning the dimensions of the cruisers.

The witness withdrew.

Thomas Hill, Chief Engineer, Commonwealth Works Department, Melbourne, sworn and examined.

130. *To the Chairman.*—I understand the Committee are inquiring into the construction of a wharf at Rabaul. To some degree my Department claims the responsibility for the plans and specifications prepared by Mr. Fowler. I can explain how my Department came to be associated in the matter. In March, 1925, the Secretary of the Home and Territories Department detailed an officer to see me and place before me certain plans and specifications on their file. With a view to obtaining advice concerning the proposal, he placed before me a memorandum by Mr. McKenzie, a consulting engineer who had been approached by Mr. Fowler in regard to the proposal. I, therefore, had the advantage of Mr. McKenzie's memorandum on the matter. After examining the proposal I advised that in so far as the information therein would permit—

(1) That the tender of £62,868 for the original scheme was a fair price.

(2) That the amendments suggested by the consultant engineer, Mr. McKenzie, are good, with the exception that I did not entirely agree with the nature of the piling proposed to be used—wood sheathed with muntz metal or wood sheathed with concrete—but instead would prefer reinforced concrete piling, the rest of the piling to be in wood as per plan and specification.

(3) The estimated cost based on the remarks under item 2 for the reduced size and altered location of jetty is £45,000.

(4) It is suggested that fresh plans and specifications be drawn up embodying the alterations and amendments, and fresh tenders be invited; if a suitable tender is not received, then the work be carried out by Departmental labour.

The Works and Railways Department was prepared to do that. In July, 1925, I received a further communication from the Home and Territories Department asking that Sir George Buchanan, the authority on ports and harbours who was then in Australia, might be consulted in regard to certain other points. On the 5th August, 1925, Sir George Buchanan advised as follows:—

> Mr. Hill, Works Director, came to see me some time ago in connexion with the construction of a wharf at Rabaul . . . As I understand the case, the design of the wharf was originally prepared by the Director of Works, and the lowest tender received amounted to £57,678. As this was in excess of the money available, Mr. McKenzie was called in to consult with the Works Director, and subsequently a modified scheme was prepared which reduced the cost to £40,846, but at the same time the Works Director at Rabaul also prepared a scheme which was estimated to cost £38,873. I am afraid it is quite impossible for me in the very limited time at my disposal to discuss these various designs, but, apart from design, I understand my opinion was wanted on three specific points, namely:—
>
> (1) Should the piles be constructed of reinforced concrete or timber?
> (2) In the event of timber being used, should the piles be surrounded by concrete pipes, and what should the space between the concrete and the pipes be filled with?
> (3) Is it advisable to drive fender piles, or have fenders attached to the concrete piles?
>
> My replies are as follow:—
>
> (1) In the circumstances explained in the papers, I prefer timber piles.
> (2) They should be surrounded by reinforced concrete cylinders manufactured in as long pieces as possible, and the space between the concrete and the timber should undoubtedly be filled with concrete and not with sand.
> (3) I am disposed to agree with the Works Director, who thinks that fender piles are better than fenders.

Acting on that, minute plans and specifications were prepared by Mr. Fowler under instructions from the Home and Territories Department, and we were then asked to call for tenders, which were eventually received, but, as they were not considered satisfactory, no tender was accepted, the deposits were returned, and the whole question referred to this committee. I am conversant with the plans and specifications, which I have carefully perused, and I have no hesitation in saying that they have my approval. They appear to me to embody a sound proposition so far as I can judge without having actually visited the site of the proposed work. I have had a conversation with Mr. McKenzie, who visited Rabaul some time ago, and also with Mr. Fowler, and, judging from the information available, the proposition seems to be a good one. There is nothing unusual in the type of structure proposed. In considering the design, the locality has to be taken into account. I should, however, like to have the opportunity of working out a design for a reinforced concrete structure, and also of framing an estimate of the cost in order to see how it compares with that of a structure of the type proposed, particularly in view of the possible difficulty and expense that may be incurred in getting ships to carry lengthy piles from the mainland to Rabaul. Necessary precaution in the way of coppering or galvanizing the reinforcement would have to be taken with that portion of the piles exposed to aeration. The rise and fall of the tide at Rabaul is not more than 3 feet, and the wind and wave action is not high. A reinforced scheme could even go further, and provide for a reinforced concrete decking. I do not suggest at this stage that such a structure would be preferable, but I think it desirable that alternative designs and estimates should be prepared. Fear has been expressed in some quarters that earth tremors would possibly cause the concrete piles to crack, and allow the sea water to enter, but I believe that concrete piles would be able to withstand earth tremors as well as timber piles. I am, however, still a little in doubt as to how concrete casing would stand earthquake stress, and whether it would not crack. I should like the opportunity to seriously consider the construction of a reinforced concrete wharf as an alternative proposal.

A filling of sand between the casing and the pile, in the event of timber being used, would give a certain amount of elasticity, but in the event of a crack developing in the casing the sand may become blocked instead of dropping, would remain in position, and would not give any indication of the presence of a fault. I am inclined to think that a concrete filling, such as recommended by Sir George Buchanan, would crack during a very severe earth tremor. Mr. McKenzie, who has visited Rabaul, favours the use of concrete piles. The Sydney Harbour Trust has not undertaken the construction of concrete wharfs owing, I suppose, to the capital cost; timber is cheaper in Sydney than it is in Rabaul. I think it would be found that the cost would favour a concrete wharf. The necessary skilled labour for wharf construction would have to be obtained from the mainland, and for concrete work no more labour would be required than for building a timber structure. The information I have received concerning the quality of the sand necessary for reinforced concrete work varies. I have been informed that the sand dredged, although micaeous, was quite satisfactory, but perhaps it would not be altogether suitable for work of the standard required in this instance. No difficulty would be experienced in sending a consignment of suitable sand from the mainland to Rabaul, but, as I have said, there would be difficulty in shipping piles 40 to 50 feet long, which would have to go as deck cargo. It would be fairly costly to ship the necessary quantity of suitable sand, but not as expensive as shipping piles. Tests could be made concerning the suitability of the sand dredged from the sea bottom. The lowest tender received for the construction of a wharf at Rabaul in accordance with the plans and specifications prepared two years ago was about £64,000, and the highest tender approximately £99,000. If the piles were properly cased, ironbark would be as satisfactory as turpentine, but I believe the latter was specifically mentioned in the specification, because the port of shipment would probably be Sydney. If stringybark had to be transhipped at Sydney, it would probably cost as much as ironbark. The most satisfactory way of carrying out the work would be to charter a small vessel to carry all the material that was required to Rabaul. If a timber structure were decided upon, there would be no objection to calling for tenders for the supply of piles from the different States; we would not restrict tenderers to turpentine or ironbark. We would be prepared to consider any other suitable timbers if the quality and price was satisfactory. I am still, however, strongly of the opinion that a reinforced concrete wharf ought to be considered, and designs prepared and estimates taken out, although, as I have said, I believe the proposed scheme a good one. Under the present proposal of a continuous wharf, two ships could be working at the same time, and the cargoes discharged carried to either shed; but if two wharfs, each 250 feet long, were constructed with an intervening space on a lower level for berthing schooners, such as has been suggested, difficulties would arise in endeavouring to satisfactorily carry on discharging and loading operations between the two wharfs. Some economy might be effected by having two wharfs of the length mentioned, but I do not think it would be found to be economical. A wharf 600 feet long would be much stronger than two small wharfs each 250 feet in length, and in the event of heavy weather the continuous wharf would provide greater stability, safety, and convenience. The quantity of material required for a rubble wall is only 3,000 cubic yards, the material for which is available, and assuming it costs 10s. a yard, the cost would amount to only £1,500. The wall will provide the necessary protection, and will prevent the sand from coming away from underneath the stores, the floors of which are to be of concrete. Considering the purpose it will serve, and the comparatively small cost, it is a necessary precaution. I favour a wall instead of an extension of the wharf, as when once it is in place it is more durable and better than a timber proposition. We have had a long experience of iron roofing for buildings on the seat front, and have never had any trouble so long as sand is not allowed to accumulate on the roof. I have seen the Hyde patent reinforced casing, which is built on the surface in the form of a cylinder, and then forced down into position. I have been very favorably impressed with what I have seen of casing manufactured under this system, which has advantages over reinforced casing done in sections. In putting short lengths in position, the services of a diver are necessary to see that the joints are in order, whereas under this system the casing goes down in one piece, and by employing this method a saving of over £1,000 could be effected. If the construction of a new wharf is authorized, I think it would be advisable to call for fresh tenders. We would submit a departmental estimate, and if those of private contractors were considered excessive the Minister would decide on who was to carry out the work. A proviso was inserted in the tenders previously called to the effect that if the old N.D.L. wharf was purchased such timber as was sound and suitable should be used in the new structure. I understand, however, that the timber in the old wharf is not too good, and it is somewhat doubtful if it would work in well with new material. I do not think it would necessitate delay of more than three or four weeks to prepare an estimate of the cost of constructing a concrete wharf, and, if necessary, I could give immediate instructions for that work to be commenced. In suggesting the preparation of estimates for the construction of such a wharf, I am supported by the opinion of Mr. McKenzie, who said, *inter alia*—

> Owing to the expense in protecting timber piles at Rabaul, and the high cost of timber delivered on the site, a reinforced concrete wharf in this case would, we estimate, have the effect of a further saving of £6,500, and would have the advantages of resisting fire, white ants, teredo, &c.

That statement was made in May, 1925, and when I saw Mr. McKenzie quite recently he repeated his assertion.

131. *To Senator Reid.*—Sir George Buchanan was consulted concerning the use of sand or concrete filling between the casing and the piles, and I have given the committee his considered opinion. I understand the sea bed of the bay at Rabaul has been tested for suitable sand, which can be obtained at a depth of from 15 to 20 feet, and some of which has, I understand, been used for concrete work. Owing to the heavy freight on piles and the difficulty of obtaining suitable timber locally, I think it would be more economical to construct a concrete wharf. I do not favour the use of native labour, and I think it would pay better to send our own men over—the number would not be large—who are accustomed to such work. Whether the wharf is of concrete or timber it would still be necessary to construct a retaining wall in order to protect the floor of the goods sheds. If the committee should decide upon the construction of a timber wharf I would favour the use of the Hyde concrete pipes in the form of cylinders without joints. The whole casing for one pile could be completed without any joints, as the work on a casing would not be commenced until it could be completed. A small pump is used for clearing the sand from the foot of the piles before the casing is placed in position. One tenderer said that by using the Hyde system his price could be reduced by £1,000

132. *To Mr. Seabrook.*—The Melbourne Harbour Trust has been using piles of Tasmanian timber probably because they are handy to the source of supply. Moreover, there are no cobra troubles in the Yarra. Stringy bark piles may be as good as piles of any other timber unless a crack should develop in the casing. There would be no likelihood of cracks occurring in the concrete filling between the casing and the piles if fender piles were used to take the jar caused by ships coming alongside. I think it possible to get a better concrete job under the Hyde system than under the reinforced pipes constructed on the horizontal system. I do not, however, value to any great extent the reinforcement in the casing which is from 1½ inches to

2 inches thick, and there is then a further 2 inches of filling between the casing and the pile. I do not think it can be said that the Hyde casing is irregular, and the specimens of the work inspected by the members of the committee in Brisbane, where it is said to be irregular, may be one of the first jobs done. Alternative tenders for different timbers will be sought and we shall, if the price is sufficiently attractive, consider other than iron bark. I am surprised that it should have been said that it would be a waste of money to erect a rubble wall owing to the shifty nature of the sand, because if the wall is likely to be affected it shows that without a wall the concrete floors of the shed would naturally be seriously interfered with. The sand at the bottom must be of a fairly coarse grain, because the test piles driven showed that they had penetrated a good depth without excessive blows. If the wharf were carried right back to the sheds there would be nothing to hold the floor of these buildings in position. Without the wall the sand might leak away and the building drop. As a space to the depth of 6 feet or 7 feet must be filled in and there must be something to retain that bulk, it is proposed to run a rubble wall right around. We had trouble in some instances where floors have subsided owing to the absence of sufficient support underneath. I do not think there would be any saving in purchasing the material in the old wharf for use in a structure such as that proposed. It is questionable whether a timber structure would withstand the earthquake shocks better than one of concrete. Notwithstanding severe earthquakes that have been experienced in Yokohama, practically all the building that is going on there is of reinforced concrete. The only trouble with reinforced concrete is the rusting of the reinforcement. The reinforcement in the piles should be coppered for 10 feet below and 10 feet above low water level in order to afford the necessary protection in the event of cracks developing. I cannot see any advantage in having twin jetties instead of one continuous wharf for the reasons I have already mentioned.

133. *To Mr. McGrath.*—Mr. McKenzie, who favours the construction of a concrete wharf, has had many years' experience in wharf construction, and has also visited the site on which it is proposed to erect a wharf at Rabaul. He has also carefully considered the possible effect of earth tremors, and has also built wharfs, which are standing well, in areas where earth tremors are prevalent. I am not in any sense opposing the scheme before the committee, but in the interests of economy and the general stability of the structure proposed I think prices should be sought for a concrete wharf. In tropical countries reinforced concrete is being largely used for work of the kind under consideration.

134. *To Mr. Lacey.*—If concrete is grouted in between the casing and the pile it is a permanent job, but if sand is used for filling between the casing and the pile, and a crack develops, the sand will, if not carefully watched, run out and remove any protection. I favour the use of concrete filling between the casing and the pile rather than a filling of sand. If the Committee decided on the construction of a timber wharf, I would still recommend the use of concrete between the casing and the pile. Mr. McKenzie's report was made after his visit to Rabaul. The system of galvanizing or coppering the reinforcement has been considered, but the cost prevents its use to any great extent; moreover, galvanizing or coppering smooths the surface of the rods, and interferes somewhat with adhesion; but not to any appreciable extent.

135. *To Mr. Cook.*—With Mr. McKenzie I think that a concrete wharf would probably cost less, but a reliable comparison has never been made by calling for alternative prices for the one job. The supervision necessary would be the same with a concrete wharf as with a timber structure. Reports concerning the quality of the sand are conflicting. At first we were told that the quality of the local sand was poor, but later Mr. McKenzie, after his visit to Rabaul, said that it was all right. One authority who told me that it was not altogether satisfactory has since informed me that it is quite all right. I do not favour the use of native labour, and, as I have already suggested, would prefer the necessary labour to be sent from Australia with the material required. It may be difficult to obtain turpentine piles in the required size, and ironbark would, perhaps, be straighter and cheaper. I could not say what the old wharf is worth, as I have not had an opportunity of inspecting it; but on the facts before me it does not seem to be a good proposition to purchase it with the idea of using some of the material in the new structure. From the information obtained I understand that local timbers are not easily obtainable, and that that available is not of a satisfactory quality. Durability is a most important factor in work of this description.

136. *To Mr. Gregory.*—I shall give careful consideration to the question of whether it would be possible to lower the level of the wharf from 7 ft. 6 in. to 5 ft. 6 in. above high-water mark, and thus reduce the quantity of filling required. Concrete for reinforced piles or casing should be of the best quality. The men who would be sent to undertake this work would produce as good a casing on the vertical system as could be manufactured under the horizontal system. I am surprised to learn that the Hyde system of casing inspected in Brisbane varied in some cases from 2 inches to 5 inches in thickness. For horizontal casings the joints are covered with a separate collar of larger diameter, and in this case provision has been made for collars. It is not possible to have spigot and faucet joints in the sizes to be used, as the largest that can be made in concrete is 24 inches in diameter, which are made with the Dalberg machine. We have not been too successful with sockets of 24 inches. I have given careful consideration to the possibility of damage by earth shocks.

137. *To Senator Payne.*—I am acquainted with the position in connexion with reinforced concrete wharfs and jetties in Auckland, New Zealand. I understand they have stood very well, but recently there have been some failures which cannot be very well explained, unless it is due to the erosion of the reinforcements which has resulted in disintegration. I have heard that repeated earth tremors have affected the wharfs there, some of which are not of the type proposed, but of the wall type consisting of trestles and slabs, and filled in at the back. I have not heard of any serious trouble there which is directly attributable to earth tremors. If the price of stringy bark piles was particularly attractive their use could be considered. In my opinion the most suitable tender submitted for the work was that of Law and Spence, which was £64,014, and also the lowest. That is the only firm which sent a representative to the site in order to become fully acquainted with the conditions. I could not say if that firm has any actual experience in constructing wharfs in tropical countries. As conditions have changed since tenders were last called, I suggest that fresh tenders be obtained, as I have never known a tender to be taken up after holding it for over a year. If the tenders received were considered unsatisfactory, the work could be undertaken departmentally, and we would have the price of outside contractors to work against. Possibly the tenders submitted were much higher than the departmental estimate because the contractors allowed a fairly wide margin. We had no difficulty in getting the required labour for constructing the wireless station at Willis Island, and for certain work at Darwin we had no trouble in obtaining boilermakers and other artisans. I am satisfied that the work to be done by unskilled labourers can be satisfactorily carried on at Rabaul by white men. I have not had any experience in supervising construction work of this type in New Guinea, but I have had men there doing work. I

understand that the percentage of humidity in the atmosphere is very high; but from the information I have obtained I do not think white men would experience any difficulty in carrying on the work. I understand there are certain disadvantages in employing native labour.

138. *By the Chairman.*—I am of opinion that a concrete structure could be built for less than a timber structure, but I have not worked out a definite estimate. A concrete decking would not, I think, become too heated to affect the natives, who would do their work barefooted, and it would not be slippery in wet weather unless mud were allowed to accumulate on it. I have not had an earlier opportunity of suggesting the construction of a concrete wharf, as this is the first occasion on which I have appeared before the Committee in connexion with this inquiry. I think it is a good suggestion to utilize planks of varying width, as narrow decking is satisfactory.

139. *To. Mr. Lacey.*—If the contract prices for a timber and a concrete wharf were about the same, I would favour the latter.

140. *To Mr. Cook.*—I do not think the department would have a substantial advantage over private tenderers, because we provide in the specification for the use of a dredge to carry out excavation, payment being made for wear and tear.

141. *To Senator Payne.*—If the work were to be undertaken departmentally we would get in touch with the local people who have had experience in wharf construction, before taking labour to Rabaul, in order to avoid unnecessary expense.

142. *To the Chairman.*—If the work is proceeded with I would either make a visit to Rabaul, or send my chief engineer, Mr. Connell. The work would be under my control.

The witness withdrew.
The committee adjourned.

Printed and Published for the GOVERNMENT of the COMMONWEALTH of AUSTRALIA by H. J. GREEN, Government Printer for the State of Victoria.