



1909.

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THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

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# FEDERAL CAPITAL: PROPOSED SITE AT YASS-CANBERRA,

PAPERS RESPECTING SELECTION OF TERRITORY AND  
PROPOSED SITE FOR THE CITY;

TOGETHER WITH

REPORTS RESPECTING TOPOGRAPHY, WATER SUPPLY, SEWERAGE,  
RAILWAY COMMUNICATION, POWER, ETC.

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[NOTE.—*The Plans and Maps prepared in connexion with this Report are printed separately.*]



## FEDERAL CAPITAL: PROPOSED SITE AT YASS-CANBERRA.

### (1) INSTRUCTIONS OF MINISTER FOR HOME AFFAIRS TO MR. DISTRICT SURVEYOR SCRIVENER.

Department of Home Affairs.  
Melbourne, 21st December, 1908.

The Secretary,  
Department of Home Affairs.

The *Seat of Government Act* 1908 provides that the Seat of Government of the Commonwealth shall be in the district of Yass-Canberra, in the State of New South Wales, and that the territory to be granted to or acquired by the Commonwealth for the Seat of Government shall contain an area of not less than 900 square miles, and have access to the sea.

With a view to giving effect to the foregoing, the Prime Minister, at my instance, has asked the Premier of New South Wales for the loan of the services of a competent surveyor, preferably Mr. Scrivener or Mr. Chesterman.

The duty which I propose to intrust to the surveyor is that of making a thorough topographical investigation of the Yass-Canberra district, with the object of placing such facts before me as will enable Parliament to decide on the most suitable territory for the purposes of the Seat of Government within the district referred to, in which connexion I am of opinion that the work to be carried out by the surveyor should be divided into three phases, as follows:—

- (1) Preliminary reconnaissance, covering the whole of the district and embracing the catchment area of the water supply governing the same;
- (2) Topographical investigation of that portion or portions of the district which, during the reconnaissance, are shown to possess the requisite characteristics for the Commonwealth territory;
- (3) Contour survey of suggested site or sites for the Federal Capital city.

The primary essentials of the territory may briefly be summarized as follows:—

- (a) That it includes a site or sites possessing the necessary topographical characteristics for the Federal Capital;
- (b) That it includes the catchment area of the water supply for the Capital—such water supply must be of sufficient magnitude to place the question of volume at all seasons and purity beyond doubt.

NOTE.—It is desirable that the catchment area shall be in the proximity of the Capital site, but should the topographical examination of the district disclose the fact that such a condition is not practicable, then the catchment area must be connected with the territory, including the site for the Capital—that is to say, severance must be avoided.

- (c) *Sanitation*.—That the site provides for a perfect system of sanitation, not only so far as the city itself is concerned, but generally.

- (d) *Accessibility*.—It is requisite that the site be easy of access with Sydney and Melbourne, and, through them, to the other Capital cities, also with a suitable harbor on the coast.

In the consideration of (a) the surveyor will bear in mind that the Federal Capital should be a beautiful city, occupying a commanding position, with extensive views, and embracing distinctive features which will lend themselves to the evolution of a design worthy of the object, not only for the present, but for all time, consequently the potentialities of the site will demand most careful consideration from an hygienic stand-point, with a view to securing picturesqueness, and also with the object of beautification and expansion.

The foregoing covers the main essentials which occur to me, and I have no doubt but that the experience of the surveyor will enable him to realize what is required from him.

I should be glad if the surveyor could enter upon the work at the earliest possible date, and, in the first instance, conduct the reconnaissance of the district, from which possibly certain territories will be shown to stand out as possessing the necessary advantages. These territories could then be more critically examined and reported on.

It is probable that after the receipt of the preliminary report from the surveyor I will require arrangements to be made under which Members of Parliament may have an opportunity of seeing for themselves the proposed territory or territories, the catchment area, and the country in the vicinity, so that when the final examination shall have been completed they will be in the best position to decide.

H. MAHON.

- (2) THE SECRETARY, DEPARTMENT OF HOME AFFAIRS, TO THE MINISTER FOR HOME AFFAIRS, RECOMMENDING APPOINTMENT OF A BOARD TO CONSIDER THE RESULTS OF THE PRELIMINARY INVESTIGATION.

Department of Home Affairs,  
Melbourne, 8th February, 1909.

### *Federal Capital Site.*

The preliminary investigation will, by the 20th instant, have arrived at such a stage as to admit of more definite ideas being formed as to the most suitable territory for the purpose. I therefore recommend that a Board be formed comprising—

The Secretary for Home Affairs (Chairman),  
The Director-General of Works,  
The Government architect of New South Wales,

The surveyor engaged on the work, to consider the results of the preliminary investigations, and to advise you as to the site or sites which conform most closely to the requirements of the Seat of Government, and the territory embracing them, with a view to such portions of the district being more closely surveyed and reported on.

DAVID MILLER.

Approved.—H. MAHON, Minister for Home Affairs, 9th February, 1909.



- (3) THE PRIME MINISTER OF THE COMMONWEALTH TO THE PREMIER OF NEW SOUTH WALES, REQUESTING THAT THE GOVERNMENT ARCHITECT OF NEW SOUTH WALES (COLONEL W. L. VERNON, F.R.I.B.A.) AND MR. DISTRICT SURVEYOR SCRIVENER ACT ON THE ADVISORY BOARD.

Melbourne,  
13th February, 1909.

SIR,

With reference to previous correspondence on the subject of the Federal Capital Site, I have the honour to inform you that it is proposed to appoint a Board comprising the Secretary for Home Affairs, the Director-General of Works, the Government Architect of New South Wales, and Mr. Scrivener, to consider the results of the preliminary investigations, and to advise as to the site or sites which conform most closely to the requirements of the Seat of Government, and the territory embracing them, with a view to such portions of the Yass-Canberra district being more closely surveyed and reported on.

2. I shall therefore be glad if you will be so good as to agree to your Government Architect and Mr. Surveyor Scrivener acting in this capacity.

I have the honour to be,  
Sir,  
Your most obedient servant,  
H. MAHON,  
For the Prime Minister.

- (4) THE PREMIER OF NEW SOUTH WALES TO THE PRIME MINISTER OF THE COMMONWEALTH OF AUSTRALIA AGREEING TO THE GOVERNMENT ARCHITECT (COLONEL W. L. VERNON, F.R.I.B.A.) AND MR. DISTRICT SURVEYOR SCRIVENER ACTING ON THE ADVISORY BOARD.

Premier's Office,  
Sydney, 22nd February, 1909.

SIR,

With reference to your letter of the 13th instant, No. 09/597, I have the honor to inform you that this Government has no objection to Colonel W. L. Vernon, New South Wales Government Architect, and Mr. C. R. Scrivener, District Surveyor, Hay, acting as members of the Board which your Government proposes to appoint to consider the results of the preliminary investigations in connexion with a site for the Federal Capital.

I have the honour to be,  
Sir,  
Your obedient servant,  
C. G. WADE.

- (5) MR. DISTRICT SURVEYOR SCRIVENER TO THE MINISTER FOR HOME AFFAIRS. REPORT UPON SITES WITHIN THE YASS-CANBERRA DISTRICT.

Yass,  
25th February, 1909.

SIR,

In compliance with your instructions of 11th January, 1909, I have made an inspection of the area embraced by Yass-Canberra, and beg to submit the following report upon sites within that area. Since, with one exception, all sites within the Yass-Canberra area lie upon the watershed of the Murrumbidgee River, all drainage will ultimately pass

into that river either directly or by way of one of its tributary streams. The Barren Jack dam has been designed with a definite object, that of irrigating some 196,000 acres of high-class land easterly from Gunbar, and north of the June-Hay railway, as well as other land on the south of the Murrumbidgee River, and along the course of the Hay railway line. The water carried in the canal to the irrigation settlements must also serve as a domestic and stock supply for the occupants of irrigation blocks, as well as for the inhabitants of the towns that will spring up as a consequence of the closer settlement of the country.

At Mildura the irrigated area is about 9,000 acres, or, roughly, 1-20th of that within the Northern Murrumbidgee scheme, the population is about 4,000. It is not unreasonable to assume that a population of not less than 50,000 will ultimately be settled upon or close to the irrigation area, and will derive their water supply from the irrigation channels; besides these there are the large and rapidly increasing numbers resident in towns situated on the banks of the Murrumbidgee River (as Wagga Wagga, Narrandera, and Hay) who obtain their water from the river, and have no other source of supply.

Having these facts in view, it is obviously desirable that a site for the Federal Capital should not be selected too near to the Barren Jack reservoir. Whatever opinion may be held with regard to the character of the effluent from septic tanks, under the most skilful management, there are at least very strong sentimental objections to using water into which large quantities of such effluent are discharged.

The greatest care may be taken to render innocuous the sewage effluent, and a large measure of success will no doubt be attained, but besides this there will be a large quantity of objectionable matter carried by storm waters directly into the river channels, and this cannot be prevented where a large population is settled upon any given area, thus the water impounded in Barren Jack reservoir must be polluted to a greater or less degree.

No city site from the location of which such results must inevitably flow can be regarded as ideal, even though in every other feature it may be highly desirable. There can be no doubt that the Commonwealth Government will endeavour to preserve with as jealous care the purity of the water supply of State occupiers of land as of those within its own territory, but whatever means may be adopted the effort will not be wholly successful.

The length of river and channel between Barren Jack reservoir and the irrigation area will certainly tend to remove impurities, and thus minimise the evil.

While Barren Jack reservoir will form an imposing sheet of water when at top level, it would present few beautiful features when, by a reduction of level, large areas of river flat and undulating country were exposed. Especially about Tamas would this occur, and it may happen that in periods of prolonged drought the impounded water would wholly disappear, leaving bare and dirty hill sides. Mr. Wade, in his report, page 11, on the irrigation scheme, shows the effect upon the reservoir had the irrigation scheme been in full operation during the years 1900 to 1904. He there states that from December, 1901, to March, 1903, there would have been no impounded water, or, in other words, the irrigation settlements, as well as users along the course of the Murrumbidgee, would have been for fifteen months dependent upon the river flow during an abnormally dry period; he also shows that in 1901 the volume of water impounded in the reservoir after the withdrawal period would have been



50-77ths of the total quantity, in 1902 nil, in 1903 up to March nil, and in 1904 about 44-77ths of total capacity of the reservoir.

These conditions may not recur, but it is, to say the least, indiscreet to ignore facts. With this illustration of the possible effect of a prolonged drought, after the irrigation settlements have been fully developed, the Barren Jack reservoir cannot be regarded as a good source from which to obtain a certain supply of power, neither would an impounding reservoir liable to very serious fluctuations of level be an altogether desirable adjunct to a Federal Capital.

If the city is to be beautified by water conservation, and that is almost essential, and certainly eminently desirable, then it should be by means of streams within the Federal territory, and under the control of the Commonwealth Government.

#### *Water Supply and Power.*

The water supply for the Federal Capital must be drawn either from the Murrumbidgee River or from its tributaries, the principal of these being the Goodradigbee, Cotter, Queanbeyan, Molonglo, and Gudgenby Rivers. The Murrumbidgee itself is an undesirable source of supply, because it is frequently very heavily charged with earthy matter, and consequently badly discoloured for long periods, while there must be considerable contamination of the water from sewage material carried into it from settlement and towns along its course. The same objection applies to some extent to both the Queanbeyan and Molonglo Rivers, though perhaps in a less degree, but the water of both these rivers, by reason of the discolouration caused by a heavy storm, has been unfit for domestic use for some weeks; of the two rivers the Molonglo offers the best prospect of a fairly pure supply, and suitable sites for impounding reservoirs can be obtained on that river.

The Gudgenby River is useless for water supply, largely because were a weir constructed it would silt up very rapidly; the bed of the principal branch of this stream is composed for a considerable distance of a great depth of coarse sand, in which the river is at times lost altogether.

Both the Queanbeyan and Molonglo rivers below the junction cease to run in very dry seasons. The only rivers that afford a good and pure supply are the Goodradigbee with its tributary the Micalong Creek, and the Cotter River; from the Goodradigbee or the Micalong the supply would be drawn for any site near Yass, the length of pipe line from the Micalong weir, at a level that would afford a gravitation supply, would be approximately 40 miles, varying somewhat with the particular location of the Capital. I should not regard Micalong Creek, with a catchment area above the take off of only 37 square miles, as sufficient to meet the possible future requirements of the Capital, in which case, water would be drawn from the Goodradigbee. The bed of this river, however, rises very slowly, and at 20 miles above Wee Jasper, which by road is 30 miles from Yass, the level of the river bed is only 1,650 feet, or 24 feet above Yass Railway Station. Clearly, a gravitation supply from this river would be extremely costly, and the best that could be done would be to pump from the river near Wee Jasper, where the level of the river-bed is roughly 1,200 feet: this would involve a lift of at least 800 feet, and a pipe-line of not less than 30 miles.

The Goodradigbee is the best river of the system within the Yass-Canberra district, because of the volume; when inspected at the latter end of January, the flow was not less than 80 cubic feet a second;

the water is rarely discoloured, and then for only very short periods, while the discharge is said to be fairly uniform, and no doubt power could be obtained by the erection of suitable weirs; but a detailed examination and survey of the river would be necessary before an estimate of the amount of power could be made; in any case, the power station would be, by road, about 50 miles from Yass, or in a direct line, about 40 miles.

The Cotter River is available for any of the eastern sites other than Lake George. This river was inspected two days after a heavy thunderstorm, the water was then dark in colour, due, no doubt, to minute particles of charcoal brought down from the steep hill sides, where there had recently been bush fires; on the following day, the water had almost resumed its normal condition. This river is a narrow mountain stream for many miles, having a width of about 40 feet, the gradient of the bed fairly uniform; it flows through a deep valley practically unoccupied, and, as no ring-barking has been done of any moment along its course, it is therefore unlikely that the water would be at any time discoloured for a longer period than a few days. If a gravitation supply is desired for the eastern sites, taking Canberra as an example, the length of pipe-line would be approximately 30 miles. A survey has been made by the Department of Works, with the object of obtaining a line, from a weir site at a level of 2,267 feet, for an open channel to the junction of the Cotter with the Murrumbidgee River. The length of this line is approximately 18 miles, and it would be probably not less than 12 miles from the terminal point of the channel to the Capital Site.

The measured average flow of the Cotter River from the 6th February to the 16th September, 1908, is stated, by Mr. E. M. de Burgh, to have been 33,000,000 gallons daily, or about 5,280,000 cubic feet, equal to a discharge of 61.12 cubic feet per second. The gauge is, however, fixed near the confluence of the Cotter with the Murrumbidgee, and the record is for the wetter months of the year; therefore, to arrive at the actual quantity available, either for a gravitation scheme of water supply or for power, certain deductions must be made.

By constructing a weir at a gravitation level, the area of the watershed is reduced from 170 to 110 square miles; and if it be assumed that the flow measured during the rainy months is maintained throughout the year, and that the rainfall over the whole watershed is uniform (these are compensating assumptions), then the quantity of water passing the weir site at the 2,267-feet level would be 22,000,000 gallons approximately, or 11.17ths of the recorded flow, and in cu. secs. the quantity would be 40.7 instead of 61.2. Even this discharge is only available under certain conditions, which presuppose the ability to impound all the water that flows down the river. This is rarely possible, because a fall occurring when the reservoirs are full, if beyond the amount required for daily use, must be lost.

As a source of water supply, the Cotter River is equal to all demands that may be made upon it, even by a population of 200,000, with a *per capita* consumption of not less than 100 gallons per diem; but as a source of power supply, it is not promising, for the reasons adduced; and further, because while the demand for power would be an increasing quantity, the supply must diminish in proportion with the increase of population, and the need for providing a greater water supply.

It may prove to be economical to carry out the scheme as an initial work, and look farther afield for power as the supply from the Cotter diminishes.



The Cotter does not afford any facilities for the construction of weirs that will impound very large quantities of water. The valley is narrow, and, consequently, the impounding capacity of any weir will be relatively low per foot of height.

Mr. De Burgh shows that a pumping scheme would be, as far as water supply is concerned, much cheaper than a gravitation, and in that case, only a low weir would be necessary near the mouth of the Cotter. If a large supply of power is required at a moderate cost, it can be obtained from the Snowy River, where there is scarcely any practical limit to the amount available, with suitable works, and no where else can better weir sites, combined with a rapid fall in relatively short distances, be obtained; while a uniform flow of not less than 500 cubic feet per second could be maintained.

The Molonglo River is also worthy of careful examination as a source of power. Mr. Gipps, C.E., who spent some time in the locality, states that a reservoir with a capacity of nearly 7,000,000,000 cubic feet can be obtained by the construction of a weir in a gorge, through which the river passes after leaving Molonglo plains. This storage would be at a level of about 2,400 feet, or about 500 feet above the town of Queanbeyan, and if the reservoir were full, a supply of 200 cubic feet per second might be drawn off for a year before the supply was exhausted. As the catchment area is only 170 square miles, this flow would not be maintained, but the river should be surveyed.

The weir, in a direct line, would be 9 miles from Queanbeyan.

#### SITES INSPECTED.

##### *Mahikoolma.*

The objections to this site are as under:—

Difficulty of disposing of sewage satisfactorily without pumping over Carroll's Creek watershed, a lift of 200 feet.

Expensive water supply scheme from an undesirable source for reasons already given; the lift would range from 1,000 to 1,200 feet, according to water level of Barren Jack Reservoir, from which it would be drawn. Restricted area of undulating land available, while the site has but one outlook through a gap in the range, through which Carroll's Creek flows, and the Federal Capital would only be visible when the ridge forming the watershed of Carroll's Creek was crossed.

I know of no advantages that this site possesses, and it is, I consider, in every way unsuitable.

##### *Yass.*

The country about Yass has a contour suitable for city purposes; there is, however, the grave objection of proximity to Barren Jack Reservoir; all storm waters and the effluent from septic tanks would pass directly into the Yass River, a few miles above the limit of the impounded water, and no effort would prevent its being polluted. The cost of supplying water to any site near Yass would be very heavy; if a gravitation scheme, the pipe line would be 40 miles; if a pumping scheme from the Goodradigbee, the lift would be 800 feet, and pipe line about 30 miles; while if a large demand were made for water, a pumping scheme could not be avoided.

The general level of the country is from 1,600 to 1,850 feet, while the bed of the Goodradigbee above the limit of the water impounded by Barren Jack dam is about 1,200 feet, thus allowing a fall of 5 feet per mile for pipe line or channel, or 150 feet in 30 miles; the difference of level would be 800 feet, with no margin for head over the more elevated areas. Should a site near Yass be selected,

it could not approach too near to the Barren Jack impounding area, as this must remain under the control of the State Government, and this would impose a limitation that might be undesirable, while the drainage question might very possibly be a serious source of trouble between the Commonwealth and State Governments.

The Yass River does not afford facilities for the storage of any large quantity of water for ornamental purposes—the distance in a direct line from Yass to the limit of the water thrown back by Barren Jack dam is about 7 miles, the difference of level 400 feet, or an average of 57 feet per mile. Following the course of the river the fall per mile would be probably 25 feet per mile on the average, but the gradient of the river bed is much steeper near Yass than near the reservoir.

With the exception of the area east of Mount Bowring, and lying between the Main Southern Railway and Yass River, sites near Yass would be quite unprotected from westerly gales, because of the absence of any high land affording shelter. This difficulty might be overcome by selecting an area near to Murrumbateman; but here a high ridge of very poor country lies between Yass River and the site, quite shutting out any extensive view in a northerly direction.

Yass sites have one advantage over any farther east or south, in that they might readily be connected by a loop line with the Main Southern Railway, and this line would not be very much longer than the existing railway; but there would be no saving in construction, because the connexion between the Federal Capital and Jervis Bay would occupy much the same position whichever site in the Yass-Canberra district may be finally selected, unless the indirect route *via* Goulburn and Braidwood were adopted.

##### *Gundaroo.*

Of this site it is necessary to say little; it has no special features, but is likely to attract notice largely because it is usually approached through country very poor in character—the Yass River at Gundaroo is a small stream which has cut a deep channel in the alluvium forming the valley through which it flows, and difficulty would be experienced in securing near the site suitable foundation for a weir to impound water for ornamental purposes. The water supply, if drawn from the Cotter River, would be very costly; but with a pipe line of 27 miles a gravitation supply might be obtained from the Molonglo River. As the site has no marked features, and lacks essentials, it cannot be considered side by side with others offering far greater advantages.

##### *Sites about Hall.*

These sites lie on the western side of the range dividing the Yass River from the Murrumbidgee and Molonglo Rivers, and encroach to some extent upon the Canberra site, but outside the limits of the latter. While fine views can be obtained towards the west, the country presents no special features, and is exposed to the westerly winds. These sites would have a wide outlook towards the high mountain ranges forming the watersheds of the Goodradigbee, Cotter, and Murrumbidgee, but would not be prominent objects from the usual lines of approach, and are in other respects inferior to other available areas.

##### *Bungendore—Lake George.*

This site occupies an unique position, in that it has an independent watershed and has, therefore, all the advantages and disadvantages which that



position involves; the dominant feature is Lake George, which is at present a grazing paddock, and has been so for some time. The lake was, I am informed, a fine sheet of water in 1895, since when the seasons have been abnormally dry, and the inflow has not been sufficient to keep pace with soakage and evaporation. The suggestion with regard to this site is that the Molonglo River should be diverted by means of a tunnel and open cutting, in order that the lake might be maintained at a constant level.

The area of the lake is, roughly, 38,000 acres, and it would require a stream of water with a flow of rather more than 50 cubic feet per second throughout the year to raise the level of the water one foot when the lake was nearly full, while if the level were reduced by one foot, thousands of acres of silt-covered lake bed would be exposed.

The flow of the Cotter River, with a catchment area equal to that of the Molonglo, was from February to September, 1908, about 40.7 cubic feet per second, and the catchment area of the Molonglo is unlikely to provide so great a run off as that of the Cotter, hence it is quite possible that the Molonglo River would not in dry years be equal to the task of maintaining the lake at a constant level.

This difficulty might be overcome by reducing, by means of a long and costly embankment, the area of the lake; but if this were done, unless the central part of the lake were banked off, only a very shallow depth would result, and in any case the mean depth would not exceed 6 feet, and the loss by evaporation would be very great.

The rainfall on the Lake George watershed may be taken as 24 inches, while the evaporation from the surface of the lake ranges from 32 to 50 inches per annum, excluding the years from 1898 to 1900, when the water was at a very low level. During many years the rainfall over the catchment area has been insufficient to produce any effect upon the lake bed, the water being either absorbed by the soil or rapidly evaporated, and even when the lake was full the rainfall could not maintain the level.

Assuming that the lake were filled during wet seasons it might and probably would be necessary to make up practically the difference between the rainfall and the evaporation, and this would be in some cases equal to 2 feet of water over the whole surface, or some 3,000,000,000 cubic feet.

The water in the lake is said to be brackish even when at a high level, and would, therefore, be useless for any purpose other than a supply for stock, only the surplus water in wet seasons could be allowed to pass away, and consequently no power could be derived from the stored water that could not be more cheaply obtained by other means. The scheme would be costly and would I consider be a great waste of water merely for scenic effect, and this water might be much more usefully employed in a State deficient in rivers, while in other localities the effect of a considerable body of water can be obtained at less cost with much less waste and amid better surroundings.

#### *Canberra.*

This site while by no means ideal approaches nearer to what is required than any other I have inspected in the Yass-Canberra district.

The general level of the country about Canberra lies between 1,900 and 2,000 feet while some of the higher hills reach an altitude of nearly 2,800 feet above sea level.

The site is intersected by the Molonglo River, a stream with a catchment area of about 700 square

miles; this river is joined by the Queanbeyan River at the town bearing that name and at a distance of some 7 miles from Canberra. Through the latter place the river flows between low banks giving everywhere an easy approach to the river, but this condition has the disadvantage that in years of heavy rainfall flood waters cover a large area and the Molonglo, which in summer may be crossed in places dryshod, and at times even ceases to run, spreads out over the lower land and is in places nearly a mile wide, the gradient of the river bed for some 10 miles below the junction with the Queanbeyan is very slight and therefore a low weir would throw back the water for some miles; what appears to be a very fair weir site is found at the extremity of a rocky spur falling abruptly to the river; I believe from the formation that the rock is continuous under the river and on the southern side.

A city could be located at Canberra that would be visible on approach for many miles; streets with easy gradients would be readily designed, while prominent hills of moderate altitude present suitable sites for the principal public buildings.

The Capital would probably lie in an amphitheatre of hills with an outlook towards the north and north-east well sheltered from both southerly and westerly winds, and in the immediate vicinity of the Capital there are large areas of gently undulating country that would be suitable for the evolutions of large bodies of troops.

Drainage will present some difficulty, the water-courses carrying large bodies of water during sudden storms, and it would not be practicable to prevent large quantities of the city refuse passing into the Molonglo, and ultimately into the Murrumbidgee River. Similarly the effluent from septic tanks must ultimately pass into that river, but the distance from the Capital Site to the limit of the impounded water in Barren Jack reservoir would be nearly 40 miles, measured along the courses of the Molonglo and Murrumbidgee, and would be less objectionable than if discharged immediately into the reservoir. I regard the Canberra site as the best that can be obtained in the Yass-Canberra district, being prominently situated and yet sheltered, while facilities are afforded for storing water for ornamental purposes at a reasonable cost.

As already stated, if a gravitation scheme of water supply is adopted, the length of pipe line will be about 30 miles, but, if a pumping scheme, this will be reduced to about 12 miles.

#### *Building Materials.*

Nowhere in the Yass-Canberra district can timber suitable for building purposes be obtained; supplies must therefore be drawn from the coast country.

As large areas of Silurian formation are met with near Canberra, good bricks will be made, but it is doubtful whether any large quantity of good building stone can be obtained locally; this must be drawn principally from other districts.

#### *Production.*

Yass-Canberra as a whole is not an agricultural district, and a very large proportion of the land embraced is only suitable for grazing; there are, however, considerable areas of gently undulating land well adapted for fruit growing, and with proper cultivation ordinary farm crops might be profitably grown; apparently holders have found it easy to make a living by grazing and have, therefore, avoided as far as possible the more strenuous life that cultivation demands.



*Value of Land.*

The value of land in the Yass-Canberra district is high—extra suburban lands near to Yass were recently sold at £10 per acre and ordinary grazing land embracing stony hills brought £4 per acre.

Near Canberra a recent subdivision of part of the Duntroon estate averaged £5 4s. per acre, much of this grazing land only and not particularly rich.

From the Shire Councils of Yass and Queanbeyan I have obtained the following figures:—

Total area of Goodradigbee Shire, 757,630 acres,

Improved capital value, £1,432,608,

Unimproved capital value, £632,538.

Hence the estimated improved average capital value is roughly £2 per acre—the unimproved 16s. per acre.

The estimated improved value of all property within the Yass municipal district is £287,238, the unimproved value £110,975, while the assessed annual value is £18,547. The figures for the Yarrolumla Shire are as under—

Total area, Yarrolumla Shire, including Crown lands, roads, &c., 1,318,130 acres.

Unimproved capital value of taxable lands, £607,000. No estimate of improved value available.

The estimated improved value of all property within Queanbeyan municipal district is £101,400.

Unimproved value, £33,676.

It must not be assumed that the values adopted by the shire councils represent anything like the true values of the property; they are not infrequently kept moderately low in order that appeals, which would be costly, may not be lodged, and in other cases the values under the Land Tax Act have been adopted, and these were notoriously much below true values.

Taking Yass-Canberra as a whole, I should look forward to a mean value of £4 per acre on a freehold basis: one large estate area, about 30,000 acres, is valued by the shire at £51,000, yet it is doubtful whether this estate could be bought for less than £5 per acre. It is clear that in this district the resumption of private lands will be a costly proceeding.

*The Limits of Territory.*

Assuming that the Canberra site will be regarded as possessing advantages over every other in the Yass-Canberra district, consideration has been given to the area that it is desirable should be embraced by the Federal territory.

First, it is essential that the whole of the catchment area of the Cotter River should be acquired, in order that a pure water supply may be placed beyond doubt, and, seeing that the Molonglo River traverses the Capital site, and should become a distinguishing feature in the future, it is equally necessary that the catchment of that river, and of the Queanbeyan should be included. If the territory extended only so far in an easterly direction as the Goulburn-Cooma railway line, it is certain that pollution of the Molonglo and Queanbeyan rivers would take place; the establishing of a large city within the Federal territory would induce close settlement of all lands on the borders of that territory, a good market for any products being assured; thus a fairly large population would gradually occupy the lands suitable for cultivation on the catchment areas of both rivers, and the

sewage from centres of population would pass directly into them. Queanbeyan already presents some difficulty, the town being built upon the river bank, and no provision has been made for dealing with sewage beyond the antiquated pan method, which is, as ordinarily conducted, but a slight advance upon the cesspit.

I therefore suggest the inclusion in the Federal territory of the whole of the catchment areas of both the Molonglo and Queanbeyan; as far as the Federal city itself is concerned, a similar system has been followed, making the ranges forming the watersheds of the various water-courses the territorial boundaries.

If the Federal Capital is to be a model city, then it is essential that the territory should embrace such an area that all streams flowing through the city site, or near it, should be controlled by the Commonwealth Government.

As the Goulburn-Cooma railway passes for some distance through the proposed Federal territory, it would be necessary to reserve a strip of land along that railway sufficient for future requirements, and an arrangement might be arrived at with the State Government by which right of access across that strip would be permanently assured.

*Railway Connexion.*

The Canberra site is already accessible from the Cooma railway, but, in order that the length of journey might be reduced, a connecting line should be run from about Yass to Queanbeyan; the length of this line would be about 50 miles, measured from the Main Southern railway, and no engineering difficulties would be encountered. This line would at once pay interest, and would ultimately yield a considerable profit; the route the line would take can only be determined after the exact site for the Capital is fixed.

A tracing showing the proposed Federal territory in connexion with the Canberra site accompanies this report, and it is furnished with illustrative notes.

*Climate and Rainfall.*

There is, as far as rainfall is concerned, no material difference between Yass and Canberra, but Canberra summer temperatures range from 3 degrees to 7½ degrees below those of Yass, while the winter temperatures at Canberra are from 1½ degrees, in July, to 8 degrees, in August, below Yass. These figures are taken from tables supplied by the Commonwealth Meteorologist, and refer to maximum temperatures; the table relating to Yass and Queanbeyan is attached; the absolute minimum temperature at Queanbeyan, in July, is given as 11.1 degrees, or 20.9 degrees below freezing, while for Yass the record is, for the same month, 22 degrees, or 10 degrees below freezing.

The absolute minimum for Queanbeyan is the same as that of Cooma for July, and much below Bombala, viz., 4½ degrees for the same month; Canberra is unlikely to differ much from Queanbeyan in temperature.

*Connexion with Jervis Bay.*

The time at my disposal has not allowed me to make an inspection of the country between Queanbeyan and Jervis Bay: I propose to carry out that work as early as possible.

I have the honour to be,

Sir,

Your obedient servant,

CHARLES ROBT. SCRIVENER,



# ArchivesACT Research Guide

|           |     |     | MURRUMBURRAH.<br>(Screen.) |              |              |                  |                  |           | QUEANBEYAN.<br>(No Screen.) |              |              |                  |                  |           | YASS<br>(No Screen.) |              |              |                  |                  |           |
|-----------|-----|-----|----------------------------|--------------|--------------|------------------|------------------|-----------|-----------------------------|--------------|--------------|------------------|------------------|-----------|----------------------|--------------|--------------|------------------|------------------|-----------|
|           |     |     | Mean<br>Temp.              | Mean<br>Max. | Mean<br>Min. | Absolute<br>Max. | Absolute<br>Min. | Rainfall. | Mean<br>Temp.               | Mean<br>Max. | Mean<br>Min. | Absolute<br>Max. | Absolute<br>Min. | Rainfall. | Mean<br>Temp.        | Mean<br>Max. | Mean<br>Min. | Absolute<br>Max. | Absolute<br>Min. | Rainfall. |
| January   | ... | ... | 75.1                       | 89.4         | 60.7         | 114.9            | 38.4             | 2.45      | 68.4                        | 82.0         | 54.8         | 104.0            | 33.0             | 2.38      | 72.3                 | 84.6         | 60.0         | 107.5            | 41.4             | 2.50      |
| February  | ... | ... | 74.2                       | 88.6         | 59.8         | 108.1            | 38.0             | 1.27      | 67.9                        | 81.4         | 54.3         | 102.0            | 36.0             | 1.81      | 71.2                 | 83.1         | 59.0         | 105.0            | 42.0             | 1.23      |
| March     | ... | ... | 69.2                       | 83.5         | 55.0         | 100.1            | 33.0             | 2.14      | 62.7                        | 75.1         | 50.4         | 90.0             | 29.8             | 1.8       | 66.2                 | 77.8         | 54.6         | 98.0             | 36.5             | 1.88      |
| April     | ... | ... | 61.4                       | 75.2         | 47.5         | 96.4             | 30.0             | 2.20      | 55.4                        | 67.0         | 43.8         | 85.0             | 26.0             | 1.71      | 58.2                 | 69.0         | 47.3         | 90.5             | 28.0             | 1.81      |
| May       | ... | ... | 53.0                       | 67.0         | 39.0         | 92.4             | 24.0             | 1.65      | 47.4                        | 58.1         | 36.6         | 69.7             | 18.0             | 1.74      | 50.0                 | 59.9         | 40.0         | 74.5             | 21.5             | 1.74      |
| June      | ... | ... | 48.5                       | 59.8         | 37.3         | 87.1             | 19.0             | 2.65      | 42.6                        | 51.6         | 33.6         | 64.0             | 15.0             | 1.94      | 45.8                 | 52.7         | 38.9         | 66.5             | 19.0             | 2.69      |
| July      | ... | ... | 47.3                       | 59.0         | 35.6         | 82.1             | 21.0             | 2.16      | 39.8                        | 49.7         | 29.9         | 61.5             | 11.1             | 1.32      | 43.8                 | 51.4         | 36.3         | 63.0             | 22.0             | 1.92      |
| August    | ... | ... | 48.9                       | 61.6         | 36.1         | 82.1             | 20.0             | 2.19      | 43.1                        | 53.7         | 32.6         | 67.0             | 13.0             | 1.54      | 46.5                 | 55.3         | 37.8         | 75.0             | 23.0             | 2.11      |
| September | ... | ... | 53.4                       | 67.0         | 39.8         | 85.1             | 21.0             | 2.04      | 48.1                        | 60.5         | 35.7         | 79.9             | 18.8             | 1.77      | 51.7                 | 61.7         | 41.6         | 82.0             | 22.5             | 2.01      |
| October   | ... | ... | 59.9                       | 74.5         | 45.4         | 94.9             | 28.4             | 2.05      | 54.8                        | 68.8         | 40.8         | 87.0             | 19.0             | 2.40      | 57.9                 | 69.4         | 46.5         | 93.0             | 28.5             | 2.34      |
| November  | ... | ... | 66.8                       | 81.5         | 52.0         | 101.9            | 28.0             | 1.51      | 61.3                        | 75.5         | 47.0         | 92.0             | 24.0             | 2.22      | 65.1                 | 77.6         | 52.5         | 103.0            | 33.0             | 1.80      |
| December  | ... | ... | 72.8                       | 87.6         | 57.9         | 112.9            | 34.0             | 1.87      | 66.1                        | 80.9         | 51.3         | 101.0            | 27.0             | 2.11      | 70.5                 | 83.2         | 57.8         | 108.5            | 36.0             | 1.93      |
| Year      | ... | ... | 60.9                       | 74.6         | 47.2         | 114.9            | 19.0             | 24.18     | 54.8                        | 67.0         | 42.6         | 104.0            | 11.1             | 22.92     | 58.0                 | 68.3         | 47.7         | 108.5            | 19.0             | 23.96     |



(6) MR. DISTRICT-SURVEYOR SCRIVENER TO THE  
SECRETARY, DEPARTMENT OF HOME AFFAIRS.  
—PLAN AND DESCRIPTIONS OF PROPOSED  
TERRITORIES.

Yass, 27th February, 1909.

SIR,

I beg to forward by same mail a tracing showing the boundaries I propose for the Federal territory and two descriptions.

The alternative boundary between the points A and B is perhaps the better, as it insures the inclusion of the whole of the Cotter River water-shed.

The area embraced by the boundary, shown by firm red line, is approximately 1,015 square miles, by the alternative boundary between the points A and B, about 1,000 square miles, the bulk of which area is taken up in securing the catchment areas of rivers and creeks passing through the territory.

CHARLES ROBT. SCRIVENER.

DESCRIPTION OF PROPOSED FEDERAL TERRITORY—  
ALTERNATIVE BOUNDARY SHOWN IN PART BY  
BROKEN RED LINES.

*Area: about 1,000 square miles.*

Commencing at One-Tree Trigonometrical Station, and bounded thence by the range forming the northern watershed of the Molonglo River to the junction with the Main Dividing Range; thence by the Main Dividing Range southerly to its junction with the range forming the southern and western watershed of the Molonglo and Queanbeyan rivers; thence by the latter range westerly and north-westerly to a point due east of the junction of the Cotter and Murrumbidgee rivers, and 1 mile distant therefrom; thence by a straight line crossing the Murrumbidgee and Paddy's rivers and passing through Portion No. 107, Parish of Congwarra, County of Cowley, in a south-westerly direction to the summit of the range forming the watershed between the Cotter and Paddy's rivers; thence by that range south-westerly and southerly, and by its continuation that forms the eastern, southern, and western watershed of the Cotter River to Mount Coree or Pabral; thence by the summit of the range forming part of western and the northern watershed of the Cotter River, through Mount MacDonald to the Murrumbidgee River; thence by that river northerly to a point 2 miles due north of the Uriarra Bridge over the Murrumbidgee River; and finally by a straight line bearing north-easterly to One-tree Trigonometrical Station, the point of commencement, as shown on accompanying tracing.

CHARLES ROBT. SCRIVENER.

DESCRIPTION OF PROPOSED FEDERAL TERRITORY—  
YASS-CANBERRA—SHOWN ON TRACING BY  
FIRM RED LINE.

*Area: about 1,015 square miles.*

Commencing at One-Tree Trigonometrical Station, and bounded thence by the range forming the northern watershed of the Molonglo River to its junction with the Main Dividing Range; thence by that range southerly to the junction with the range forming the southern and western watershed of the Queanbeyan and Molonglo

rivers; thence by the latter range to a point due east of the junction of the Cotter and Murrumbidgee rivers; thence by a line bearing east to a point 1 mile east of the Murrumbidgee River; thence by a straight line crossing the Murrumbidgee and Paddy's rivers, and passing through Portion No. 107, Parish of Congwarra, County of Cowley, in a south-westerly direction to the summit of the range forming the watershed between the Cotter and Paddy's rivers; thence by that range south-westerly and southerly and by its continuation that forms the eastern, southern and western watershed of the Cotter River to Mount Coree or Pabral; and finally by a straight line running in a north-easterly direction to One-Tree Trigonometrical Station, the point of commencement, as shown on accompanying tracing.

CHARLES ROBT. SCRIVENER.

(7) THE SECRETARY, DEPARTMENT OF HOME  
AFFAIRS, TO MINISTER FOR HOME AFFAIRS,  
RECOMMENDING REFERENCE OF MR. DISTRICT  
SURVEYOR SCRIVENER'S REPORT TO THE AD-  
VISORY BOARD.

A.09/1977.

Department of Home Affairs,  
Melbourne, 2nd March, 1909.

Submitted that the accompanying report from Mr. District Surveyor Scrivener be referred to the Board (Federal Capital Site) for consideration and report as to the portions of the district demanding closer investigation and survey and generally.

DAVID MILLER.

Approved.—H. MAHON, Minister for Home  
Affairs, 2nd March, 1909.

(8) ADVISORY BOARD TO MINISTER FOR HOME  
AFFAIRS, GIVING VIEWS AND RECOMMENDATIONS.

Canberra, 8th March, 1909.

In accordance with your instructions indorsed on Mr. District Surveyor Scrivener's report on his preliminary investigations of the Yass-Canberra district in connexion with the determination of the site of the Federal Capital and the Federal Territory, we have the honour, after personal inspection of the country, to submit our views and recommendations as follows:—

1. *Sites.*—We concur generally with the conclusions arrived at by Mr. Scrivener with respect to the suggested sites at Mahkoolma, Yass, Gundaroo, Hall, and Bungendore—Lake George—and are of opinion that the most suitable sites are about Canberra, on lands comprised in Duntroon and adjoining holdings, where the physical and scenic qualifications required for the capital city of the Commonwealth are best met.

2. We recommend, however, with a view to placing us in a position to advise as to the exact locality of the city site, that the essential features should be tested by actual survey, and the more prominent of them covered by a contour survey of the locality indicated by red tint on plan herewith.

*Territory.*—We further agree with Mr. Scrivener in his recommendations respecting the territory to be acquired by the Commonwealth, because it includes the site for the capital city and the catchment area required for the water supply of the city, and the catchment areas of the streams passing through the city, all of which will be required



in its development. This recommendation embraces an area of approximately 1,000 square miles.

3. *Water Supply and Power.*—Your Committee has obtained the following later and more complete information as to the flow of the Cotter River:—

Total discharge for 12 months ended 5th February, 1909—13,752,000,000 gallons

Mean discharge, 37,677,205 gallons per day

Minimum discharge, 5,940,000 gallons per day

and agree with Mr. Scrivener's suggestion that a careful examination of the Molonglo River be made, and extended to include the Queanbeyan River.

We deem it desirable also that further information should be obtained regarding the practicability of a scheme for the generation of power from the Cotter River, as set out in the report of the Electrical Engineer, Department of Public Works, of 22nd October, 1908.

*Sewage Disposal.*—We recommend that further investigation be made as to irrigation areas in connexion with the disposal of effluent resulting from sewage purification.

*Railway to Sea.*—No definite information respecting the connexion by railway with a port being available, we urge the necessity for action in the direction of preliminary investigation of practicable routes.

We have the honour to be, sir, your obedient servants,

DAVID MILLER (Chairman),  
W. L. VERNON, F.R.I.B.A.,  
CHARLES ROBT. SCRIVENER,  
PERCY T. OWEN.

Approved.—H. MAHON, Minister for Home Affairs. 11th March, 1909.

(9) THE SECRETARY, DEPARTMENT OF HOME AFFAIRS, TO MR. DISTRICT SURVEYOR SCRIVENER, INSTRUCTIONS AS TO FURTHER SURVEY.

Department of Home Affairs,  
Melbourne, 11th March, 1909.

SIR,

I have the honour to forward herewith, for your information, copy of the report of the Official Board appointed by the Minister for Home Affairs to advise him in connexion with the Federal Capital territory, &c., and to inform you that the Minister has approved thereof.

2. I am directed by the Minister for Home Affairs, to ask that you will be good enough to proceed with the survey of that portion of the territory referred to in paragraph 2 of the Board's report, and the investigation as to irrigation areas in connexion with the disposal of the effluent resulting from sewage purification.

3. The Premier of New South Wales is being asked for whatever information may be available in his Departments respecting—

- (1) The Molonglo River,
- (2) The Queanbeyan River,
- (3) The Cotter River—more particularly in connexion with the report of the Electrical Engineer, Department of Public Works, of 22nd October, 1908,
- (4) Railway routes from Jervis Bay to the Goulburn-Cooma railway line.

This information, when obtained from the Premier of New South Wales, will be placed at your disposal.

Please acknowledge receipt of this communication.

I have the honour to be,

Sir,

Your obedient servant,

DAVID MILLER.

(10) THE PRIME MINISTER OF THE COMMONWEALTH OF AUSTRALIA TO THE PREMIER OF NEW SOUTH WALES, RE NO FURTHER ALIENATION OF LAND, ETC.

Melbourne, 16th March, 1909.

SIR,

1. With reference to previous correspondence relative to the Yass-Canberra site for the Federal Capital, I have the honour to forward for your information the attached plan showing proposed boundaries of the area which the Board of which Colonel Vernon and Mr. Scrivener were members has recommended should be acquired, and shall be glad if you will be so good as to arrange that, pending negotiations on the subject, no further alienation or the granting of long leases within this area shall be permitted.

2. I shall be pleased if you will also be so good as to favour this Government by furnishing at your earliest convenience all information available in any of the Departments of your Government respecting the following:—

- (a) The Molonglo River.
- (b) The Queanbeyan River.
- (c) The Cotter River, more particularly in connexion with the Report of the Electrical Engineer, Department of Public Works, of 22nd October, 1908.
- (d) Railway routes from Jervis Bay to the Goulburn-Cooma railway line.

I have the honour to be,

Sir,

Your most obedient servant,

ANDREW FISHER.

(11) THE MINISTER FOR HOME AFFAIRS TO THE PRIME MINISTER OF THE COMMONWEALTH OF AUSTRALIA, RE ACTION TAKEN, AND SUGGESTING COMMUNICATION BE FORWARDED TO THE PREMIER OF NEW SOUTH WALES.

Department of Home Affairs,  
Melbourne, 23rd March, 1909.

In accordance with the provisions of the "Seat of Government Act 1908" the following action has been taken:—

- (1) I instructed Mr. District Surveyor Scrivener to conduct a preliminary topographical investigation of the District of Yass-Canberra. Copy of instructions herewith.
- (2) Mr. Scrivener completed the preliminary investigation and reported the result to me on the 25th February—copy of report herewith.
- (3) I appointed a Board, comprised as under—

Secretary for Home Affairs (Chairman),  
Director-General of Works,  
Government Architect, New South Wales, and Mr. District Surveyor Scrivener,



to consider the report and to advise me as to those portions of the district which, in their opinion, demanded closer investigation or survey with a view to :—

- (a) The Selection of the Federal Territory,
- (b) The site for the Capital.
- (4) The Board assembled at Canberra, and reported that they concurred with the boundaries of the territory proposed by Mr. Scrivener, and advised that certain possible sites for the purposes of the Capital city be surveyed, &c.—Copy of report herewith.
- (5) The survey of the possible sites is now being conducted, and the Premier of New South Wales has been asked to prevent alienation of Crown lands in the proposed territory, and to supply certain additional information which, I understand, has been furnished by his officers respecting the Cotter, Molonglo, and Queanbeyan Rivers, the route for a railway from the Goulburn-Cooma railway line to the coast, &c.

I shall be glad to have a further communication addressed to the Premier of New South Wales, forwarding a copy of the map showing the boundaries of the proposed Federal Territory, and informing him that this Government is anxious to enter into negotiations with his Government on this important subject at as early a date as possible, and asking for a map showing the unalienated Crown lands in the district, with nature of occupation thereof, if any.

H. MAHON.

- (12) THE PRIME MINISTER OF THE COMMONWEALTH OF AUSTRALIA TO THE PREMIER OF NEW SOUTH WALES, EXPRESSING DESIRE TO ENTER INTO NEGOTIATIONS, ETC.

Melbourne, 2nd April, 1909.

SIR,

With reference to previous correspondence relative to the Yass-Canberra site for a Federal Capital, I have the honour to forward herewith a map showing the boundaries of the proposed Federal territory [plan enclosed].

2. This Government is anxious to enter into negotiations with your Government on this important subject at as early a date as possible, and I shall be pleased, therefore, if you will be so good as to favour me with a map showing the unalienated Crown lands in the district, with nature of occupation thereof, if any.

I have the honour to be,

Sir,

Your most obedient Servant,

H. MAHON,  
For the Prime Minister.

- (13) THE PREMIER OF NEW SOUTH WALES TO THE PRIME MINISTER OF THE COMMONWEALTH OF AUSTRALIA, AS TO INFORMATION DESIRED *re* RIVERS, ETC.

Premier's Office,  
Sydney, 5th April, 1909.

SIR,

Adverting to your letter of the 16th ultimo (P.M. 09/1046) requesting, *inter alia*, to be furnished with all information available in the State

Government Departments in New South Wales respecting the Molonglo, Queanbeyan, and Cotter rivers, I have the honour to request that, in order to obviate the collection of unnecessary data, and the duplication of that which is contained in the reports made to your Government direct by Mr. Surveyor Scrivener, of the Department of Lands in this State, you will be good enough to specify more particularly the nature of the information which it is now desired to obtain.

I have the honour to be,

Sir,

Your most obedient servant,  
C. G. WADE.

- (14) THE PREMIER OF NEW SOUTH WALES TO THE PRIME MINISTER OF THE COMMONWEALTH OF AUSTRALIA—ACKNOWLEDGMENT.

Premier's Office,  
Sydney, 6th April, 1909.

SIR,

I have the honour to acknowledge the receipt of your letter of the 2nd instant, No. 09/1320, transmitting a map showing the boundaries of the proposed Federal Territory in connexion with the Yass-Canberra site for a Federal Capital, and asking to be furnished with a map showing the unalienated Crown lands in the district, with the nature of the occupation thereof, if any.

The matter will receive attention.

I have the honour to be,

Sir,

Your most obedient servant,  
C. G. WADE.

- (15) THE PRIME MINISTER OF THE COMMONWEALTH OF AUSTRALIA TO THE PREMIER OF NEW SOUTH WALES—PARTICULARS OF INFORMATION DESIRED *re* RIVERS.

Melbourne, 23rd April, 1909.

SIR,

Adverting to your letter of the 5th April, relative to the proposed Federal Territory, I have the honour to inform you that this Government is anxious to be furnished with such further particulars, if any, in addition to those already published respecting the Molonglo, Queanbeyan, and Cotter Rivers, as may be available in the Departments of your State.

2. For example, it is particularly desired to ascertain the position of the gauge or gauges on the Cotter River from which the capacity of that river was determined, and to obtain a plan of the course of the river showing the levels at different points, as well as to learn the capacity and potentialities of the Molonglo and Queanbeyan Rivers for the purposes of water supply and power in general.

3. This Government shares your desire to avoid the collection of unnecessary data, and the duplication of any work done in connexion with this matter, but wish to procure the fullest information on certain points which up to the present has not been supplied.

I have the honour to be,

Sir,

Your most obedient servant,

W. M. HUGHES,  
For the Prime Minister.



- (16) THE PREMIER OF NEW SOUTH WALES TO THE  
PRIME MINISTER OF THE COMMONWEALTH  
OF AUSTRALIA—ACKNOWLEDGMENT.

Premier's Office,  
Sydney, 26th April, 1909.

SIR,

I have the honour to acknowledge the receipt of your letter of the 23rd instant, No. 09/1636, asking to be furnished, in connexion with the proposed Federal Territory, with certain further information relative to the Cotter, Molonglo, and Queanbeyan Rivers.

The matter will receive attention.

I have the honour to be,  
Sir,  
Your most obedient servant,

C. G. WADE.

- (17) THE PREMIER OF NEW SOUTH WALES TO THE  
PRIME MINISTER OF THE COMMONWEALTH OF  
AUSTRALIA, *re* RESERVATION FROM SALE AND  
LEASE OF PROPOSED TERRITORY.

Premier's Office,  
Sydney, 30th April, 1909.

SIR,

With further reference to your letter of the 16th March last, No. 09/1046, I have the honour, at the instance of my colleague, the Secretary for Lands, to inform you that the area recommended by the Board (Colonel Vernon, Colonel Owen, and Mr. District Surveyor Scrivener) to be acquired for Federal Capital Territory has been reserved from sale generally and lease other than annual lease, as per notification in the *Government Gazette* of 31st March, 1909, pending negotiations on the subject.

I have the honour to be,  
Sir,  
Your most obedient servant,

JAMES ASHTON,  
For the Premier.

- (18) THE PREMIER OF NEW SOUTH WALES TO THE  
PRIME MINISTER OF THE COMMONWEALTH  
OF AUSTRALIA, FORWARDING MAP SHOWING  
UNALIENATED CROWN LANDS WITHIN THE  
PROPOSED TERRITORY.

Premier's Office,  
Sydney, 18th May, 1909.

SIR,

With reference to your letter of the 2nd ultimo, No. 09/1320, I have the honour to forward, under separate cover, a map which has been prepared by the Department of Lands, Sydney, showing the unalienated Crown lands, and the tenure thereof, within the boundaries of the proposed Federal Capital Site Territory at Yass-Canberra, the limits of such territory being taken from a sketch plan furnished by Mr. Surveyor Scrivener.

I have the honour to be,  
Sir,  
Your obedient servant,

C. G. WADE.

- (19) MR. DISTRICT-SURVEYOR SCRIVENER, TO THE  
MINISTER FOR HOME AFFAIRS.—REPORT AS  
TO CONTOUR SURVEY, WATER SUPPLY, AND  
RAILWAY AND PORT.

To the Honorable the Minister for Home Affairs.  
SIR,

In compliance with your instructions of the 11th March, 1909, I have the honour to transmit the following report:—

#### *Contour Survey.*

A survey has been made of about 35 (thirty-five) square miles, being portions of the following holdings:—Duntroon, Acton, Jerrabomberra, and Yarralumla. Contours have been run at the following levels:—1825, 1850, 1875, 1900, 1950, and 2,000 feet above sea-level, the datum being Cooma railway survey; intermediate levels have also been taken. To prevent large errors, a triangulation was made covering the greater part of the area contoured, and the running of the contours was checked by independent levels from Bench marks by the New South Wales Department of Works. Permanent marks have been planted at the angles of triangles and at stations on the different contours. From careful inspection, I consider that the best sites for weirs to impound water for ornamental purposes are at AB, CD, EF, and GH; a weir at any of these sites, raised to the 1,825-ft. level, would impound water covering an area of from 1,100 to 1,500 acres, as shown by the blue-shaded contour line, but this water would be badly discoloured for long periods. If the eastern part of the area contoured is selected for the city site, the weir should be raised to the 1,830-ft. level, in order to cover the low lands bordering the Molonglo River, especially on the southern side, and near to the boundary between Jerrabomberra and Duntroon holdings. At this level the water would be thrown back up Jerrabomberra Creek, beyond the bridge on the Queanbeyan-road.

One effect of the construction of any one of these weirs would be the gradual reduction of the depth of water by the deposition of silt, which is brought down by the Molonglo in very large quantities; as an illustration of the amount deposited, the rainfall at the end of February of this year may be cited, when on the approaches to the river on the Canberra-road there was a depth of 12 inches of mud after the flood waters had receded. The same result must be expected over the shallower areas behind the weir, where the water would move very slowly during those sudden rises of the river, when it carries most earthy matter. Openings in the weir would only have effect along the main channel; wherever the velocity was retarded extensive deposition would take place. The approximate level of the highest flood of which any authentic details can be obtained is that of 1891, which is shown approximately by a broken red line. This line leaves the 1,825-ft. contour east of the ford on the Canberra-road; at the ford it was practically coincident with that contour line, while at the weir site marked AB the limit of flood waters was 6 feet below the 1,625-ft. contour; west of this point, the flood line rapidly reaches a lower level, due to the steeper gradient of the river bed.

These levels indicate that in high floods the Molonglo rises vertically about 25 feet. During recent years, the river has cut a channel, which is now ordinarily about 15 feet deep. It is said that in 1830 no defined channel, such as the present, existed, but rather a depression with deep holes at intervals, and clear water, excepting for short



periods, after heavy rainstorms; the change is no doubt due to the heavy stocking with sheep and ringbarking.

The contours indicate generally the character of the land covered, and from them can be deduced the class of gradient obtainable over different parts of the area. Excepting on the higher spurs of Mount Ainslie, Mugga Mugga, and the Black Mountain, no difficulty would be experienced in the projection of a design satisfactory so far as street gradients are concerned.

Between the 1,825 and 1,850 feet contours, there are areas of fairly deep sandy soil, suitable for sewage treatment in connexion with septic tanks. These are shown on the plan, from which it is clear that a sewerage scheme would be least difficult for those areas lying to the west of Jerrabomberra Creek, on the south side of the Molonglo River, and for the area between Mount Ainslie and the Black Mountain on the northern side of that river; on both sides of that river there are ample areas suitable for parks and gardens. The extent of land unsuitable for large buildings by reason of its character, yet well adapted for the above purposes, is in excess of requirements.

There can be no doubt that, should Canberra become the site of the Federal city, the tendency will be to occupy the slopes under the higher ranges in order to secure as much shelter from strong winds as possible, and good residential areas are found at as high a level as 2,200 feet.

#### *Water Supply.*

The Cotter River cannot be regarded as a satisfactory source from which to obtain a water supply, for the following reasons:—

In the earlier investigations by Mr. De Burgh, it was proposed to have the service reservoir near Canberra at an elevation of 2,050 feet, but this is too low an altitude, as lands suitable for building and desirable from a residential point of view have altitudes as great as 2,150 feet, or over 2,200 feet, the highest occupied building being at an elevation of 2,185 feet. The service reservoir should, therefore, be at a level of 2,250, in order to provide a reasonable head. To deliver water to such an elevation from the Cotter River by gravitation, the weir on that river would need to be at a level of 2,400 feet, allowing 150 feet fall in pipe line from the weir to the service reservoir. This allowance is none too great, because to reach an elevation of 2,400 feet on the Cotter the pipe line and aqueduct must be longer than thirty miles. If an aqueduct is used between the weir site and the junction of the Cotter and Murrumbidgee Rivers, that channel will be more than twenty miles long, and will pass over rough country, where, for at least half the distance, the constructional costs will be heavy. If to avoid this expense a pumping scheme is decided upon, the weir would be placed near the junction of the Murrumbidgee and the Cotter Rivers, and water would be available at a level of about 1,560 feet. From this weir to the service reservoir the distance would be about twelve miles, and allowing five feet per mile fall for pipe line, sixty feet of head would be lost; the water must, therefore, be raised from a level of 1,560 feet to that of 2,310 feet, or through a height of 750 feet; even this will probably be cheaper than a twenty-mile channel and pipe line with a more expensive impounding reservoir at the 2,400 feet level.

The supply, judging from the gauge readings extending over a year, is ample to meet probable future requirements, but these readings were taken just

above the junction with Paddy's River, and not far (about one mile) from the junction of the Cotter and Murrumbidgee. The average daily flow at that point is about thirty-eight million gallons; it has already been pointed out in my earlier report that this quantity is not available either for power or for a gravitation scheme of water supply; for the latter purpose with a weir at the 2,400 feet level, the catchment area of the river would be reduced to about 100 square miles, while the catchment area of the river at the gauge point is about 170 square miles; hence the probable flow at the 2,400 feet level would be about twenty-two million gallons per diem—ample for a domestic supply, with suitable impounding weirs, but of no value for both water supply and power, and for the latter purpose the amount of power obtained would not, I think, warrant the expenditure necessary in the construction of a channel over twenty miles long, and other works connected with the scheme. It is rarely that the whole flow of a river can be used for power purposes, but even if the whole twenty-two million gallons per diem were available, the amount of power derived from it would equal 370 horse per one hundred feet of fall (allowing eighty per cent. efficiency), and with a fall of 750 feet the power obtained would be 2,775 horse, but in order to secure this no water could be used for domestic purposes, and the whole of the river flow must be impounded.

The Cotter River affords an excellent supply of pure water, rarely discoloured, this being due to the fact that the catchment area is very lightly stocked at any time, and little or no ring-barking has been done; under similar conditions the water of the Molonglo or Queanbeyan would probably be equally clear, and old residents who have known these rivers for very many years state that it is only within comparatively recent times that the water of either the Molonglo or Queanbeyan has been turbid, except for a few days after very heavy storms.

A much cheaper supply of water for domestic use could be obtained from the Queanbeyan River than from the Cotter, but if this river were used it would be necessary to make provision for storing at least one month's supply, and possibly for filtration when the duration of turbidity exceeded that period, and further it would be essential to restrict stocking, permitting only cattle and horses to graze on the catchment area and to prohibit further ring-barking, allowing those lands already so treated to re-afforest.

It is obvious that other considerations enter into this matter, because the restrictions that would be necessary would reduce the value of the improvements already effected to a very small amount, while the revenue derived from the land under these conditions would be very small; since, however, the cost of a gravitation scheme from the Cotter River, delivering water to a service reservoir at a level of 2,050 feet near Canberra is estimated by Mr. De Burgh at £853,920, and clearly to reach the higher level of 2,250 feet the cost would be increased considerably, it is desirable that every means by which a sufficient water supply for a large city can be obtained at a less expenditure should be considered.

At a level of 2,020 feet on the Queanbeyan River there is an excellent weir site, shown on tracing A. At this point a weir one hundred feet high could be cheaply constructed that would impound about 800 to 1,000 millions of cubic feet of water, and, if it were taken off at a level of 2,070, or fifty feet below the crest of the weir, it would only require a lift of 250 feet to discharge into the service reservoir at Canberra at a level of 2,250 feet, or a lift five hundred feet less than would be required were the supply drawn from the Cotter River, while the power required for pumping would be less than



one-third. A gravitation scheme from the Queanbeyan is possible, but it would be found cheaper, I think, to pump, than to carry a long pipe line through rough country. The length of pipe line from the weir site on the Queanbeyan River to service reservoir would be about the same as from the Cotter River to that reservoir, but this will depend largely upon the site decided upon for the city. The catchment area of the Queanbeyan River above the weir site at "x" is about three hundred square miles. Other weir sites at greater elevations can be obtained on this river, but in no case of very great impounding capacity, while sites for reservoirs to impound a month's supply can be obtained near the city site at a suitable elevation. The Molonglo carries too little water to be alone of much use for power purposes, and as mining is carried on on the upper river, its waters could not be used for town supply; at present little mining is done, but a rise in the price of metals would lead to the re-opening of one large mine at least; there is an exceptionally fine site for a weir at the point marked "P" on the tracing A, and above this a basin capable of impounding an immense amount of water, but it is altogether too large for the capacity of the river; from a clinometer and aneroid inspection, and assuming the average flow of the Molonglo to be forty cubic feet per second, I estimate that it would take fifteen years to fill the reservoir with a weir one hundred feet high; this really means that in all probability the inflow would not keep pace with the evaporation and soakage, and consequently that the reservoir would never be filled. A similar site on the Murrumbidgee would be very valuable, here it is useless.

Other sites of moderate impounding capacity can be obtained, and may be useful for maintaining at a constant level waters impounded near the proposed city site for ornamental and recreative purposes, or even in conjunction with the Queanbeyan River to supply power.

Both the Molonglo and the Queanbeyan, and, in a less degree, the Cotter River, are subject to great variations in the daily flow; the former combined carry after heavy falls of rain immense quantities of water for a few days, while in dry summers they may and do cease to run; hence if power is to be derived from these rivers a series of storage reservoirs would be required to maintain a uniform flow throughout the year.

The combined watersheds of the Molonglo and Queanbeyan Rivers above the weir sites marked "x" and "P" on tracing A would not be less than 450 square miles.

In order that water may be conserved near to the selected city site, a weir at any of the points AB, CD, EF or GH, would throw back the water for at least 5 miles in a straight line. The most suitable site can only be determined by careful examination and boring to test the character of the river bed. A fine sheet of water would result, as shown by shaded blue edging on contour plan; this lake must be maintained at a constant level, and to do this, the weir at X on the Queanbeyan River would be most suitable; if 100 feet high, it would, as already stated, impound 800 to 1,000 millions, and if raised to 125 feet, the capacity would be not less than 1,500,000,000 cubic feet, the former capacity being equal to a flow of approximately 25 cubic feet per second throughout the year, ample to provide,

if necessary, for a water supply for the city, and to make up the loss by evaporation in the water impounded for ornamental purposes at the city site.

If the average daily flow of the Cotter near its confluence with the Murrumbidgee be taken at 38,000,000, or 6,080,000 cubic feet, the total volume for a year would be 2,219,200,000 cubic feet, while assuming the catchment area to be 170 square miles, a fall of 1 inch of rain on that area is equal to 394,944,000 cubic feet, hence the annual flow of the Cotter is equal in volume to a rainfall of 5.6 inches over the whole area of the watershed. The run-off from either the Queanbeyan or the Molonglo watersheds would be less than that of the Cotter, but might reasonably be taken at two-thirds of that quantity, or equal to 3.7 inches over the whole watershed of 450 square miles, or equal to a flow of 123 cubic feet per second, or two and three-quarter times that of the Cotter at the weir at the 2,267-ft. level, and as water from the weir site at Y, tracing "A," might be taken off at a level of 1,820 and carried by an open channel, as shown on tracing "A," to a point overlooking the Murrumbidgee, where an effective fall of from 250 to 275 feet would be obtained, at least as much power could be derived by this means as would be afforded by the Cotter, with this advantage, the channel would be shorter, and would pass over relatively easy country, readily accessible by existing roads.

This scheme would involve the construction of at least two weirs in addition to those at X and Y, tracing A, one on the Molonglo River, near P, and one above X on the Queanbeyan River, and the combined capacities of these weirs, together with that of X, should be equal to at least 4,000,000,000 cubic feet; the weirs X and Y are in any case necessary to provide water for the beautification of the city site, and for recreative purposes. It is, however, very doubtful whether any power supply that involves the construction of large impounding reservoirs and long lengths of open channel, and gives only a very modest output, would be commercially a success, and before such scheme is seriously considered, daily gauging of the rivers should be undertaken for an extended period, and careful surveys of weir sites, and the lines of channels, should be made.

#### *Railway and Port.*

An inspection of the country between Canberra and Jervis Bay, with a view to determining the probable route for a railway, was made during March. As the main Dividing Range, forming the eastern watershed of the Molonglo River, is usually high, a start was made near the 168 mile post, on the Goulburn-Cooma line, after that line has crossed the range. From this point to Jervis Bay a practicable railway, with a ruling gradient not worse than one in forty, and probably as flat as one in fifty, can be obtained in the position shown approximately by red band on lithograph, on which are also shown barometric heights of various points along the route. The chief difficulty will be experienced in descending from the range at Sassafras to the Turpentine, where there is a very rapid fall, and it is here that the steepest gradients will be encountered. From the Cooma line, the country passed through presents no unusual difficulties as far as the Shoalhaven River. This I should cross below Larbet, thus avoiding the Durra Durra range lying to the east



of that village. The country west of the Shoalhaven is largely granitic, some silurian, with outcrops of limestone, suitable and occupied for grazing purposes, much of it well adapted for dairying and fruitgrowing. From the Shoalhaven River, the country changes in character, the granite dying out, and silurian formation being met with, broken country of very poor character, and only third-rate grazing land, thickly timbered and scrubby, and well watered. This character of country continues beyond the Corong River with little variety, but near the Endrick River a basaltic formation is met with, and both soil and timbers are of good quality, but they cover only a small area. The best timber is messmate, which, at the Vines, is very fine, and has not been ring-barked. The basaltic outcrop here flows between high sandstone cliffs, and sandstone country continues as far as Sassafras, rocky spurs with marshy areas intervening, the route here lying close to the range forming the watershed between the Shoalhaven and Clyde Rivers, the fall towards the latter being precipitous. Neither the soil nor the timber are here of any value. At the Sassafras, another basaltic outcrop occurs, both soil and timber being of high quality, though the area embraced is small, while much of the best timber has been destroyed in clearing the land for grazing. From Sassafras, the range dividing the Clyde and Shoalhaven would be followed for some distance, and then a leading ridge, usually broad, and having fair gradient to the Turpentine, where there is a belt of good timber, principally ironbark and turpentine. The soil between Sassafras and the Turpentine is either sandy or sandy loam of poor quality, the formation sandstone. From the Turpentine to Jervis Bay, the formation is either silurian or sandstone, the principal timber spotted gum and blackbutt, the best timber having been already felled. About Jervis Bay, the country resembles that usually found along the coast, as at Botany, rocky sandstone ridges with marshy areas intervening, usually very scrubby, with poor sandy soil.

Speaking generally, the country between the Shoalhaven River and Jervis Bay is of the poorest possible description, only relieved by the few basaltic outcrops met with; it is costly to clear, and when cleared of little value, hence it is unlikely in the near future to carry any considerable population.

The only settlement along this part of the route is about Nerrige and Sassafras, the former a hamlet comprising one hotel, store, post-office, and school, with a number of farmers and small graziers in the vicinity where basaltic outcrops occur; the latter a group of about twelve occupied holdings, the owners apparently not being exceptionally prosperous.

This railway would not give access to any large amount of useful timber, but sufficient for the purpose of construction would be obtained near the route.

The line shown in red indicates a practicable route requiring bridges over the Shoalhaven, Mongarlowe, and Corong Rivers. An alternative route is shown in blue, following the Bora Creek, and crossing the Shoalhaven below the Mongarlowe. If this prove practicable, it will reduce the distance between Canberra and Jervis Bay, and avoid a large bridge over the Mongarlowe. Before a route is finally

decided upon, a comprehensive inspection, extending over many weeks, is necessary, and only after such an inspection should any survey work be undertaken.

By using that part of the Cooma line between Queanbeyan and the 168 mile-post, much rough country is avoided, though, if thought desirable, a line might possibly be obtained, leaving the Cooma line near Burbong, and crossing the main range east of that station, but there would appear to be little to gain by this departure.

If this line were constructed, it would, no doubt, carry eventually all the traffic from the Monaro district as well as that of the Upper Murrumbidgee.

The distance from Canberra to Jervis Bay by the route shown in red would be about 125 miles, and it would cross the Shoalhaven about 13 miles north of Braidwood; by crossing the Shoalhaven further south better access to Braidwood would be given at the expense of a longer railway.

I have inspected the country about the shores of Jervis Bay, and recommend that any land required for wharfs and yards should be located within the area shown by red edging on the Admiralty Chart herewith, and also on the Parish Map of Bherwerre, County St. Vincent.

There is a good anchorage here, and both the 3 and 5 fathom lines lie closer in shore than is usually the case, while this part of the bay is well sheltered from south-easterly or easterly gales.

Though Jervis Bay has a fine entrance, open in all weather, the shore line is too regular to provide shelter within the bay itself, and on account of its large area, rough water will be experienced with all winds to the west of north, or even due north, hence works must be undertaken to provide shelter from these winds. The most sheltered part of the bay is at the north-east, but here the water is shoal, and there are mud flats along the margin, so that this cannot be seriously considered. While in the locality, I inspected St. George's Basin, an extensive sheet of water about one mile south of Jervis Bay, connected with the sea by Sussex Inlet, which is about 3 miles long and 10 chains wide. Through the inlet there is a tortuous channel, carrying from 8 to 10 feet of water for the greater part of the distance, but near the entrance the depth is only 2 feet, and at low tide boats drawing that amount cannot pass the sandbank. There is also a bar across the entrance on which the water is very shallow, while a reef which runs in a north-easterly direction from the southern headland for about half-a-mile would render it difficult to make the entrance with a south-easterly or easterly wind.

The basin itself has a depth of from 16 feet upwards, the water generally shoaling rapidly as the shore is approached, though in places deep water lies close inshore. The bottom is mud and sand.

Without works of a very expensive character, dredging and stone retaining walls for 6 miles, nothing could be done to render Sussex Inlet navigable even by small craft. The bottom of the inlet itself is usually a fine sand, especially about the entrance, that would need to be held back by well-fitted masonry. Practically, there is no tidal effect in St. George's Basin, on account of the disparity between its area and the width of the inlet, and consequently very little scouring effect.



*Occupation of Proposed Federal Territory.*

Through the courtesy of the Under-Secretary for Lands I have been supplied with a map of the proposed Federal Territory on a scale of 1 mile to an inch, on which the different forms of tenure under which the lands are held are shown by distinctive colouring. The total area—644,929 acres—differs little from my original estimate, and until survey is effected of the whole of the boundaries, only an approximate value can be expected.

A schedule is attached showing in each parish the areas and the tenures.

The inclusion of Queanbeyan presents some difficulty, though there is no escape from that position, because it would be highly undesirable that a town upon the banks of the river flowing through the Federal City, and within a few miles of that city, should be under any other than Commonwealth control.

It will, however, be necessary to install a sewerage scheme of some kind for Queanbeyan, and this on account of its position with respect to the Queanbeyan River will be a costly matter, while it is very probable that the town, overshadowed by the Federal City, will gradually decline and a large loss of capital invested in the works will result.

The value of the lands within the proposed boundaries can be only given approximately—such estates as Duntroon, Gungahlin, Acton, Jerrabomberra, Yarralumla, and Ginninderra, as well as the smaller holdings in their neighbourhood, will be costly to resume; on Duntroon rentals range from 6s. to 10s. per acre, the latter price being charged for river flats, and, taking the whole of the estates named, it is doubtful whether they could be acquired at an average rate of less than £4 10s. to £5 per acre.

As far as lands held under conditional purchase, conditional lease, homestead selection, and the various leasehold tenures are concerned, it is less difficult to arrive at an estimate of value, since in regard to the three first classes re-appraisal of the original capital values has in many cases been applied for, and the evidence given by applicants is available.

I estimate that if the whole of the alienated and leased lands were resumed, the cost would not be less than £1,100,000. Of a total area of 644,929 acres, 399,005 acres are either freehold or may be ultimately converted, freehold lands alone covering an area of 231,100 acres.

The population within the proposed Federal Territory is about 3,400, including the town of Queanbeyan.

The following plans are herewith:—

Rough plan showing contours and triangulation contour plan of areas about Canberra.

Tracing showing proposed territory, and details in connexion with water supply.

Lithograph showing practicable route for a railway from city site to Jervis Bay.

Admiralty chart of Jervis Bay, showing best site for workshop and yards.

Map showing by distinctive colouring the tenures under which lands within the proposed Federal Territory are held.

I have the honour to be, Sir,  
Your obedient servant,

(Signed) CHARLES ROBT. SCRIVENER,  
26th May, 1909.



# ArchivesACT Research Guide

SCHEDULE showing tenure of land within the catchment areas of Queanbeyan, Cotter, and Molonglo Rivers and other boundary lines of the proposed Federal Capital Territory as defined by Mr. Charles Scrivener and shown on sketch transmitted on 24th February, 1909.

| Parish.              |              |     |     | Freehold Land. | Conditional Purchase. | Conditional Lease. | Homestead Selection. | Special Lease. | Improvement Lease. | Scrub Lease. | Residential Lease. | Occupation Licence. | Annual Lease. | Residential, not under Occupation. | Vacant Crown Lands. | Total.  |
|----------------------|--------------|-----|-----|----------------|-----------------------|--------------------|----------------------|----------------|--------------------|--------------|--------------------|---------------------|---------------|------------------------------------|---------------------|---------|
|                      |              |     |     | Acres.         | Acres.                | Acres.             | Acres.               | Acres.         |                    |              |                    |                     |               |                                    |                     |         |
| County of Cowley.    | Cotter       | ... | ... | ...            | ...                   | ...                | ...                  | ...            | 7,750              | ...          | ...                | ...                 | 8,650         | ...                                | ...                 | 16,400  |
|                      | Fergus       | ... | ... | 223            | ...                   | ...                | ...                  | ...            | 18,030             | 3,500        | ...                | ...                 | ...           | ...                                | ...                 | 21,753  |
|                      | Milligan     | ... | ... | ...            | ...                   | ...                | ...                  | ...            | ...                | ...          | ...                | ...                 | 4,740         | ...                                | 13,250              | 17,990  |
|                      | Punyibah     | ... | ... | ...            | ...                   | ...                | ...                  | ...            | ...                | ...          | ...                | ...                 | 1,920         | ...                                | 22,810              | 24,730  |
|                      | Tidbinbilla  | ... | ... | 370            | 680                   | 848                | ...                  | ...            | ...                | ...          | ...                | 22,800              | ...           | 30                                 | 1,470               | 26,248  |
|                      | Urayarra     | ... | ... | 3,839          | 7,401                 | 4,379              | ...                  | ...            | ...                | ...          | ...                | ...                 | 2,540         | 865                                | ...                 | 19,024  |
|                      | Congwarra    | ... | ... | 580            | 330                   | 768                | ...                  | ...            | ...                | ...          | ...                | ...                 | 1,056         | ...                                | 200                 | 2,994   |
| County of Murray.    | Weetangera   | ... | ... | 14,312         | 4,091                 | ...                | ...                  | ...            | ...                | ...          | ...                | ...                 | ...           | ...                                | ...                 | 18,403  |
|                      | Ginninderra  | ... | ... | 8,250          | 2,625                 | 15                 | ...                  | ...            | 50                 | ...          | ...                | ...                 | 37            | 15                                 | ...                 | 10,992  |
|                      | Canberra     | ... | ... | 21,537         | 2,401                 | 81                 | ...                  | 30             | ...                | ...          | ...                | ...                 | ...           | 457                                | ...                 | 24,506  |
|                      | Goorooyarroo | ... | ... | 5,725          | 3,426                 | 902                | ...                  | 119            | ...                | ...          | ...                | ...                 | 1,576         | ...                                | ...                 | 11,748  |
|                      | Pialligo     | ... | ... | 12,218         | 4,845                 | 2,608              | ...                  | 29             | ...                | ...          | ...                | ...                 | 664           | 350                                | ...                 | 20,714  |
|                      | Amungula     | ... | ... | 3,874          | 1,311                 | 3,332              | ...                  | 277            | ...                | ...          | ...                | ...                 | 1,684         | 1,231                              | 281                 | 11,990  |
|                      | Majura       | ... | ... | 4,257          | 2,480                 | 831                | ...                  | 58             | ...                | ...          | ...                | ...                 | ...           | 318                                | 34                  | 7,978   |
|                      | Molonglo     | ... | ... | 19,860         | 2,852                 | 997                | ...                  | ...            | ...                | ...          | ...                | ...                 | 168           | 240                                | 1,460               | 25,577  |
|                      | Thuralilly   | ... | ... | 10,168         | 2,644                 | 1,984              | ...                  | ...            | ...                | ...          | ...                | ...                 | 1,980         | 2,860                              | 160                 | 19,746  |
|                      | Yarrolumla   | ... | ... | 11,279         | 3,812                 | ...                | ...                  | ...            | ...                | ...          | ...                | ...                 | ...           | 80                                 | ...                 | 15,171  |
|                      | Narrabundah  | ... | ... | 16,556         | 1,635                 | 158                | ...                  | ...            | ...                | ...          | ...                | ...                 | 20            | 25                                 | ...                 | 18,391  |
|                      | Queanbeyan   | ... | ... | 15,979         | 82                    | 250                | 1,301                | 10             | ...                | ...          | ...                | ...                 | 65            | 820                                | ...                 | 18,507  |
|                      | Googong      | ... | ... | 10,778         | 4,004                 | 635                | ...                  | ...            | ...                | ...          | ...                | ...                 | 351           | 160                                | 250                 | 16,178  |
|                      | Carwoola     | ... | ... | 10,450         | 2,911                 | 2,603              | ...                  | 236            | ...                | ...          | ...                | ...                 | 1,955         | 2,720                              | 140                 | 21,015  |
|                      | Yarrow       | ... | ... | 9,389          | 710                   | 8,130              | ...                  | ...            | ...                | ...          | ...                | ...                 | 2,850         | 30                                 | ...                 | 21,149  |
|                      | Burra        | ... | ... | 7,648          | 4,518                 | 4,750              | ...                  | ...            | ...                | ...          | ...                | ...                 | ...           | 15                                 | 60                  | 16,991  |
|                      | Tuggeranong  | ... | ... | 4,431          | 2,275                 | 150                | ...                  | ...            | ...                | ...          | ...                | ...                 | ...           | 57                                 | ...                 | 6,913   |
|                      | Keewong      | ... | ... | 4,717          | 1,226                 | 760                | ...                  | ...            | ...                | ...          | ...                | ...                 | ...           | ...                                | 540                 | 7,243   |
|                      | Urialla      | ... | ... | 5,422          | 4,904                 | 6,321              | ...                  | ...            | ...                | 2,520        | ...                | ...                 | 5,344         | 20                                 | 1,880               | 26,411  |
|                      | Tantangera   | ... | ... | 420            | 567                   | 520                | ...                  | ...            | 1,280              | ...          | ...                | ...                 | 1,650         | ...                                | 1,347               | 5,784   |
| County of Beresford. | Yanynunbeyan | ... | ... | 13,527         | 811                   | 1,073              | ...                  | ...            | ...                | ...          | ...                | ...                 | 8,055         | 140                                | 1,250               | 24,886  |
|                      | Bullongong   | ... | ... | 1,250          | 2,459                 | 5,222              | ...                  | ...            | ...                | ...          | ...                | ...                 | 8,624         | 2,643                              | 1,900               | 22,098  |
|                      | Ballallaba   | ... | ... | 2,820          | 1,700                 | 2,171              | ...                  | 540            | ...                | ...          | 40                 | ...                 | 3,202         | 1,040                              | 3,750               | 15,263  |
|                      | Jinjera      | ... | ... | 1,879          | 4,495                 | 11,051             | ...                  | ...            | ...                | ...          | ...                | ...                 | 10,029        | 1,235                              | 10,137              | 38,826  |
|                      | Wise         | ... | ... | 1,962          | 1,734                 | 3,168              | ...                  | ...            | ...                | 12,080       | ...                | ...                 | 520           | 50                                 | 1,010               | 20,524  |
|                      | Holland      | ... | ... | 2,646          | 3,005                 | 5,525              | ...                  | ...            | 6,400              | ...          | ...                | ...                 | ...           | 180                                | 150                 | 17,906  |
|                      | Sherlock     | ... | ... | 2,607          | 3,816                 | 5,850              | ...                  | 34             | ...                | ...          | ...                | 5,124               | 2,166         | 300                                | 4,750               | 24,647  |
| County of Beresford. | Milford      | ... | ... | 1,157          | 2,550                 | 3,604              | ...                  | ...            | ...                | ...          | ...                | 640                 | 880           | 200                                | 850                 | 9,881   |
|                      | Rowland      | ... | ... | 810            | 1,612                 | 1,896              | ...                  | ...            | ...                | ...          | ...                | ...                 | ...           | 20                                 | ...                 | 4,338   |
|                      | Hill         | ... | ... | 160            | 1,001                 | 1,049              | ...                  | 40             | ...                | ...          | ...                | 4,656               | 4,340         | ...                                | 715                 | 11,961  |
| Total                |              |     |     | 231,100        | 84,973                | 81,631             | 1,301                | 1,373          | 33,510             | 18,100       | 40                 | 33,220              | 75,136        | 16,151                             | 68,394              | 644,929 |



(20) THE PREMIER OF NEW SOUTH WALES TO THE  
PRIME MINISTER OF THE COMMONWEALTH OF  
AUSTRALIA, FORWARDING COPY OF REPORT BY  
THE CHIEF ENGINEER FOR SEWERAGE CON-  
STRUCTION AS TO SEWERAGE.

Premier's Office,  
Sydney, 27th May, 1909.

SIR,

In looking over the information that has been obtained from time to time in respect of the proposed Federal Capital site at Canberra, I noticed that hitherto no reports have been obtained on the subject of the sewerage of the Capital City. As this is a matter of the utmost importance, I directed the Chief Engineer for Sewerage Construction of the State to have surveys made and furnish a report upon this question. The report is now to hand, a copy of which I have much pleasure in forwarding herewith, for the information of the Parliament and Government of the Commonwealth.

Accompanying the report are the maps referred to by the Chief Engineer.

I have the honour to be, Sir,  
Your obedient servant,

C. G. WADE.

Department of Public Works, N.S.W.,  
Irrigation and Drainage,  
25th May, 1909.

#### SUGGESTIONS AS TO THE SEWERAGE OF THE PROPOSED YASS-CANBERRA FEDERAL CAPITAL CITY.

Two alternative sites have been selected for the Federal Capital City in the Yass-Canberra area. Contour surveys have been completed under the direction of the Federal officers, and I understand that consideration is to be given to the relative merits of the alternative sites and a selection made. The alternative sites are known as Canberra and Mugga Mugga. Canberra is situated on the north side of the Molonglo River, between Black Mountain and Mount Ainslie. Mugga Mugga is situated on the south side of the Molonglo River, between the Mugga Mugga Mountain and the western population boundary of the town of Queanbeyan. The accompanying county map shows the relative positions of these two sites and the town of Queanbeyan. An officer of this Department has made a detailed investigation of both sites, and has approximately marked the probable course of the main sewers that would be necessary to construct to deal with the areas.

The sewage in either case will be disposed of by biological treatment—that is, will be passed first through septic tanks, then through filters, and lastly treated by land filtration. The resulting effluent will then be fit to be discharged into any stream without danger of pollution. The greatest difficulty, as a rule, in applying the biological method of treatment to inland towns is the location of treatment works that would be free from sentimental and other objections. A point that should not be lost sight of in connexion with the selection of a city area is that of the storm-water drainage gathered from the city area itself, and any additional volume that may be passed through the city area and gathered in catchment areas outside of it. The existence of channels passing through a city area which are liable to carry large volumes of flood waters gathered from areas outside of the city entail very heavy expense, as all such channels must be

trained and protected by permanent works and, where possible, completely covered in, so that they do not form an eyesore.

#### *Canberra.*

On the accompanying map showing the proposed Canberra area the approximate lines of main sewer and proposed position of treatment works are indicated. Assuming that there are no objections to the site of the proposed treatment works, the whole area on the north side of the Molonglo can be drained by gravitation to the proposed outfall. It would be necessary, however, to pump the small area to the south side of the river. The proposed site for treatment works will be, I consider, free from any objection. They are, however, situated on the river flat, and should any works be constructed for the purpose of forming an artificial lake in connexion with the city, it may be that the proposed site would be covered with water. It would then be necessary to carry the outfall westerly beyond the Black Mountain. The only land available here for treatment works is at a high level, which would necessitate the pumping of the sewage from the whole area. One large storm-water channel, having a total catchment area of 25 square miles, runs through the proposed city area. There would be no difficulty in dealing with this channel. Altogether, the Canberra site may be said to present facilities for dealing with both sewage and storm-water drainage.

#### *Mugga Mugga.*

The Mugga Mugga site is much more rugged than Canberra, and is intersected by the Jerrabombra Creek, which has a catchment area of 50 square miles. On the accompanying map is indicated the approximate lines for the proposed main sewers and the site proposed for treatment works. The bulk of the area can be drained by gravitation. The site of the treatment works I consider free from objection, but if this area should be required for ornamental water, then the outfall works will have to be carried a very considerable distance down stream to a suitable site, and it is then probable that the greater part of the city area will have to be pumped. The Jerrabombra Creek, passing as it does through almost the centre of the proposed city area, is a great drawback; its catchment area is so large that it would be out of the question to attempt to cover it, and I think it will be very difficult to treat it so that it will not always be an eyesore in the city.

To summarize the respective merits of the two sites, the Canberra site undoubtedly presents the better facilities for the treatment of sewage, and the storm-water question is easily dealt with. If it should be decided by the authorities in charge of the city that it would be undesirable to discharge the scourings from the street surfaces into any artificial lake that would be formed for the beautification of the city, then means would have to be taken to intercept the storm-water drains and carry them to a point in the Molonglo River below the lake. This would not be a very costly matter in regard to Canberra, but would involve an enormous expenditure in connexion with Mugga Mugga.

As regards pollution to the artificial lake sources outside of the city, the sewage of the town of Queanbeyan, which is little better than a village, can be dealt with and treated in the same manner as proposed in connexion with the Federal City, and the effluent, which would be turned into the Molonglo River, will be free from any objection. There is, however, in any case no difficulty to be anticipated in dealing with its drainage.



With reference to pollution from the catchment areas of the Queanbeyan and Molonglo Rivers, should these catchments remain the property of the State, the purity of the streams can be maintained under section 4 and Regulations of the *Water Rights Act 1902*; under section 74 of the Public Health Act of 1902; the question of sludge—the result of mining operations—can be dealt with under section 122 of the Mining Act of 1906.

The detailed reports of the officer who was charged with the investigation of these sites are attached for information. The above statement deals only with the general aspect of the drainage of the proposed areas and their liability to pollution.

L. A. B. WADE,  
Chief Engineer.

(21) THE PREMIER OF NEW SOUTH WALES TO THE  
PRIME MINISTER OF THE COMMONWEALTH  
OF AUSTRALIA, FORWARDING COPY OF REPORT  
BY CHIEF ENGINEER FOR HARBORS AND  
WATER SUPPLY, *re* WATER SUPPLY.

Premier's Office,  
Sydney, 29th May, 1909.

SIR,

*Water Supply of the Federal Capital City.*

In continuation of former correspondence, I have now the honour to forward herewith, for the information of the Federal Government and Parliament, a report which has been furnished by the Chief Engineer for Harbors and Water Supply of this State, containing additional information respecting the water supply obtainable from the Cotter, Molonglo, and Queanbeyan Rivers within the suggested Federal Capital Territory.

The necessary explanatory map is also forwarded herewith.

I have the honour to be,  
Sir,  
Your most obedient servant,  
C. G. WADE.

*Federal Capital—Water Supply, Canberra Site.*

In reply to the request by the Hon. the Premier for additional information *re* above, I have to report that further investigations have been made as to a supply from the Cotter River.

I reported on this question in November, 1907, making certain forecasts as to the run-off from the catchment, and I again reported as to water supply and electrical power on 9th October, 1908. These reports have been printed.

From 6th February, 1908, to date, the flow of the river has been actually gauged, the gauging station being close to the junction of the Cotter and Murrumbidgee, but above the confluence of the Paddy River.

The year 1903 was a dry one on the Cotter catchment. I estimate the rainfall at only 26.5 inches, or little more than I assumed in my previous reports for 1902—the exceptionally dry year, for which 25.5 inches only was assumed. I figured on a run-off of 11,812 million gallons for 1902, and for 1908 actually measured 13,752 million gallons. So that my forecast has been almost exactly verified.

I may say that our gaugings for 1908 are exceptionally valuable, for not only does the estimated rainfall approximate to that of 1902, but the 1908 rainfall at Kiandra, a dominating station, is the lowest on record. The gaugings for 1908 show a discharge of 13,572 million gallons, or an average of over 37 million gallons per day. Of this quantity it is estimated that five millions per day will be required for domestic supply for the capital at the rate of 100 gallons per head per day for 50,000 persons. So that a margin of 32 million gallons per day is left.

This quantity of water, however, is delivered at the junction of the Cotter and Murrumbidgee, and as it is desirable that the point of off-take should, if possible, be so high as to enable the water to gravitate to the city, and also to admit of any surplus being used with the maximum possible head. I have had an investigation made of the upper portion of the river for sites suitable for the construction of a storage reservoir. A suitable site exists on the upper river at R.L. 2,420 feet (Canberra 1,877 feet). At this place a dam 158 feet high would impound approximately 3,778 million gallons, or, neglecting evaporation, roughly, 750 days' supply at 5 million gallons per day. The catchment above this dam is estimated at 10-16ths of the whole, or 100 square miles.

I propose to neglect the lower 40 feet of the reservoir and take a race off at R.L. 2,460, and convey the water by means of that race about 22 miles to a balance reservoir at Mount MacDonald, overlooking the Murrumbidgee at R.L. 2,385, or 508 feet above Canberra. This race would pick up the water of Lee and Condor Creeks *en route*.

From this point the water required for domestic use would gravitate to the city, and the surplus, so far as required, would be gravitated under a head of 830 feet through a generating station to the Murrumbidgee River.

The exact head available for the gravitation of water to the city cannot be given till the actual site of the city is fixed, but there is a fair margin available.

The investigations made have borne out my anticipations with regard to the Cotter. That the catchment can supply a large city with ample water for domestic, garden, and manufacturing purposes is shown by the fact that the run-off in such a bad year as 1908 amounted to a daily mean of 37,677,000, of which, approximately, 26 millions per day could have been gravitated under the scheme I propose, while the consumption of Sydney and suburbs, with a population of 620,000 averaged 24,567,400 per day for the same period.

As to electrical power, the Cotter can, with the balancing storage I have indicated, supply the needs of the city for years to come. As the population increases it may be necessary to provide auxiliary power to prevent depletion of storage in exceptional years—a course usually adopted with advantage in such cases. This, however, is a question of the comparative cost of storage and auxiliary, and need not be considered until estimates for the works are needed.

I have no hesitation in recommending that the whole of the Cotter catchment—160 square miles—be reserved for water supply purposes if the Capital is to be in the vicinity of Canberra.



With regard to the Queanbeyan and Molonglo catchment, Mr. Pridham reports as follows:—

*Molonglo and Queanbeyan Rivers.*

The Molonglo and Queanbeyan are two distinct rivers which unite about 30 chains down-stream of the town of Queanbeyan. Although the Queanbeyan is by far the larger and better stream, they are jointly called the Molonglo from their confluence down to the Murrumbidgee, a river distance of about 30 miles.

*Queanbeyan River.*

The total length of this river above Queanbeyan is about 70 miles. Its trough having been for the most part eroded through slate rock with a nearly vertical dip, there are no very economical storage sites available. The best is at the point shown on Map C, about 8 miles below the junction of Burra Creek, where a curved concrete weir about 150 feet high would form a storage reservoir 15 miles long, having a capacity of, roughly, 5,000,000,000 gallons. This site, being only about 2,045 feet above sea level, would be too low to supply the now proposed Capital City with water directly by gravitation, but its catchment of 340 square miles would furnish in the driest seasons a large supply of water, which could be brought by a gravitation canal 5 or 6 miles long to a convenient point, and thence pumped without much loss of head to a service reservoir at, say, 2,300 or 150 feet above the highest proposed building site.

There are no rainfall gauges on the Queanbeyan River catchment. The nearest is at Captain's Flat, where the mean annual rainfall of seven years ending 1906 was 27 inches, the lowest record, in 1902, being 18.59 inches.

Assuming the minimum annual rainfall on the higher catchment of the Queanbeyan at 20 inches and the run-off at 10 per cent., or half that taken for the steeper and higher Cotter catchment, about 9,860,000,000 gallons would be discharged in a very dry year at the proposed dam site, or sufficient for a population of 270,000; and this quantity could be fairly economically conserved at the proposed site, and other inferior ones farther up-stream.

Although the Queanbeyan catchment, being mostly of a slaty nature, decomposed on the surface, will not yield water equal in quality to that of the Cotter, which is principally of granite formation, there is no doubt that, should the gathering ground be allowed to revert to its natural condition by reservation from deforestation, mining, and grazing, the now fully recognised purifying effect of storage in large and deep reservoirs will very greatly improve it.

At the request of the residents, a low concrete weir was built a few years ago across the Queanbeyan River just below the town. For sanitary reasons the sooner this weir is removed the better.

*Molonglo River.*

The most economical site for storage on this river up-stream of Queanbeyan is at the point shown on Map C, where a weir 100 feet high would impound, roughly, 1,500,000,000 gallons, the top water level reaching a short distance above the Bungendore-road, crossing at the edge of the Molonglo Plains.

The catchment area above the proposed weir site is 170 square miles, half that of the Queanbeyan.

From gaugings made on the 5th instant, the discharge of the Queanbeyan and Molonglo Rivers near their confluence were found to be 5 and  $1\frac{1}{2}$  cubic feet per second respectively, the Molonglo discharging only 1-3.3 as much as the Queanbeyan, which is probably due to the fact that for about 8 miles of its course of 40 miles above Queanbeyan it traverses the extensive Molonglo Plains, where much water is lost by evaporation and absorption.

Taking the ratio of flow as giving some idea of the relative values of the two catchments, it may be roughly assumed that about 2,500,000,000 gallons can be fairly economically conserved on the Molonglo River at the site above mentioned, and down-stream in the vicinity of Burbong.

Eight or ten years ago a proposal was made to form a large storage reservoir on the Molonglo Plains for the purpose of replenishing Lake George in dry seasons, and it was ascertained by survey that a dam 90 feet high just below the Bungendore-road crossing would impound about 55,000,000,000 gallons, covering an area of 13 square miles of these valuable flats. As 20 per cent. of the average rainfall would only yield about 13,000,000,000 gallons, and the loss by evaporation alone from a full reservoir would be over 9,000,000,000 gallons, the utter unsuitability of such a very wide and shallow storage reservoir in this country is clearly shown.

The existence of the mining township of Captain's Flat, where some thousands of men used to camp close to the river, and the probability of the Molonglo Plains being used for cultivation, are reasons for condemning the Molonglo River as a suitable source of water supply for domestic use without efficient filtration; but with sufficient storage the water in its natural state could be made use of to maintain a constant flow through Queanbeyan and supply losses by evaporation from a small artificial lake lower down-stream if required.

*Water Power.*

The physical features and conditions of neither the Queanbeyan nor Molonglo River are favorable for the generation of electricity by water power to any large extent.

From the suggested reservoir on the Molonglo the average available head at a power station near Queanbeyan would be about 450 feet, for which about 7 miles of conduit would be required; and from the proposed reservoir on the Queanbeyan about 240 feet, requiring a conduit 6 miles long.

Without systematic gauging during a dry period the amount of power available cannot be even roughly estimated.

*Reservation on the Molonglo and Queanbeyan Rivers.*

Mr. Pridham suggests that should it be decided to utilize the Molonglo and Queanbeyan Rivers in connexion with the Federal Territory the areas shown on Map C bordered by blue shading, *vide licet*, Molonglo 170 square miles, Queanbeyan 340 square miles, should be reserved for purposes of water supply.

E. M. DE BURGH,

Chief Engineer for Harbors and Water Supply.

(22) THE PREMIER OF NEW SOUTH WALES TO THE PRIME MINISTER OF THE COMMONWEALTH OF AUSTRALIA, FORWARDING REPORT AS TO ELECTRIC LIGHT AND POWER SUPPLY.

Premier's Office,  
Sydney, 9th June, 1909.

SIR,

In supplementation of former correspondence upon the subject of the Yass-Canberra proposed Federal

$\frac{1}{3.3}$   
Nothing can be deduced from this single gauging.  
E. M. De B.  
24.5.09.



territory, I have now the honour to enclose, herewith, a further report as to electric light and power supply available within the territory named, which has been prepared and furnished to me by the Electrical Engineer of the Department of Public Works in this State.

The document, as will be seen, deals largely with certain portions of Mr. Surveyor Scrivener's report of the 26th ultimo, and I shall be favoured if you will, as soon as possible after perusal of the report, make its contents available to the Advisory Board at present investigating the proposed Federal territory.

I have the honour to be, Sir,

Your most obedient Servant,

C. G. WADE.

5th June, 1909.

*Federal Capital—Electric Light and Power Supply.*

At the desire of the Government Architect, I have the honour to request that the following information may be officially forwarded for the use of the Advisory Board in connexion with Mr. Scrivener's Report of the 26th May, a copy of which the Government Architect has handed to me.

Mr. Scrivener's figures on page 5 of his Report are, of course, correct, but he has omitted to take note of the Pipe Head Reservoir, which I indicated in the diagram accompanying my minute of 22nd October, 1908, nor has he grasped the import of the words in that minute, "allowing for . . . a ratio of average to maximum flow of 25 per cent."

The race which I suggested, which, with fluming and pipe, proves to be about 20 miles in length, would be so designed as to carry from the upper dam to the Pipe Head Reservoir a steady flow for 24 hours of the day. From this Reservoir, one pipe would take a steady flow of five million gallons per day to the Service Reservoir at the Capital Site. Another pipe, or pipes, would carry a varying flow straight down the hillside to the turbines, situated over 800 feet below. The variations of this flow would depend upon the demand for power at the city from hour to hour during the day, the demand at night being chiefly confined to street lighting, whilst during the hours of daylight a moderate tramway and motor load may be expected, followed by, and towards sundown at midwinter over-lapping, the shop lighting load, which, in its turn, falls rapidly from 5.30 to 6 p.m., and is succeeded by the evening residential lighting load.

I subjoin a diagram—Appendix I.—showing the way in which the demand varies during the day, and what may be expected in the case in point with a maximum load of 7,000 E.H.P.

On a base line in Figure 1, each quarter-inch represents one hour, and against each hour the vertical height of the curve A represents the h.p. in use at the respective hour, so that the area of the shaded portion represents the whole output for the 24 hours in h.p. hours. This amounts, in the case in point, to 43,200 h.p. hours, and is equivalent to an average of 1,800 h.p. hours during the day, as shown by the line B, across the diagram, and separately in Figure 2. The area under the horizontal dotted line C through the topmost point of the curve gives the number of h.p. hours which would be used if the maximum flow were being maintained constantly through the 24 hours. This amounts to 168,000 h.p. hours. This area is separately shown in Figure C.

The ratio of the actual number of h.p. hours in any given time, either day, week, month, or year, to the number which would be used if the maximum were maintained for the whole of the time is known as the "load factor," for the day, week, month, or year, as the case may be. In the example given, this ratio is 43,200 : 168,000, or 25.8 per cent.

With such a load factor, Mr. Scrivener's figure of 2,775 h.p. would suffice if the water were properly conserved for a maximum load of 10,800 h.p.

Or, again, starting with the figure which Mr. Scrivener gives—22 million gallons per diem—and allowing 5 million gallons for water supply, 17 million gallons are left, which, with a head of 850 feet (for my investigation on the spot, on which I am separately reporting, shows 830 feet available), will provide an average of 2,370 h.p. and a maximum of 9,200 h.p.—more than sufficient for the 7,000 h.p. at the city, suggested in my previous minute.

The ratio of that part of the shaded area in the Figure 1, which is cross-hatched, marked x, to the total area, representing the output for the day, is the proportion of the 17 million gallons per diem, for which storage is required. This proportion amounts to only  $4\frac{1}{2}$  million gallons, but other considerations will lead to a larger storage than this being provided.

As regards the 7,000 h.p., I attach a schedule—Appendix II.—showing those of the English Municipal Combined Light and Traction undertakings, serving populations between 40,000 and 60,000. The average figures for these twelve towns are as follows:—

|                          |                 |
|--------------------------|-----------------|
| Population ...           | 50,250          |
| Load factor for Year ... | 15.29 per cent. |
| Plant capacity ...       | 2,295 h.p.      |

It will be seen, compared with English towns, that I have allowed more than ample power—7,000 h.p.—as against an average of 2,295 h.p. for England.

On comparing with Sydney, where the maximum lighting load has not yet reached 8,400 h.p., nor the maximum traction load 24,000 h.p. on the basis of population ratio, say, 50,000 to 600,000, or 1 : 12, at the capital, 700 h.p. might be expected to be required for lighting and power, and 2,000 for trams—or 2,700 in all, as against the 7,000 that I suggested.

I desire to point out, however, that the object of my previous minute was not so much to recommend that 7,000 h.p. should be provided in the first instance, but to show, on the data which I had before me, that there was ample water and fall to eventually provide 7,000 h.p. if the demands of the city should reach this figure. My subsequent investigations have shown this view to be correct, and that if a large expenditure is in any case necessary for water supply, it is a perfectly reasonable proposal to so arrange the works as to use the surplus water for the production of electric light and power.

In conclusion, although the diagram in Appendix I. is based on a maximum of 7,000 h.p., I submit, in view of the figures which I have adduced, that for a city of 50,000 inhabitants it will be a long time, if ever, before 7,000 h.p. will be required.

W. CORIN, M. Inst. C.E.,  
Electrical Engineer.

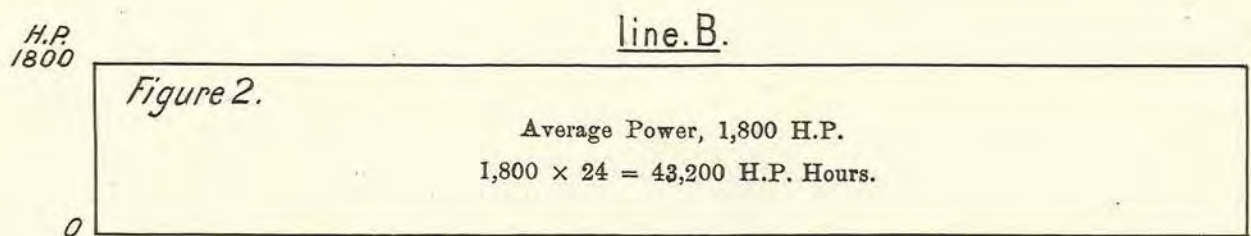
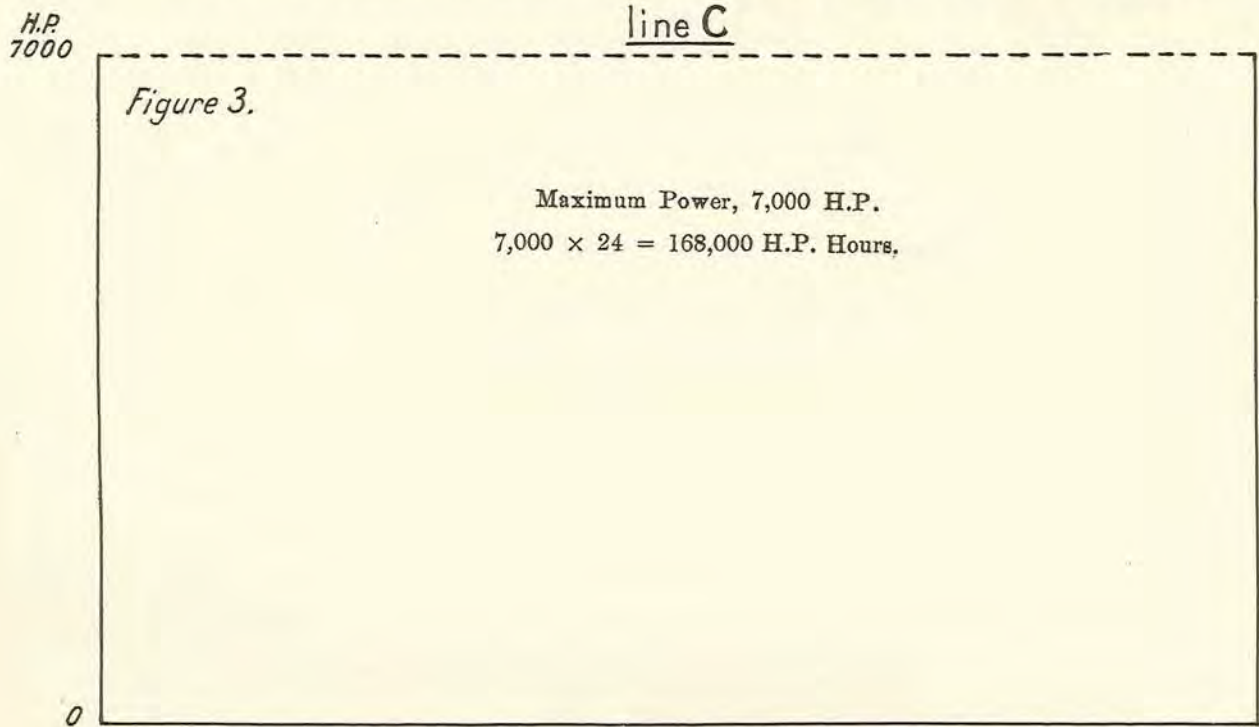
5th June, 1909.

The Under-Secretary for Public Works.

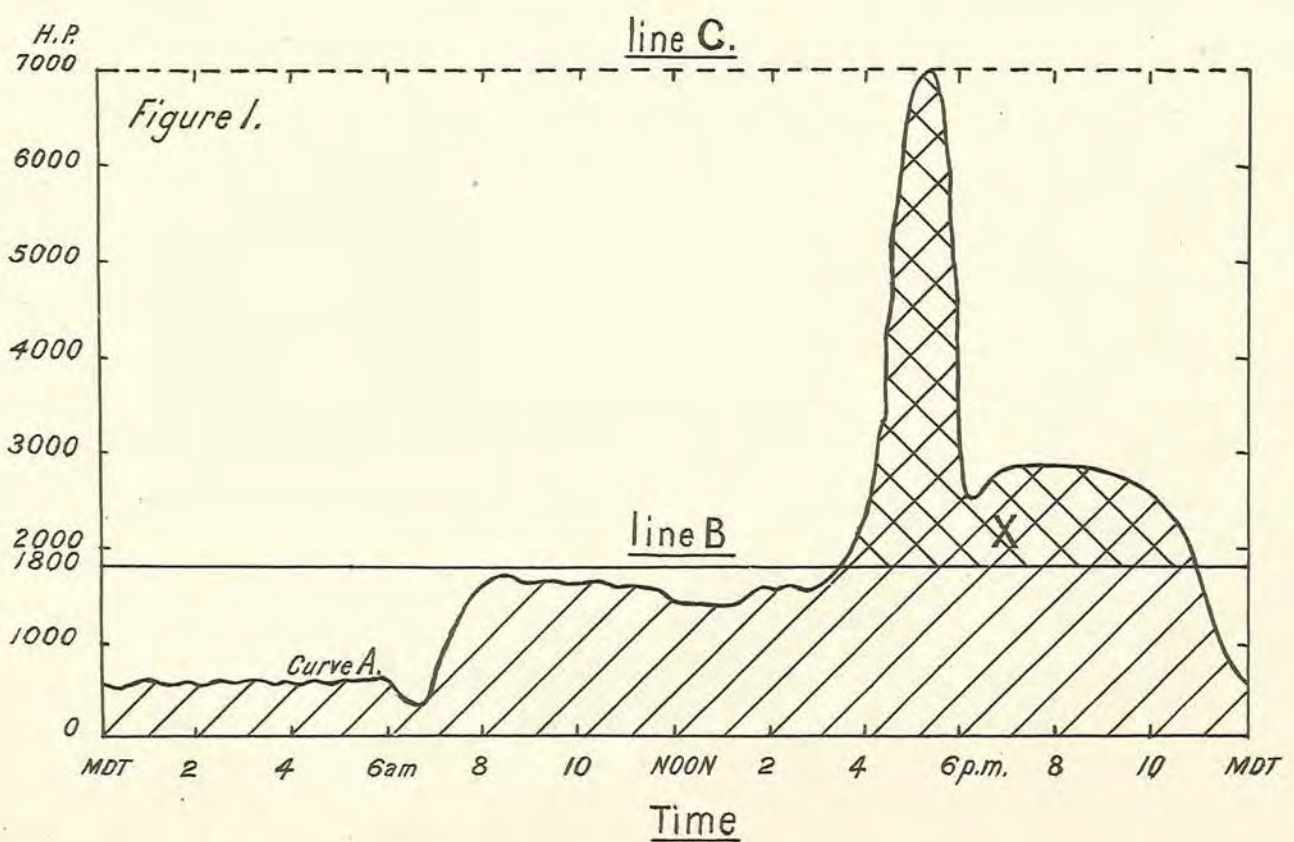


## APPENDIX I.

DIAGRAM ILLUSTRATING VARIATION OF DEMAND AND "LOAD FACTOR."



$$\text{"Load Factor"} = \frac{43,200}{168,000} = 25.8 \%$$





APPENDIX II.

List of towns in England of population between 40,000 and 60,000 having Municipal Combined Electric Lighting and Traction plants (deduced from table published weekly in the *Electrical Times*).

| Name.                  | Population in Thousands. | Length of Single Track in Miles. | Maximum Load on Feeders, 1908, in H.P. | Load factor, 1908, per cent. | Plant capacity in H.P. |
|------------------------|--------------------------|----------------------------------|--|------------------------------|------------------------|
| Blackpool ... ..       | 56·0                     | 17·38                            | 3,486                                  | 13·39                        | 5,963                  |
| Burton ... ..          | 52·0                     | 9·88                             | 1,192                                  | 17·93                        | 2,291                  |
| Darwen ... ..          | 42·0                     | 7·16                             | 830                                    | 12·37                        | 1,206                  |
| Doncaster ... ..       | 42·0                     | 10·65                            | 999                                    | 14·20                        | 1,608                  |
| Exeter ... ..          | 55·0                     | 7·37                             | 1,232                                  | 16·18                        | 2,010                  |
| Gloucester ... ..      | 49·8                     | 15·01                            | 1,267                                  | 15·89                        | 2,345                  |
| Keighley ... ..        | 42·0                     | 6·11                             | 751                                    | 15·23                        | 991                    |
| Lancaster ... ..       | 44·6                     | 4·82                             | 938                                    | 12·42                        | 1,340                  |
| Rotherham ... ..       | 60·0                     | 11·16                            | 1,154                                  | 22·51                        | 1,618                  |
| Southend-on-sea ... .. | 55·0                     | 7·42                             | 1,845                                  | 13·61                        | 2,345                  |
| Southport ... ..       | 51·0                     | 10·76                            | 2,241                                  | 14·32                        | 3,149                  |
| Yarmouth ... ..        | 53·7                     | 14·39                            | 1,491                                  | 15·48                        | 2,686                  |
| AVERAGES ... ..        | 50·25                    | 10·17                            | 1,452                                  | 15·29                        | 2,295                  |

(23) THE PREMIER OF NEW SOUTH WALES TO THE PRIME MINISTER OF THE COMMONWEALTH, FORWARDING INFORMATION AS TO TENURES OF LAND, &C., WITHIN THE PROPOSED TERRITORY.

No. P.O. 09/2304.

Premier's Office,  
Sydney, 5th June, 1909.

SIR,—

I have the honour to inform you that, in pursuance of the request contained in the letter of your predecessor in office, dated 2nd April, the necessary information has been collected regarding tenures of land, &c., in the proposed Yass-Canberra Federal territory, which, for the purpose of convenience, has been tabulated, and also set out in detail on the plan which accompanies this letter. The tenures are divided into three classes, namely:—(a) freehold (coloured red); (b) reserves and vacant Crown lands (coloured yellow). This includes annual leases and occupation licences; (c) conditional purchases and various forms of leases, excluding those named in (b) (coloured blue).

It has been found that, by taking the boundaries of the proposed Federal Capital Territory as delineated upon the sketch plan supplied by Mr. Scrivener, the total area included in such boundaries represented, approximately, 644,929 acres, being 4,929 acres in excess of the 1,000 square miles. The total area as now estimated by the aid of the more complete map gives an excess area of 8,587 acres over the total area as given in the schedule supplied.

Annual leases and occupation licences have been included in the area of Crown lands tinted yellow, inasmuch as land held under such tenure is available for settlement, unless otherwise reserved.

The total population within the boundaries of the proposed territory is 3,397 persons. The total improved value is, approximately, £1,006,974, exclusive of the municipality of Queanbeyan.

I take the opportunity of drawing your attention to the peculiar features which the municipality of Queanbeyan presents. This area is almost wholly freehold land, with a population of 1,831 persons residing in the locality. The unimproved value is estimated to be £32,003; the improved value, £102,240. Further, the possibility must be borne in mind that, in the event of it being agreed that Queanbeyan shall form a part of the Federal territory, the population may dwindle away owing to its proximity to the Capital itself, and the present values depreciated.

Further, it will be noticed that the State railway from Goulburn to Queanbeyan intersects the proposed territory, and that in calculating values, the land and plant between the railway fences has not been taken into consideration.

In view of the fact that stress is naturally laid on the question of water conservation, I have, for purposes of more convenient comparison, had the proposed territory divided into four portions showing (1) catchment of the Molonglo River below its junction with the Queanbeyan River, within which area sites have been previously considered for the Capital city; (2) catchment of the Cotter River; (3) catchment of the Queanbeyan River to its junction with the Molonglo; (4) catchment of the Molonglo to its junction with the Queanbeyan River. Helios. (3) are enclosed of the above-mentioned divisions, and tables are attached indicating the total area in each division, each class of tenure, and the approximate values of the same.

I beg to draw your attention to the fact that in the plan of the Cotter catchment, there is an area of 37,730 acres of vacant Crown land, and only 223 acres of freehold land in the area south of the junction of that river with the Murrumbidgee, the population being only 57 persons. On the Queanbeyan catchment (plan 3 above), there is an area of 20,206 acres of vacant Crown lands higher up the river from the town of Queanbeyan. The value of the Queanbeyan municipality is £102,240, and the population is 1,831 persons. Crown lands outside the Cotter and Queanbeyan catchments are very small. On the other hand, the value and extent of freehold land in plan 1 is very large.

I may also add that the Chief Engineer for Water Conservation, in investigating the possibilities for water storage in the Queanbeyan and Molonglo basin, located sites for dams at (a) the Queanbeyan River, at a point about 8 miles below Burra Creek, where a weir about 150 feet high would form a reservoir 15 miles long with a capacity, roughly, of 5,000 million gallons; (b) the Molonglo River upstream of Queanbeyan, where a weir 100 feet high would impound, roughly, 1,500 million gallons, the top water level reaching a short distance above the Bungendore-road crossing at the edge of the Molonglo plains; and (c) on the Molonglo, in the vicinity of Burbong.

I have, &c.,

C. G. WADE.

The Honorable  
The Prime Minister of the Commonwealth of  
Australia, Melbourne.



[Annexure.]

YASS-CANBERRA PROPOSED FEDERAL TERRITORY.

(SCHEDULES.)

SCHEDULES showing, in four Sections, the tenure of land within the proposed Yass-Canberra Federal Capital Territory, namely, Catchment Areas of—

- (a) the Cotter River ;
- (b) the Queanbeyan River ;
- (c) the Molonglo River above its junction with the Queanbeyan River ;
- (d) the Molonglo River below its junction with the Queanbeyan River.

“A.”

Catchment Area of the Cotter River, 129,139 acres.

| Parish.        | Con-<br>ditional<br>Pur-<br>chase. | Con-<br>ditional<br>Lease. | Annual<br>Lease. | Occupation<br>Licence. | Improve-<br>ment.<br>Lease. | Scrub<br>Lease. | Crown<br>Lands not<br>held under<br>Lease<br>or Licence. | Reserves<br>not<br>held under<br>Lease<br>or Licence. | Freehold. | Totals. |
|----------------|------------------------------------|----------------------------|------------------|------------------------|-----------------------------|-----------------|--|---|-----------|---------|
|                | Acres.                             | Acres.                     | Acres.           | Acres.                 | Acres.                      | Acres.          | Acres.   | Acres.  | Acres.    | Acres.  |
| Urayarra ..    | 7,401                              | 4,379                      | 2,540            | Nil                    | Nil                         | Nil             | Nil  | 865   | 3,839     | 19,024  |
| Tidbinbilla .. | 680                                | 848                        | Nil              | 22,800                 | Nil                         | Nil             | 1,470  | 80  | 370       | 26,248  |
| Punyibah ..    | Nil                                | Nil                        | 1,920            | Nil                    | Nil                         | Nil             | 22,810   | Nil   | Nil       | 24,730  |
| Milligan ..    | Nil                                | Nil                        | 4,740            | Nil                    | Nil                         | Nil             | 13,250   | Nil   | Nil       | 17,990  |
| Fergus ..      | Nil                                | Nil                        | Nil              | Nil                    | 18,030                      | 3,500           | Nil  | Nil   | 223       | 21,753  |
| Cotter ..      | Nil                                | Nil                        | 8,650            | Nil                    | 7,750                       | Nil             | Nil  | Nil   | Nil       | 16,400  |
| Congwarra ..   | 390                                | 768                        | 1,056            | Nil                    | Nil                         | Nil             | 200  | Nil   | 580       | 2,994   |
| Totals ..      | 8,471                              | 5,995                      | 18,906           | 22,800                 | 25,780                      | 3,500           | 37,730   | 945   | 5,012     | 129,139 |

G. H. SHEAFFE,  
District Surveyor.

15th April, 1909.

Lands within the Cotter River Catchment Area.

|                                  | Acres.  | Value per Acre. | Total Value. |
|----------------------------------|---------|-----------------|--------------|
|                                  |         | £ s. d.         | £ s. d.      |
| Freehold .. .. .                 | 5,012   | 3 0 0           | 15,036 0 0   |
| Conditional Purchase .. .. .     | 8,471   | 1 10 0          | 12,706 10 0  |
| Conditional Lease .. .. .        | 5,995   | 1 0 0           | 5,995 0 0    |
| Annual Lease .. .. .             | 18,906  | 0 5 0           | 4,726 10 0   |
| Occupation Licence .. .. .       | 22,800  | 0 5 0           | 5,700 0 0    |
| Improvement Lease .. .. .        | 25,780  | 0 4 0           | 5,156 0 0    |
| Scrub Lease .. .. .              | 3,500   | 0 4 0           | 700 0 0      |
| Vacant .. .. .                   | 37,730  | 0 2 6           | 4,716 5 0    |
| Reserves not under Lease .. .. . | 945     | 1 0 0           | 945 0 0      |
| Total .. .. .                    | 129,139 |                 | £55,681 5 0  |

Population, 57.

G. H. SHEAFFE,  
District Surveyor

15th April, 1909.



Catchment Area, Queanbeyan River, 249,969 acres.

| Parish.       | Freehold. | Condi-<br>tional<br>Pur-<br>chase. | Condi-<br>tional<br>Lease. | Annual<br>Lease. | Occu-<br>pa-<br>tion<br>Licence. | Improve-<br>ment<br>Lease,<br>including<br>Special<br>Lease. | Scrub<br>Lease. | Crown<br>Lands not<br>held under<br>Lease or<br>Licence. | Reserves<br>not held<br>under<br>Lease or<br>Licence. | Totals. |
|---------------|-----------|------------------------------------|----------------------------|------------------|----------------------------------|--|-----------------|--|---|---------|
|               | Acres.    | Acres.                             | Acres.                     | Acres.           | Acres.                           | Acres.   | Acres.          | Acres.   | Acres.  | Acres.  |
| Hill ..       | 160       | 1,001                              | 1,049                      | 4,340            | 4,656                            | 40   | Nil             | 715  | Nil   | 11,961  |
| Milford ..    | 1,157     | 2,550                              | 3,604                      | 880              | 640                              | Nil  | Nil             | 850  | 200   | 9,881   |
| Sherlock ..   | 2,607     | 3,816                              | 5,850                      | 2,166            | 5,124                            | 34   | Nil             | 4,750  | 300   | 24,647  |
| Holland ..    | 2,646     | 3,005                              | 5,525                      | Nil              | Nil                              | 6,400  | Nil             | 150  | 180   | 17,906  |
| Wise ..       | 1,962     | 1,734                              | 3,168                      | 520              | Nil                              | Nil  | 12,080          | 1,010  | 50  | 20,524  |
| Jinjera ..    | 1,879     | 3,856                              | 9,913                      | 9,749            | Nil                              | Nil  | Nil             | 8,454  | 845   | 34,696  |
| Bullongong .. | 417       | 2,099                              | 4,282                      | 7,979            | Nil                              | Nil  | Nil             | 300  | 500   | 15,577  |
| Tantangera .. | 420       | 567                                | 520                        | 1,650            | Nil                              | 1,280  | Nil             | 1,347  | Nil   | 5,784   |
| Urialla ..    | 5,422     | 4,904                              | 6,321                      | 5,344            | Nil                              | Nil  | 2,520           | 1,880  | 20  | 26,411  |
| Keewong ..    | 4,717     | 1,226                              | 760                        | Nil              | Nil                              | Nil  | Nil             | 540  | Nil   | 7,243   |
| Burra ..      | 7,648     | 4,518                              | 4,750                      | Nil              | Nil                              | Nil  | Nil             | 60   | 15  | 16,991  |
| Tuggeranong   | 3,481     | 1,830                              | 90                         | Nil              | Nil                              | Nil  | Nil             | Nil  | Nil   | 5,401   |
| Queanbeyan    | 4,352     | * 1,257                            | 250                        | 65               | Nil                              | 10   | Nil             | Nil  | 820   | 6,754   |
| Googong ..    | 10,778    | 4,004                              | 635                        | 351              | Nil                              | Nil  | Nil             | 250  | 160   | 16,178  |
| Carwoola ..   | 1,744     | 1,431                              | 1,470                      | 1,565            | Nil                              | Nil  | Nil             | 140  | 1,480   | 7,830   |
| Yarrow ..     | 7,147     | 710                                | 7,100                      | 2,890            | Nil                              | Nil  | Nil             | Nil  | Nil   | 17,847  |
| Rowland ..    | 810       | 1,612                              | 1,896                      | Nil              | Nil                              | Nil  | Nil             | Nil  | 20  | 4,338   |
| Totals ..     | 57,347    | 40,120                             | 57,183                     | 37,499           | 10,420                           | 7,764  | 14,600          | 20,446   | 4,590   | 249,969 |

\* Includes Homestead Selections.

15th April, 1909.

G. H. SHEAFFE,  
District Surveyor.

Lands within the Catchment Area of the Queanbeyan River above the Molonglo River.

|                                  | Acres.  | Value per Acre. | Total Value. |
|----------------------------------|---------|-----------------|--------------|
|                                  |         | £ s. d.         | £ s. d.      |
| Freehold .. .. .                 | 53,863* | 3 0 0           | 161,589 0 0  |
| Conditional Purchase .. .. .     | 39,957  | 1 10 0          | 59,935 10 0  |
| Conditional Lease .. .. .        | 57,183  | 1 0 0           | 57,183 0 0   |
| Annual Lease .. .. .             | 37,459  | 0 5 0           | 9,364 15 0   |
| Occupation Licence .. .. .       | 10,420  | 0 5 0           | 2,605 0 0    |
| Improvement Lease .. .. .        | 7,754   | 0 4 0           | 1,550 16 0   |
| Scrub Lease .. .. .              | 14,600  | 0 4 0           | 2,920 0 0    |
| Vacant .. .. .                   | 20,296  | 0 2 6           | 2,537 0 0    |
| Reserves not under Lease .. .. . | 4,560   | 1 0 0           | 4,560 0 0    |
| Total .. .. .                    | 246,002 |                 | 302,245 1 0  |

\* Exclusive of the Town and Municipality of Queanbeyan.

|  |        |
|--|--------|
| Area within catchment area of Cotter River and Molonglo River after its junction with Queanbeyan River .. .. . | Acres. |
| Area within Molonglo River Catchment Area .. .. .  | 677    |
| Queanbeyan Town and Municipality, within Queanbeyan Catchment Area .. .. .                                     | 3,967  |
| Total .. .. .  | 5,696  |

Improved value, £101,040 ; unimproved value, £32,003.

The unsold land in the Town of Queanbeyan contains about 150 acres, worth about £1,200.

Total improved value of the whole area of 251,698 acres is £404,485 (includes 677 acres within Molonglo River Catchment Area No. 4, tracing "C," and 1,052 acres within Molonglo River Catchment Area No. 1 on tracing "A" within the Municipality of Queanbeyan).

Population, 1,831.

15th April, 1909.

G. H. SHEAFFE,  
District Surveyor.



"C."

Catchment Area of the Molonglo River above its junction with the Queanbeyan River, 129,134 acres.

| Parish.        | Freehold.  | Con-<br>ditional<br>Pur-<br>chase. | Con-<br>ditional<br>Lease. | Annual<br>Lease. | Occu-<br>pation<br>Licence. | Improve-<br>ment<br>Lease<br>including<br>Special<br>Lease. | Scrub<br>Lease. | Crown<br>Lands not<br>held<br>under<br>Lease or<br>Licence. | Reserves<br>not held<br>under<br>Lease or<br>Licence. | Resi-<br>dential<br>Lease. | Total<br>Area. |
|----------------|------------|------------------------------------|----------------------------|------------------|-----------------------------|---|-----------------|---|---|----------------------------|----------------|
|                | Acres.     | Acres.                             | Acres                      | Acres.           | Acres.                      | Acres.  | Acres.          | Acres.  | Acres.  | Acres.                     | Acres.         |
| Majura ..      | 4,257      | 2,480                              | 831                        | <i>Nil</i>       | <i>Nil</i>                  | 58  | <i>Nil</i>      | 34  | 318   | <i>Nil</i>                 | 7,978          |
| Thurralilly .. | 10,168     | 2,644                              | 1,984                      | 1,980            | <i>Nil</i>                  | <i>Nil</i>  | <i>Nil</i>      | 160   | 2,860   | <i>Nil</i>                 | 19,796         |
| Ballallaba ..  | 2,820      | 1,700                              | 2,171                      | 3,202            | <i>Nil</i>                  | 540   | <i>Nil</i>      | 3,750   | 1,040   | 40                         | 15,263         |
| Amungula ..    | 3,304      | 663                                | 1,760                      | 20               | <i>Nil</i>                  | 277   | <i>Nil</i>      | 221   | 1,191   | <i>Nil</i>                 | 7,436          |
| Vananunbeyan   | 13,527     | 811                                | 1,073                      | 8,085            | <i>Nil</i>                  | <i>Nil</i>  | <i>Nil</i>      | 1,250   | 140   | <i>Nil</i>                 | 24,886         |
| Jingera ..     | <i>Nil</i> | 639                                | 1,138                      | 280              | <i>Nil</i>                  | <i>Nil</i>  | <i>Nil</i>      | 1,683   | 390   | <i>Nil</i>                 | 4,130          |
| Bullongong ..  | 833        | 360                                | 940                        | 645              | <i>Nil</i>                  | <i>Nil</i>  | <i>Nil</i>      | 1,600   | 2,143   | <i>Nil</i>                 | 6,521          |
| Yarrow ..      | 2,242      | <i>Nil</i>                         | 1,030                      | <i>Nil</i>       | <i>Nil</i>                  | <i>Nil</i>  | <i>Nil</i>      | <i>Nil</i>  | 30  | <i>Nil</i>                 | 3,302          |
| Molonglo ..    | 19,860     | 2,852                              | 997                        | 168              | <i>Nil</i>                  | <i>Nil</i>  | <i>Nil</i>      | 1,460   | 240   | <i>Nil</i>                 | 25,577         |
| Carwoola ..    | 8,706      | 1,480                              | 1,133                      | 390              | <i>Nil</i>                  | 236   | <i>Nil</i>      | <i>Nil</i>  | 1,240   | <i>Nil</i>                 | 13,185         |
| Queanbeyan     | 1,060      | <i>Nil</i>                         | <i>Nil</i>                 | <i>Nil</i>       | <i>Nil</i>                  | <i>Nil</i>  | <i>Nil</i>      | <i>Nil</i>  | <i>Nil</i>  | <i>Nil</i>                 | 1,060          |
| Totals ..      | 66,777     | 13,629                             | 13,057                     | 14,770           | <i>Nil</i>                  | 1,111   | <i>Nil</i>      | 10,158  | 9,592   | 40                         | 129,134        |

NOTE.—Includes 667 acres within Municipality of Queanbeyan.

15th April, 1909.

G. H. SHEAFFE,  
District Surveyor.

Lands within the Catchment Area of the Molonglo River above its junction with the Queanbeyan River.

|                                  |    |    |    |    | Acres.  | Value per Acre. | Total Value. |
|----------------------------------|----|----|----|----|---------|-----------------|--------------|
|                                  |    |    |    |    |         | £ s. d.         | £ s. d.      |
| Freehold .. .. .                 | .. | .. | .. | .. | 66,777  | 3 0 0           | 200,331 0 0  |
| Conditional Purchase .. .. .     | .. | .. | .. | .. | 13,629  | 1 10 0          | 20,444 0 0   |
| Conditional Lease .. .. .        | .. | .. | .. | .. | 13,057  | 1 0 0           | 13,057 0 0   |
| Annual Lease .. .. .             | .. | .. | .. | .. | 14,770  | 0 5 0           | 3,693 0 0    |
| Occupation Licence .. .. .       | .. | .. | .. | .. | ..      | ..              | ..           |
| Improvement Lease .. .. .        | .. | .. | .. | .. | 1,111   | 0 4 0           | 222 0 0      |
| Scrub Lease .. .. .              | .. | .. | .. | .. | ..      | ..              | ..           |
| Vacant .. .. .                   | .. | .. | .. | .. | 10,158  | 0 2 6           | 1,270 0 0    |
| Reserves not under Lease .. .. . | .. | .. | .. | .. | 9,592   | 1 0 0           | 9,592 0 0    |
| Residential Lease .. .. .        | .. | .. | .. | .. | 40      | 1 0 0           | 40 0 0       |
| Total .. .. .                    | .. | .. | .. | .. | 129,134 | ..              | 248,649 0 0  |

Population, 670.

15th April, 1909.

G. H. SHEAFFE,  
District Surveyor.



“D.”

Catchment Area of the Molonglo River below its junction with the Queanbeyan River, 136,687 acres.

| Parish.        | Freehold. | Conditional Purchase, including Homestead Selections. | Con- ditional Lease. | Annual Lease. | Occupation Licence. | Improve- ment Lease, including Special Leases. | Scrub Lease. | Crown Lands not held under Lease or Licence. | Reserves not held under Lease or Licence. | Total Area. |
|----------------|-----------|---|----------------------|---------------|---------------------|--|--------------|--|---|-------------|
|                | Acres.    | Acres.  | Acres.               | Acres.        | Acres.              | Acres.   | Acres.       | Acres.                                       | Acres.                                    | Acres.      |
| Yarrolumla ..  | 11,279    | 3,812   | Nil                  | Nil           | Nil                 | Nil  | Nil          | Nil  | 80  | 15,171      |
| Narrabundah    | 16,556    | 1,635   | Nil                  | Nil           | Nil                 | Nil  | Nil          | Nil  | 25  | 18,394      |
| Tuggeranong    | 950       | 445   | 60                   | Nil           | Nil                 | Nil  | Nil          | Nil  | 57  | 1,512       |
| Queanbeyan     | 10,567    | 126   | Nil                  | Nil           | Nil                 | Nil  | Nil          | Nil  | Nil                                       | 10,693      |
| Amungula ..    | 570       | 648   | 1,572                | 1,664         | Nil                 | Nil  | Nil          | 60   | 40  | 4,554       |
| Pialligo ..    | 12,218    | 4,845   | 2,608                | 664           | Nil                 | 29   | Nil          | Nil  | 350                                       | 20,714      |
| Goorooyarroo   | 5,725     | 3,426   | 902                  | 1,576         | Nil                 | 119  | Nil          | Nil  | Nil                                       | 11,748      |
| Ginninderra .. | 8,250     | 2,625   | 15                   | 37            | Nil                 | 50   | Nil          | Nil  | 15  | 10,992      |
| Weetangera ..  | 14,312    | 4,091   | Nil                  | Nil           | Nil                 | Nil  | Nil          | Nil  | Nil                                       | 18,403      |
| Canberra ..    | 21,537    | 2,401   | 81                   | Nil           | Nil                 | 30   | Nil          | Nil  | 457                                       | 24,506      |
| Totals ..      | 101,964   | 24,054  | 5,396                | 3,961         | Nil                 | 228  | Nil          | 60   | 1,024                                     | 136,687     |

NOTE.—Includes 1,052½ acres within Municipality of Queanbeyan.

15th April, 1909.

G. H. SHEAFFE,  
District Surveyor.

Lands within the Catchment Area of the Molonglo River, below the junction of the Queanbeyan.

|                          |    |    |    |    |    | Acres.  | Value per Acre. | Total Value. |
|--------------------------|----|----|----|----|----|---------|-----------------|--------------|
|                          |    |    |    |    |    |         | £ s. d.         | £ s. d.      |
| Freehold                 | .. | .. | .. | .. | .. | 101,964 | 3 10 0          | 356,874 0 0  |
| Conditional Purchase     | .. | .. | .. | .. | .. | 24,054  | 1 10 0          | 36,081 0 0   |
| Conditional Lease        | .. | .. | .. | .. | .. | 5,396   | 1 0 0           | 5,396 0 0    |
| Annual Lease             | .. | .. | .. | .. | .. | 3,961   | 0 5 0           | 990 0 0      |
| Improvement Lease        | .. | .. | .. | .. | .. | 228     | 0 4 0           | 46 0 0       |
| Occupation Licence       | .. | .. | .. | .. | .. | .....   | .....           | .....        |
| Scrub Lease              | .. | .. | .. | .. | .. | .....   | .....           | .....        |
| Vacant                   | .. | .. | .. | .. | .. | 60      | 0 2 6           | 8 0 0        |
| Reserves not under Lease | .. | .. | .. | .. | .. | 1,024   | 1 0 0           | 1,024 0 0    |
| Total                    | .. | .. | .. | .. | .. | 136,687 |                 | 400,419 0 0  |

Population, 839.

15th April, 1909.

G. H. SHEAFFE,  
District Surveyor.



(24) REPORT OF ADVISORY BOARD, SUBMITTING  
VIEWS AND RECOMMENDATIONS.Melbourne,  
16th June, 1909.The Honorable,  
The Minister of State for Home Affairs,  
Melbourne.

SIR,

The *Seat of Government Act* 1908 provides that the Seat of Government of the Commonwealth shall be in the district of Yass-Canberra, in the State of New South Wales, and the territory to be granted to, or acquired, by the Commonwealth shall contain an area of not less than 500 square miles, and have access to the sea.

In our report to you on the subject, dated the 8th March last, we recommended:—

- (a) That within the Yass-Canberra district the territory recommended by Mr. Scrivener was the most suitable for the purposes of the Commonwealth;
- (b) that certain sites which had been indicated as presenting features most suitable for the purposes of the Federal city should be tested by actual survey, and the more prominent of them covered by a contour survey;
- (c) that a careful examination should be made of the Molonglo River, and extended to include the Queanbeyan River; also that further information should be obtained respecting the practicability of a scheme for the generation of power from the Cotter River, as set out in the report of the Electrical Engineer, Department of Public Works, New South Wales, dated 22nd October, 1908;
- (d) that investigations be made in connexion with the disposal of the effluent resulting from sewage purification;
- (e) that a preliminary investigation be made of practical routes for a railway to Jervis Bay;

with which you concurred.

Mr District Surveyor Scrivener has, in response, now furnished:—

- (a) A plan of a contour survey embracing that area where the physical and scenic qualifications required for the Capital City of the Commonwealth are best met.
- (b) A tracing showing the proposed Federal territory with detail connected with water supply.
- (c) A map showing a practicable route for a railway between the Federal territory and Jervis Bay.
- (d) Admiralty chart of Jervis Bay indicating the most favorable position of land for Commonwealth purposes.
- (e) Map of the proposed Federal territory showing by distinctive colouring the various tenures under which lands are held.
- (f) A report covering the foregoing from (a) to (e), and generally.

After having carefully considered Mr. Scrivener's report, and the other information afforded by him, and having made a second personal inspection of the country, we have the honour to submit our views and recommendations.

In the determination of the relative merits of the sites for the purposes of the Federal Capital City, we have borne in mind the principles laid down in your minute of the 21st December last, particu-

larly with reference to the primary essentials of the territory, viz.:—

- (a) That it includes a site or sites possessing the necessary topographical characteristics for the Federal Capital.
- (b) That it includes the catchment area of the water supply for the Capital. Such water supply must be of sufficient magnitude to place the question of volume at all seasons, and purity, beyond doubt.
- Note.—It is desirable that the catchment area shall be in the proximity of the Capital Site, but should the topographical examination of the district disclose the fact that such a condition is not practicable, then the catchment area must be connected with the Territory, including the site for the Capital, that is to say, severance must be avoided.
- (c) Sanitation.—That the site provides for a perfect system of sanitation, not only so far as the City itself is concerned, but generally;

and your desire "that the Federal Capital should be a beautiful city, occupying a commanding position, with extensive views, and embracing distinctive features, which will lend themselves to the evolution of a design worthy of the object, not only for the present, but for all time, consequently the potentialities of the Site will demand most careful consideration from an hygienic stand-point, with a view to securing picturesqueness, and also with the object of beautification and expansion."

Also we have been guided by your instructions of the 9th February last, when establishing this Board, when you approved of the following:—

"To consider the results of the preliminary investigations, and to advise you as to the site or sites which conform most closely to the requirements of the Seat of Government."

*Qualifications and Factors.*

We therefore deemed it necessary to give particular prominence to certain essential qualifications and factors, viz.:—

- Contour and physical features.
- Area available.
- Aspect and shelter.
- Panoramic value.
- Railway facilities and approach.
- Facilities for classification of city areas.
- Ornamental water areas.
- Disposal of sewage.
- Suitability of soil.
- Water supply—domestic.
- Water supply—power.
- Water supply—ornamental.
- Environment and park lands.
- Suburban settlement.

*City Site.*

With the foregoing in view, we advise that the area most suitable for the purposes of a Site for the Federal Capital City is that indicated by red tint on the accompanying lithograph plan of Mr. District Surveyor Scrivener's contour survey of the Canberra district.

The Site may be briefly described as a rectangular area, the eastern and western boundaries of the northern part resting on the slopes of Mount Ainslie and the Black Mountain, the southern boundary being intersected by the Narrabundah Range, running from Mugga Mugga Mountain towards the Molonglo River. This river, which flows through the area in a westerly direction, affords facilities for the conservation of water for ornamental purposes.



The whole area is generally suited for building purposes, the feature contours being more marked or bolder south of the River Molonglo than on the north.

The area of about 3 miles square is recommended advisedly in order that the fullest scope may be given for the projection of the City design, and the most effective location of the official centre.

#### *Sewerage.*

Respecting the sewerage of the proposed Federal Capital City, we consider that no engineering difficulties will be encountered in the satisfactory disposal of sewage, and the effluent from treatment works. It will be necessary to make provision for dealing with the storm waters, in which connexion the general fall of the land favours a satisfactory scheme.

#### *Cotter River.*

There is a supply of perennially clear and pure water in the Cotter River. The catchment area of this river, above the point at which the gauge readings for 1908 were taken, embraces an area of about 170 square miles. According to the 1908 records, the supply at the point of gauging is sufficient for the domestic and civic requirements of a population of 250,000; the total volume from the catchment area of 170 square miles would be available, however, only by pumping.

It is practicable to supply water by gravitation from the upper 100 square miles of this catchment to service reservoirs at the city. Such a scheme would involve large capital expenditure, even for the initial population.

For water supply only—apart from power—a pumping scheme with conservation works, designed for extension in course of time, presents advantages over a gravitation scheme. To accept the Cotter River as the source of power (in addition to supply) involves carrying out of part of the engineering works for the gravitation scheme. To meet the combined demands the full development of the Cotter would (so far as available data indicates during years of low rainfall, such as 1908) provide for a population of 50,000, a sufficient water supply for domestic and civic purposes—for electric transmission of energy for lighting, and for city power and street tramways; but from the information available it cannot be determined whether or not a scheme combining a gravitation water supply and a power installation could be laid down at a cost that would be economical. In view, however, of the maximum consumption during drought, combined with the minimum flow during successive years of low rainfall, it cannot be anticipated with certainty that the Cotter supply would meet the demands for the above combined purposes for a greater population than 50,000, and for manufacturing purposes of any magnitude, should such ever be proposed within the territory.

#### *Molonglo and Queanbeyan Rivers.*

There are, however, other sources of water supply for power in the territory, namely, the Molonglo and Queanbeyan Rivers combined. In order to regulate the flow of these rivers through the Capital City, and to conserve water for ornamental purposes, the construction of weirs on the upper reaches will be necessary. The total catchment is about 500 square miles, and, in conjunction with developed conserva-

tion, the combined flow of these rivers, taken off from the weir below the city area and carried to a site for generating, would provide considerable power. The character of the country points to the practicability of such a scheme, but there is not sufficient information available upon which to estimate the cost. It will be a question for prolonged gauging and still further investigation to ascertain the possibilities in this respect. It may transpire that, in view of capital expenditure for a power scheme from the Cotter River, coupled with the possibility of being faced at a future date with dual schemes (an auxiliary source of power) that the Queanbeyan and Molonglo flow may be found preferable for power, thus conserving the whole of the Cotter for domestic and civic supply.

#### *Ornamental and Flood Waters.*

Ornamental water may be conserved at the city by means of a weir at any one of the sites indicated on the map of the contour survey of Canberra. It will be necessary, however, to preserve a constant level in the lake so formed, which object will be attained by the construction of a weir above the town of Queanbeyan—on the Queanbeyan or on the Molonglo River, as shown on the map of the Federal territory. A weir on either river would impound sufficient water to maintain the flow of the Molonglo below the junction of the two rivers (during dry periods), and thus compensate for the loss by evaporation on the city ornamental waters. It is also pointed out that weirs on the upper reaches of these rivers will regulate the flood waters.

#### *Railway to Port.*

The Board is of opinion that a practicable route for railway communication can be found between the site of the Federal Capital City and Jervis Bay, but consider that, before location is finally decided upon, an exhaustive examination of the intervening country should be made, in order that all requirements may be met.

#### *Port Jervis Bay.*

With respect to the proposed port for the capital, we are of opinion that Jervis Bay meets the requirements of the Commonwealth, and that the area of land proposed by Mr. Scrivener in his report, and situate at the southern extremity of the bay, is the most suitable. This part of the bay is protected from winds between the north-east and south, and in a measure from the west, but is exposed to those from the north and the north-west; which may involve the construction of protecting works. The anchorage is good, and the three-fathom and five-fathom lines lie close inshore. The entrance to the port is good in all weather.

#### *Area of Territory.*

The area included in the boundaries of the proposed Federal territory is approximately 648,587 acres, or slightly in excess of the 1,000 square miles originally referred to by this Board. The actual area, however, can only be determined after survey of the territorial boundaries.

#### *Population.*

The population within the proposed territory is approximately 4,000.



## *Acknowledgment.*

We desire to acknowledge our appreciation of the valuable reports made by :—

1. Mr. L. A. B. Wade, M. Inst. C.E., Chief Engineer for Irrigation and Drainage, Department of Public Works, New South Wales, respecting the Sewerage of the proposed Federal City.

2. Mr. E. M. de Burgh, M. Inst. C.E., Chief Engineer for Harbors and Water Supply, Department of Public Works, New South Wales, respecting the Water Supply obtainable from the Cotter, Molonglo, and Queanbeyan Rivers.

3. Mr. W. Corin, M. Inst. C.E., Electrical Engineer, Department of Public Works, New South

Wales, as to Electric Light and Power Supply available within the Territory.

We have the honour to be, Sir,  
Your obedient servants,

DAVID MILLER (Chairman),  
Secretary, Department of Home Affairs.

PERCY T. OWEN,  
A. Inst. C.E. ; A. Am. Inst. E.E.,  
Director-General of Commonwealth Public Works.

W. L. VERNON, F.R.I.B.A.,  
Government Architect, New South Wales.

CHARLES ROBT. SCRIVENER,  
District Surveyor, New South Wales.

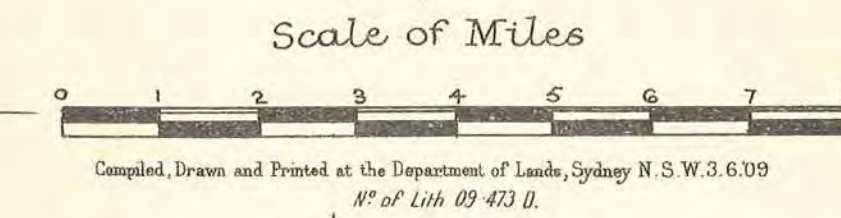


# MAP

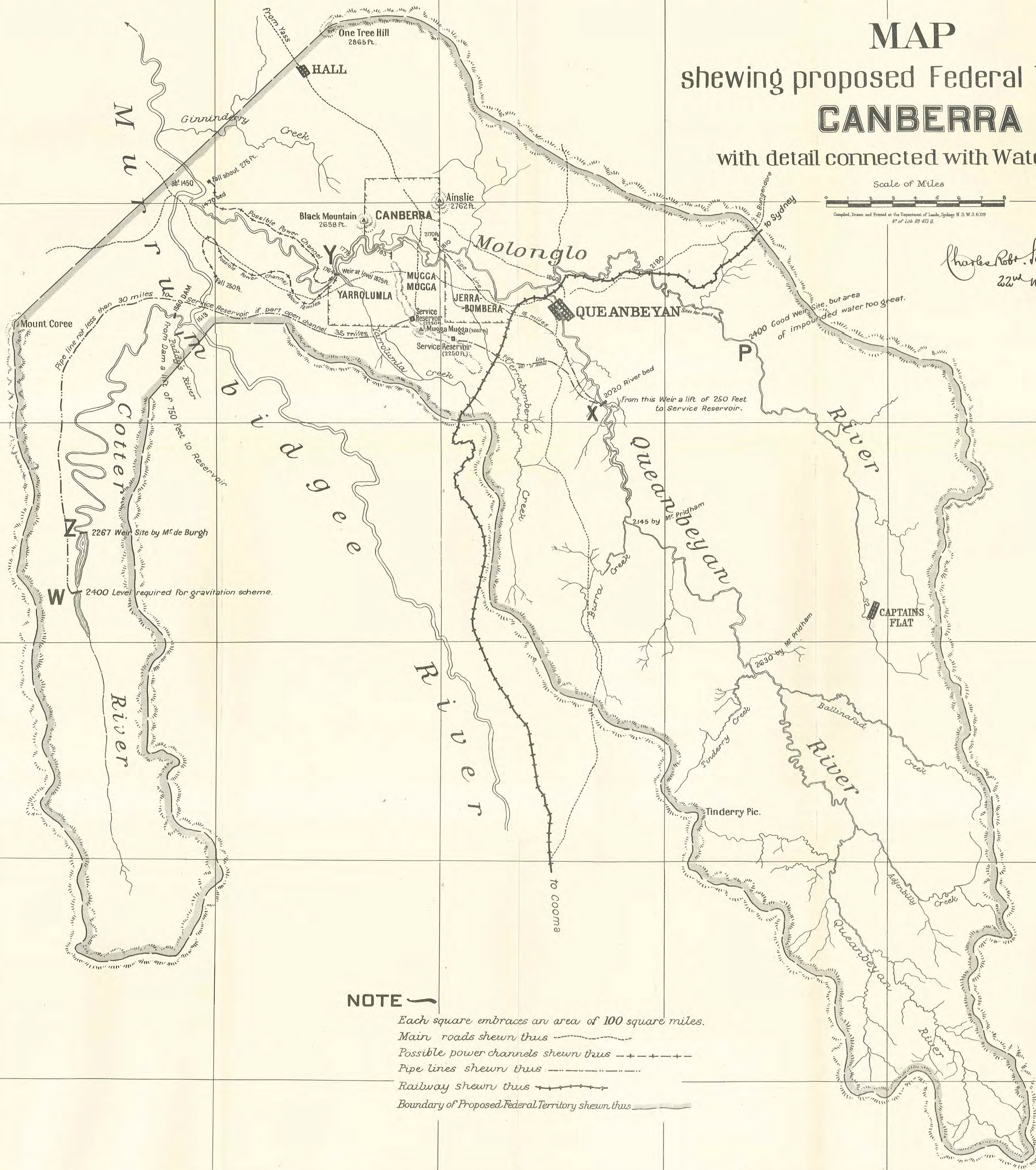
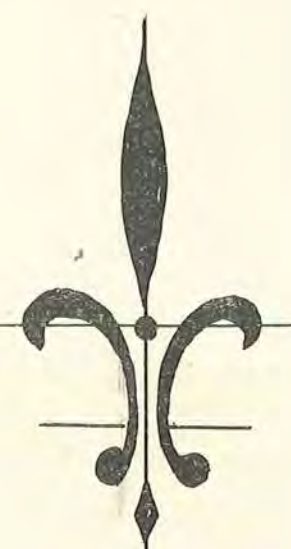
## showing proposed Federal Territory

# CANBERRA

### with detail connected with Water Supply



Charles Robt. Scrivener  
22nd May 1909



#### NOTE

Each square embraces an area of 100 square miles.  
Main roads shewn thus ————  
Possible power channels shewn thus — + + + +  
Pipe lines shewn thus — - - - -  
Railway shewn thus — + + + +  
Boundary of Proposed Federal Territory shewn thus ————