

"BOTANICAL GARDENS IN CANBERRA"

A report dealing with scope site, buildings
costs of maintenance, etc.

by

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In preparing the accompanying report concerning the establishment of botanical gardens in Canberra I have endeavoured to foresee every likely main contingency and so to present as complete a survey as possible. Throughout the report two important considerations were kept constantly in mind. In the first place botanical gardens cannot be created in a short time. They take years to establish and once established they cannot be materially changed in general lay out. Consequently the most careful attention must be given to the choice of site and its suitability for the development of the main features of the gardens. Further if the establishment is once initiated it should be pursued consistently in order that the scheme may come to fruition in a reasonable period of years.

In the second place it is necessary to be quite clear on the point that botanical gardens cannot be successfully maintained, even if initially well-founded, in the absence of an adequate annual appropriation. For this reason a section is devoted to estimates of annual expenditures which it is thought will obtain when the general lay out of the botanical gardens has been accomplished and attention to detail assumes increasing importance. From the commencement it will be necessary to approve an annual expenditure for some permanent staff under the direction of the Superintendent of Parks and Gardens because the work of establishment cannot be left solely to casual labour but it will be some years before the annual requirement reaches the £15,000 estimated.

No attempt has been made to present any details of lay out because it was assumed that consideration of general principles only was required at the moment. Attention is drawn to several points about the choice of site which is recommended in this report.

It is not to be confused with the area marked on Map 103 B as Canberra Gardens, near the Stadium and Aquarium, which

should be ornamental gardens tending to be quite formal in design. Nor does it coincide with the Continental Arboretum scheme suggested by Mr. Burley Griffin for the surroundings of West Lake and the lower Molonglo reaches. Instead the area recommended, as shown in the accompanying rough plan, invades that part of the area set aside for University purposes which approaches the lower slope of Black Mountain and also the residential area alongside the site of the laboratories of the Council for Scientific and Industrial Research. It is necessary to include the former in the area in order to have some approximately level land as a contrast with the large area of slopes and as a site upon which to erect glasshouses, etc., and in which to develop certain specialized sections. It is extremely unlikely that so extensive a massing of University buildings will eventuate as to require the use of this land for such purposes. The area at present allotted to residential development should be included because it is not only conspicuous and susceptible of treatment but it is of some size and has the best gradient and soil of any of the slopes.

The choice of this site is particularly recommended because, while the soil is far from good, it is the most sheltered from strong westerly winds in marked contrast with all the area allotted to the arboretum as shown on Map 103 B and protection from wind is very necessary in Canberra if the best effects are to be obtained.

It is not disguised that the land is gravelly and that the control of the gullies which have developed down the slopes will constitute a difficult problem, though one not impossible of solution. Against this is to be set the scenic beauty of the site with the lake and the mountain forming the lower and upper boundaries.

Development of the scheme, if approved, will necessarily occupy several years and during this time casual labour could usefully be employed for work such as road and path making, gully treatment, drainage, grading, trenching for water reticulation and so forth. Prior to the initiation of developmental work it is obvious that plans of the broad lay out will be required and the preparation of these will entail considerable study because of the relative permanence of the main features of botanical gardens.

In order to facilitate the preparation of a detailed design it is necessary to have a large scale map of the area and this will involve a special survey.

If the site recommended for the botanical gardens is approved the upper slopes of Black Mountain should be constituted a Reserve because there are to be found the most numerous examples of native wild flowers in the city area. It will be a matter for regret in future years if they are not protected now.

In the succeeding pages the proposal is dealt with under the following captions:-

- I. Type and scope of the proposed gardens.
- II. Site of the gardens.
 1. Relation to other city features.
 2. Area.
 3. Accessibility.
 4. Aspect, soil, etc.
 5. Possibilities of subdivision.
- III. Roads, paths and parking areas.
- IV. Buildings.
- V. Costs of maintenance.
- VI. Scheme of Development.

1. TYPE AND SCOPE OF THE PROPOSED GARDENS.

There are in the world about three hundred and fifty botanical gardens, some of which are national, as the Royal Botanic Gardens at Kew, some municipal, as the New York Botanical Gardens in Bronx Park, and some connected with Universities, particularly in Europe, as the Hortus Botanicus at Amsterdam where De Vries carried out his remarkable researches into mutations among plants.

Modern botanical gardens are derived from one-time herbal gardens, whence arose the study of systematic botany, of which an outstanding example is the Chelsea Physic Garden established in 1673. As a result of this derivation the organization of a properly equipped garden involves not only the services of a head gardener and his assistants, but also those of a director and a scientific staff. The modern tendency is for botanical gardens to become a combination of scientific and educational institution and public park, a fact which is well illustrated by the Royal Botanic Gardens at Kew, Le Jardin des Plantes of Paris, Berlin Botanic Garden at Dahlem, the New York Botanical Garden at Bronx Park, and the Botanic Garden of the Imperial University at Tokyo, Japan.

In view of the anticipated development of Canberra as the capital of the Commonwealth with a University and scientific institutions, the Botanical Gardens should be planned to serve as an additional scientific institution and as Canberra will increasingly become a Mecca for visitors the conception of a public park with aesthetic landscape treatment should be a natural part of any scheme of development. The botanical gardens of the sister national capital at Washington have tended to be more of a public park, and the scientific side has not been developed to the extent that it has in many other places. The authorities would be well advised to plan the proposed gardens at Canberra so that they are developed with a balance between the scientific

and the aesthetic, and certain not to the neglect of the scientific phase. That this is no new or extravagant basis for the establishment of botanical gardens is evidenced by the fact that similar institutions have been developed in Sydney, Melbourne, and other cities and the scientific staffs have justified their continued inclusion in the scheme from the national point of view equally as public appreciation has justified the expenditure on the aesthetic side.

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National education in floral and arboreal beautification of the home, the community and the country, is fostered by visits to botanical gardens where trees, shrubs and plants may be seen in appropriate settings and groupings. Many of our native plants are eminently suited to garden and landscape treatment and this is well recognised abroad for one may read in catalogues of highly prized plants originally obtained from the Australian flora, and similarly we owe much that is worth while in our gardens and parks to exotics. From this point of view, botanical gardens are centres of trial and demonstration and we are well equipped in this respect in the case of coastal zones, but not so for the highlands and near interior. It is here that the Canberra Gardens may play an important national part. All plants and trees of the Australian flora which are found to be hardy should be grown and in addition exotic plants and trees from homoclimates should gradually be collected for trial, or if already known, for use in these gardens. In this connection one may consider trees for avenues, or as isolated or grouped specimens on lawns, for shade or protection from wind, for autumn foliage or as evergreens, and plants may be thought of for the garden or indoor purposes. Deep fertile soil is not always a necessary requirement for beautification of surroundings because some most beautiful effects can be obtained by the use of alpine and rock plants or by making a heath garden or a bog garden. Consequently for the botanical gardens properly to fulfil their part of their function, they should provide examples of each kind of treatment.

A constant stream of visitors passes daily through the conservatory near the Treasury Gardens in Melbourne, to view the magnificent collections of cyclamen gloxinias, chrysanthemums or begonias in their several seasons, and similarly whenever they are

available fern-houses, orchid-houses, collection of foliage plants and succulents are a source of delight to thousands of visitors in the course of the year. So much is this the case that no botanical gardens of note are without such houses, and it is very desirable that a group be included in the scheme for Canberra Gardens.

For schools and University, a botanical garden is necessary for the full development of courses of instruction and study in botany as a science, or as applied to horticulture, agriculture, landscape gardening, silviculture and so forth. In fact, as noted earlier, in many cases botanical gardens were not public places at all, but were adjuncts to the Universities.

For scientific studies it is also necessary to have as full a representation as possible of the Australian flora and of specimens from homolines. The difference in point of view between the landscape and scientific requirements will occur in those special cases where plants are arranged in botanical groups, e.g., a family or an order for comparison purposes, without regard to effect. With trees and major shrubs also, planting may be arranged on a continental basis, but in this case, landscape composition is possible.

Class-houses and shade-houses are necessary for University studies and, except in special cases, those which are used for general plant culture can also be used for scientific investigations and particularly so in winter.

II. SITE OF THE GARDENS.

1. RELATION TO OTHER CITY FEATURES:-

While it is necessary to consider such questions as suitability of soil, drainage, protection from wind and so forth in selecting a site, it is obvious that consideration should be given in a developing City like Canberra, to the relation of any proposed site to the other major features in the layout of the city and its environs.

In the "Report Explanatory of the Preliminary General Plan" for the Federal Capital (October 1913) Walter Burley Griffin deals with Botanical Gardens under item 2. 11121 which has to do with the University. He suggests by diagram on p. 9 of the Report that the Botanical Gardens should be near the University, particularly adjoining the Botanical and Agricultural buildings, and adjoining the Forest Reserve and Black Mountain. On p. 7 of the Report he again refers to the botanical gardens in the paragraph :

"The Molonglo is left in its present state in the lower channelled reaches, where it forms a feature of the botanical gardens and forest reserve continuous with Black Mountain, incidentally perpetuating there the only remnant of primeval luxuriance on the city site."

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On Map/B, however, the lower channelled reaches of the Molonglo are bounded by areas devoted not to botanical gardens but to an arboretum scheme on a continental basis. A rough estimate indicates that the area proposed for the arboretum is about 800 acres.

Judging by the diagrams on pp. 8 and 9 of the Report, it would appear that the site for botanical gardens suggested by Griffin is on the Black Mountain part of the water axis of the city and it must be concluded that he considered the arboretum the same as botanical gardens.

The conclusion which the writer has reached as to the site after giving careful consideration to other possible areas is in conformity with the view that it should be near Black Mountain. It is certain, however, that the actual area, as defined by boundaries, which is being recommended is not the same as that which was in the mind of the originator of the plan of Canberra because according to Map 103 B several buildings were projected on the site which is recommended herein.

The site recommended by the writer stretches from the southern boundary of the area occupied by the Council for Scientific and Industrial Research generally southwards along the margin of the lake, including the promontory area marked South America on Map 103 B. The approximately south-western end overlooks the bridge leading to the Zoological Gardens (labelled Australia and New Zealand on Map 103 B) the approximately western boundary is the timber line on the slopes of Black Mountain and the north-eastern boundary at the northern end runs from the 1825 foot contour to University Avenue.

This site is roughly outlined on the accompanying plan and is seen to be about $1\frac{3}{4}$ miles in length from University Avenue to the tip of "South America" and slightly less to the bridge leading to the Zoological Gardens. In width it varies from about 800 yards at the northern end to 120 yards in the middle. The slope is one in fifty at the northern and one in ten at the southern end. The general appearance of the mountain slope part of the site is shown in the accompanying panoramic photograph taken from the opposite side of the lake and in which the lake position has been vignettted into the photograph. (Photograph 1).

With reference to other features of the city the proposed site of the botanical gardens seems to be most suitable. It is continuous with the site of the Zoological Gardens so that the access road system can be made to complete a circuit of both areas. The mountain backing will not only provide shelter from wind but will augment the beauty of the setting, particularly when the lake completes the scene. It will form a feature which is visible from many points such as Capitol Hill, Acton, Civic Centre, Ainslie, etc., and the planting schemes of Civic Centre, University Ave., the University site, C.S.I.R., etc., will combine with the Botanical Gardens and the Zoological Gardens to form a magnificent belt of vegetation.

It will be located so that the Commonwealth Forestry School, the University and C.S.I.R. will be within easy access. Rising above it are the upper slopes of Black Mountain and these should be constituted a Reserve complementary, as it were, with the gardens.

From the higher slopes of the gardens, especially above Sullivan's trig-point, the splendid views across the city to the surrounding hills strike one instantly and they should attract many visitors. Some of these views are illustrated in photographs 2, 3, 4,⁵ and 6.

2. Area of the Gardens.

To enable the best development of any botanical gardens an area of some size is essential, particularly when the arboretum phase of the Gardens is given its proper proportion in the scheme as should be the case in Canberra. Further, in order that the gardens shall be in keeping with the general scheme of layout for the capital, they should be spacious and susceptible of considerable subdivision.

The writer has not been able to measure the proposed area with any exactitude, but by visual examination it would appear to be about 300 acres. The plantable area is of course reduced by the requirements for roads and paths, by the gullies which cannot be avoided and by the space required for buildings and nursery areas. Just how much the above will reduce the plantable area it is impossible at present to say.

It may be of interest to compare the area of the proposed Canberra Botanical Gardens with those of other gardens in Australia and elsewhere. The Sydney Botanical Gardens cover 88 acres, while those in Melbourne are 100 acres in area. The Royal Botanic Gardens at Kew were originally 15 acres in extent but now cover 95 acres. The Arnold Arboretum commenced with about 125 acres in 1872 and now has 220 acres free of taxes for 1000 years. The New York Botanical Gardens established in 1894 comprise 250 acres and those at Buitenzorg total 89 acres in the city, 173 acres outside and a further 74 acres on the slopes of the volcano of Gede.

It is clear from these comparisons that the area of the proposed gardens in Canberra is reasonable, and this is especially so when one considers land values.

3. Accessibility:

To serve best the public and scientific interest comparative ease of access to the gardens is desirable as is so well illustrated in the case of the Sydney gardens. Access to the proposed site will be obtained from the northern part of the city via University Avenue and from the southern part at Westridge via Garden Gate Drive (Map 103B) through the Zoologic Gardens. When the University Grounds are established access can be had from them to the Botanical Gardens by gate in the north-eastern boundary. The time may come when water access is also

possible from Acton across the lake to the gardens.

4. Aspect, Soil, etc.

(a) Protection from wind is desirable as trees growing in an area exposed to the buffeting of strong winds tend to grow unsymmetrically and to lean from the upright. In the area proposed a certain measure of protection is given to a considerable part by Black Mountain. The most exposed part will be the peninsula above-noted at the southern end of the gardens. In this it may be necessary to develop windbreak masses of trees in suitable locations. No other available area combines the same scenic beauty with protection from wind.

(b) By utilising the lower slopes of the mountain a further advantage is gained in the reduction of danger from frost damage. Frosts will occur of course but they will be less severe on the slopes as compared with low-lying areas where temperatures of about 10-12° fah. on the grass have been registered (Acton, June 19th and 20th, 1935). Even so it may be necessary to grow shelter belts or zones in certain cases for the protection of exotic trees, shrubs, and smaller plants.

(c) The soil is not ideal either from the point of view of variety or fertility. An ideal site would contain soils derived from under-lying limestones, others from sandstones and still others from igneous rocks, as for example is the case near the junction of Paddy's River and the Cotter. The choice of such a site within the city area is precluded as, with the exception of a small area of laminated porphyries in the northern corner and small areas of quartz porphyry in the west and south, the city area is almost entirely in the zone of Silurian shales and sandstones.

The area proposed for the gardens is thus all of the same formation and the soil, which is part of the alluvial

deposit forming a detrital fan at the foot of the mountain, is mainly red and gravelly. The fertility level will gradually be raised by cultural methods and experience with similar soils in other parts of the city area indicates that trees and shrubs should do quite well when once established. Certain types of trees, however, prefer specific types of soils and it would be impossible to develop any large groups of such trees in the absence of such soils. For specimen trees, of course, soil may be provided by transferring requisite quantities to the site.

(d) Drainage problems are of two kinds, viz., those concerning the area as a whole, and those which involve detailed agricultural drainage.

It is certain that, with gardens situated generally on slopes of varying gradient, care will have to be exercised in the provision of run-off ditches, etc. on contour lines, so that soil erosion by water is reduced to a minimum.

The gullies which have developed down the slopes will require treatment to control their further extension during heavy rains as well as to render them susceptible of landscape treatment. They are at present uncontrolled and unsightly.

Agricultural and contour drainage will need to be considered when the detailed layout is settled.

While on the subject of drainage, one naturally thinks of water supplies which are an essential requirement for botanic gardens. With a reservoir on Black Mountain, and a pipe line traversing the area recommended for the gardens, it would seem quite feasible to arrange for reticulation of water supplies for all services in the gardens without great difficulty.

5. Possibilities of sub-division:

It is customary so to arrange the layout of a botanical garden that lawn areas are available and in the Melbourne Gardens for example, there are four, the central, eastern, western and buffalo-grass lawns. In and around these lawns are arranged about forty-two botanical groups with five hundred genera and almost two thousand species.

The area proposed for the Canberra Gardens does not lend itself to a simple layout of lawns because much of it is on slopes of a fairly steep gradient. Two parts do, however, commend themselves in this respect - the area immediately adjoining C.S.I.R., to the South and the area between the present road leading to University Avenue and the north-eastern boundary of the recommended site. It is because this latter area is approximately level that it is recommended to be included in the botanical gardens, although it appears to be allocated as part of the University area. It is here that glass-houses, nursery and propagating sections should be placed as will be noted later.

While other grassed spaces will be relatively limited in size, it will be possible so to arrange planting schemes that adequate spacing among botanical groups or in specialised sections is allowed. In fact, where trees form an important part of the gardens, as they must in these, it is necessary to have space in order to stand away and view them properly.

All botanical gardens develop specialised sections such as alpine rock garden, moraine garden, bog garden, heath garden, iris garden, succulent garden, and so forth.

The rocky slope overlooking Sullivan trig point is susceptible of development as an alpine area, and in fact, should be a striking part of the gardens. The alpine may be grown both above and below the site, where the water tanks once stood, and leading to them the path should be alternated with flights of irregular rock steps. Where the tanks stood is an ideal position for a lookout for the very fine views of the

surrounding country and hills, and it is recommended that a shelter or kiosk be erected here.

The quarry which at present is an unsightly scar can also be utilized for rockery plants. It is recommended that the floor of the quarry be levelled and the forward part used as the site of the Gardens refreshment kiosk, which will be required for the convenience of visitors. At rear of the building the quarry face can be utilized for rock plants, especially of the climbing or hanging types. Areas to the north and south forward of the building, each about 20 yards by 45 yards, can be made into parking areas and the part in front from the sunken road up to the refreshment building should preferably be terraced.

In the area adjoining the University, bog, heath, iris, and other such specialised sections can be developed.

The main road through the gardens should be bounded by specimen trees to form a series of avenues, rather than one long avenue, and the breaks so arranged as to allow views along vistas or across the lake to wide views. Similarly the planting of trees anywhere in the Gardens should be carried out so that not only is it possible to see individual specimens, but vistas from various focal points are always available.

111. Roads, paths and parking areas:

Because of the general shape of the site and its relation to other areas, the main road must traverse the length of the proposed gardens and in part, along the lake margin. It will join University Avenue at the northerly end and the road through the Zoological Gardens at the other end. A branch of it should enter the part of the Gardens marked North America on Map 103 B. in order to provide easy access to that part of the Gardens. A short side road will be necessary to accommodate traffic to the glasshouses and propagating section at the left, entering from University Avenue, and a car road leading to the Director's quarters on the right.

It is impossible to lay down anything specific as

to paths until a detailed planting plan has been decided upon, but it would seem that little difficulty should be experienced because the area is well supplied with gravel.

Reference has already been made to the possibility of using two areas on either side of the quarry area for parking, which should accommodate sixty or more cars with ease. It may be necessary eventually to arrange another parking area near the University Avenue end of the gardens, particularly for visitors to the glasshouses and the special sections in that part.

IV. BUILDINGS.

It is obvious that certain types of buildings are essential in a botanical garden and others, while not essential from one point of view, are recognised as forming part of a complete scheme.

In the nursery area a potting house, seedhouse, shadehouse and propagating house are necessary for the regular supply of plants to the gardens. Similarly implement shed, paintshop and toolsheds are required, together with stables if horse-drawn instead of motor driven machinery is used.

For the convenience of visitors it is customary to provide a refreshment kiosk and reference has been made earlier to the possibility of utilizing the quarry site for this purpose. For the further convenience of visitors it has been suggested that a lookout shelter be built on the slope above Sullivan trig. point.

Glasshouses and conservatories form a very prominent feature of botanical gardens in cold climates such as at Christiania, while at Buitenzorg shadehouses are more required. Here in Canberra the climate is such that, if any attempt is made to present examples of collections like orchids, foliage plants, tropicals and ferns, glasshouses are essential. There is no doubt about the attractiveness of glasshouses and conservatories to visitors and on this count alone, ^{some} should be erected in the Canberra botanical gardens. They would be available for scientific work as well as functioning as show places.

Gardeners' quarters should be provided in order to enable the necessary supervision of the gardens at any time. In the Melbourne gardens, in addition to the Director's house, there are cottages for three gardeners and a carpenter, erected at convenient points, and in Sydney the superintendent and overseer live in the grounds. At least two cottages would be necessary in this case, one near each end of the main road traversing the gardens and a third is desirable in the glasshouse and nursery area, especially for oversight during winter.

It is usual in botanical gardens of any consequence to have the Director live on the ground and if the scheme for gardens in Canberra comes to fruition, such provision should eventually be made in this case, especially as the site is relatively distant from residential areas.

A working laboratory, not necessarily very large, and an office are obvious requirements. Adjoining the office it will be necessary to have a room for a library because it is inevitable that, once a garden is established, publications and reference books will be required for ready use in connection with the acquirement, and care of collections of plants and trees.

V. COSTS OF MAINTENANCE.

The cost of maintaining a botanical garden is greatly in excess of that for a park of the same area because it is more intensively developed from the landscape and horticultural point of view, as well as being specially developed botanically. It is in fact a great museum or exhibition of living plants, all of which must be specially tended and labelled under the care of experts. In many cases the trees and plants are also more costly to obtain in the first place, particularly when rare types are desired for the completion of collections.

It is impossible to make more than a provisional estimate of the annual cost for the maintenance of botanical gardens in Canberra, once they are established, until the actual scope of the gardens is determined, but a fair idea may be

gained by considering the costs of similar gardens elsewhere.

The Sydney Botanic Gardens cover about 88 acres with approximately one-third of an acre of glasshouses, one-sixth acre of propagating frames, one-fifth acre for Bush and Aquatic houses and a little over an acre of nursery or propagating grounds. The gardening staff is made up as follows:-

3	gardeners, special class.
4	" first "
18	" "
3	youths, junior gardeners.
1	patrolman.
23	labourers.
1	aviary keeper.

In addition there are 4 employees whose services are more or less general. Namely, a landscape gardener, a painter and label writer, a carpenter and a plumber. These four are also employed in connection with work in other grounds under the control of the Department of Agriculture.

The approximate cost in wages and salaries for the above at present rates works out at £12,000 per annum and a further £1,300 per annum is required for maintenance and working expenses.

In the Melbourne gardens the glasshouses cover 500 sq.ft. for tropical plants and 2400 sq.ft. for smaller displays and propagation purposes. The staff, including in this case the Director and 3 technical assistants totals 56 and the annual maintenance cost totals about £13,600.

In Adelaide, with a garden limited to 40 acres and including 2 greenhouses, 1 large conservatory, and several store houses, the gardening staff totals 24. Excluding the Director's salary the annual cost of maintenance is £5,680.

It would seem that to maintain Botanical Gardens in Canberra, of a size and kind which would be in keeping with the national capital, an annual expenditure of not less than £15,000 per annum is required once the gardens are properly

established. This estimate does not include the salaries of a Director and Superintendent or other technical officers who might ultimately be appointed. It is also to be understood that this figure applies only when the botanical gardens are fully established and during early years the amount required will depend on the rate and scope of development.

SCHEME OF DEVELOPMENT.

If approval is given to the choice of site and it is decided to initiate work on the gardens it is obvious that very careful consideration will have to be given to the plans for the main layout. This will take some time but it need not prevent the prosecution of certain preliminary phases of development in which casual labour could usefully be employed.

The quarry area could be cleared of rubble, the face of the quarry improved by the removal of loose blocks and by shaping, the parking area on either side levelled and the area in front terraced to the present sunken road. This is a prominent feature of the proposed area.

Practically all the work required to control the gullies could be carried out before planting is commenced. It is recommended that the upper parts of the gullies be cleared of loose gravel and so cut that series of small cascades and pools are made. Where necessary concrete retaining banks should be put in to prevent further cutting out and in the lower parts concrete basins of irregular outline set in to form the pools. Finally the outlets under the lake road should be constructed. preparatory work of this nature will enable an early start to be made in clothing the gullies with plants and ferns.

The construction of the main road system is an important piece of work which can well be carried out at this stage not only because it is an essential, the location of which is easily determined, but because it will be available from the beginning for traffic during the planting of the gardens. A further advantage in early construction of this road would seem to

be the utilization of a considerable quantity of stone from the site for the foundation. In suggesting this I have not consulted the Department and it may, of course, be that the stone is not suitable for the purpose.

In any case the clearing of stone and gravel from the surface of the site is another job which should be done in the early stages of preparation. This can be joined with a certain amount of grading which will be necessary in some parts. A number of trees at present on the site are unsuitable either because of position or because they are ill-shaped or partly dead. These require to be felled and grubbed out as all old stumps must be cleared.

Following the planning of the layout there will still be a considerable amount of work for which casual labour will be suitable in the way of grading, contour drainage, construction of paths and trenching for water reticulation. Planting of the trees in the main vistas and groups will take several years but it should be commenced at the earliest moment possible so that results may begin to appear in a reasonable time. During the period of establishment of the trees and large shrubs attention can be turned to the development of specialized areas or sections and to the general horticultural or floricultural treatment. Thus there will be a gradual organized evolution of the botanical gardens from which the most satisfactory results will be obtained.

The erection of glasshouses could also be spread over several years thus distributing capital expenditure.

I have not attempted to estimate the total capital expenditure required for the construction of roads and paths, the installation of water, the erection of buildings and glasshouses and so forth, as that seems to me to require departmental consideration, but obviously it will involve a fairly large sum. Instead I have indicated what seem to me to be the chief requirements if the botanical gardens of Canberra are to be worthy of the national capital.

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