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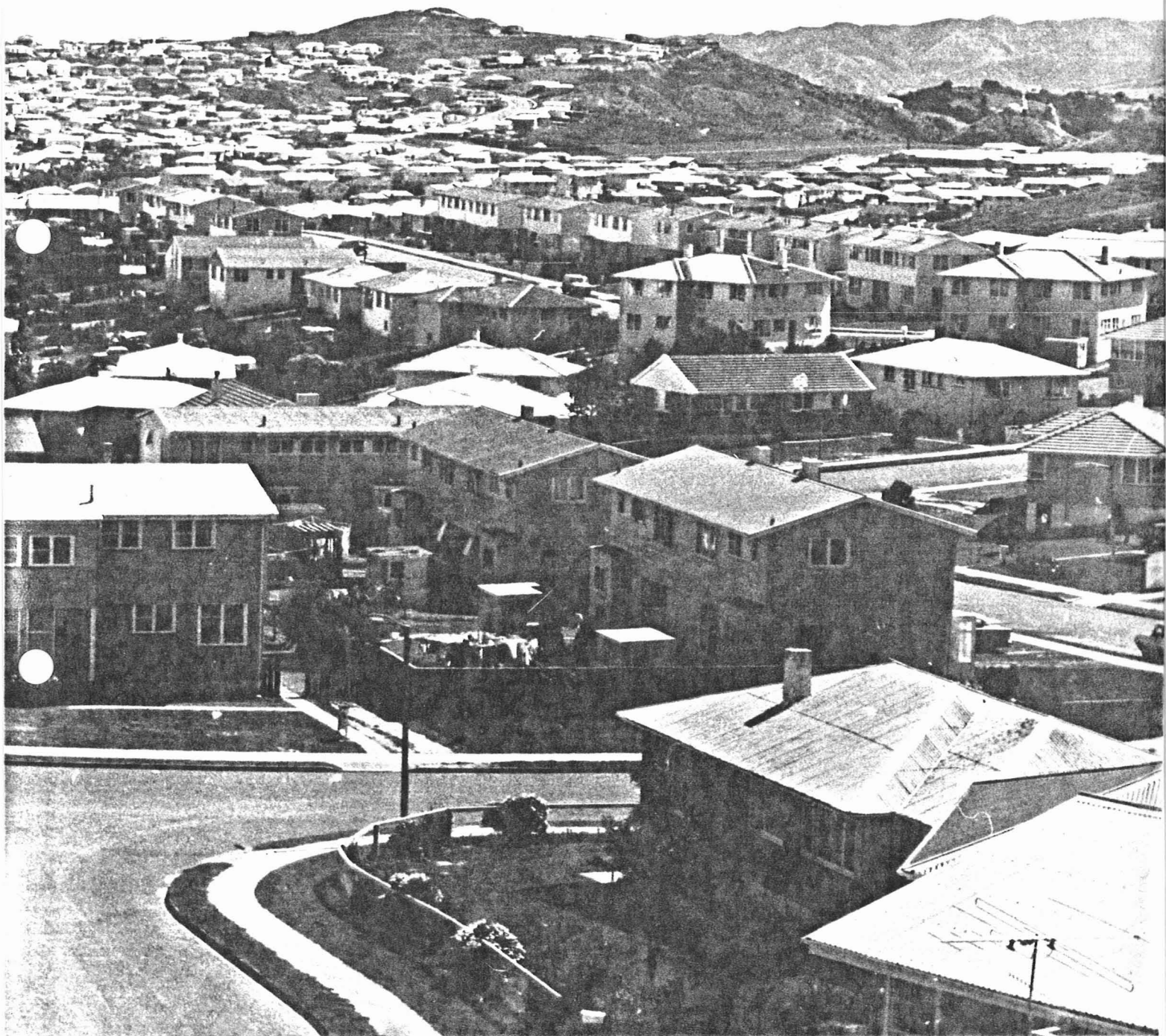
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Okowai

A Study In Hillside Residential Development

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A Research Study submitted for the
Diploma of Landscape Architecture at
Lincoln College, University of Canterbury
1977

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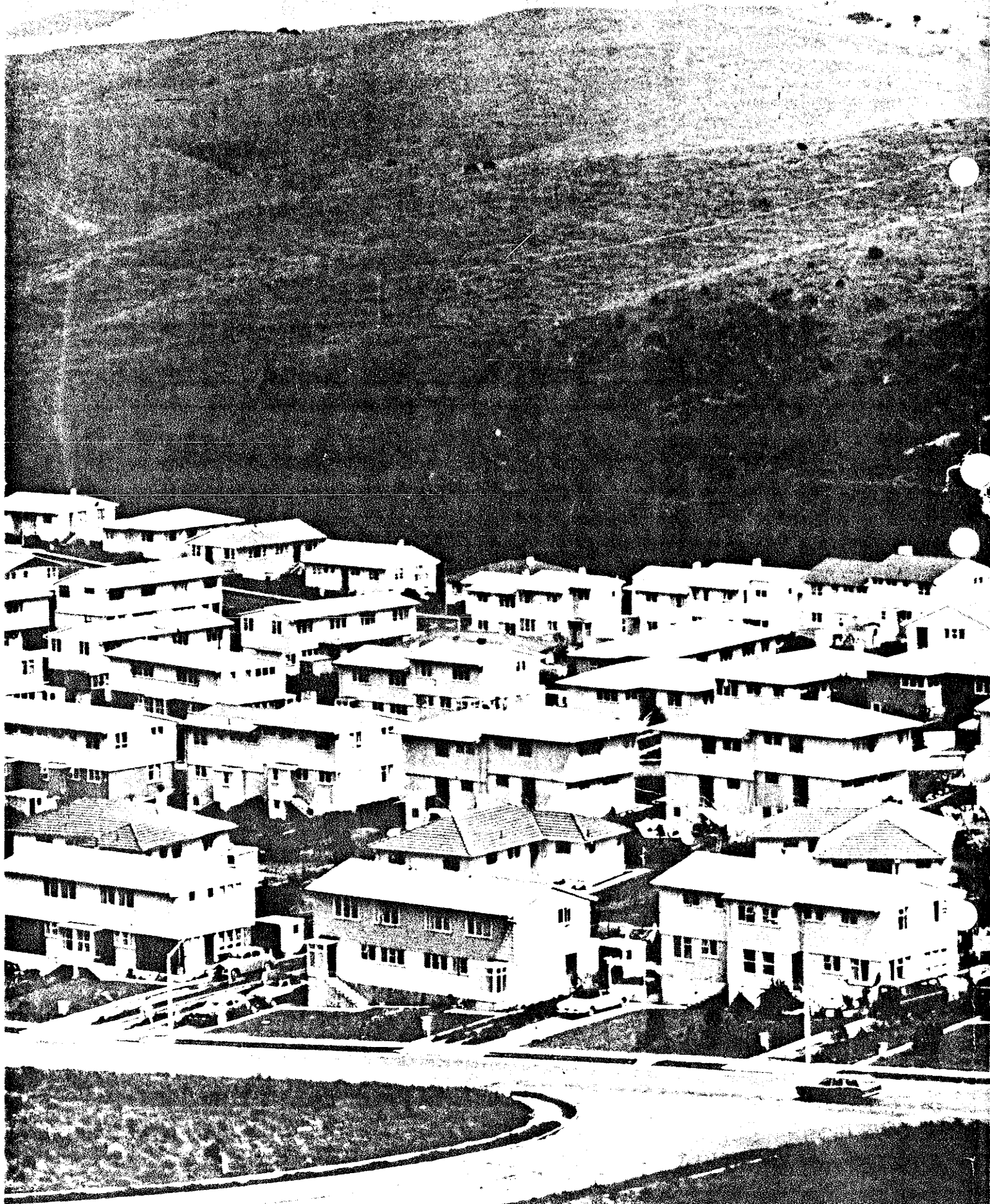
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Introduction & brief

A residential area is home for most people. It is also a social unit of individual and community. Residential environments are what most people, for a large part of their lives, see, experience and live. It is a refuge from work in office or factory, a place for children's education and play, for parents, for old people. The residential fabric is a place of life - it is man's environment.

Man's living environment is so fundamental that it is often taken for granted and in doing so, abused. Man's living needs are many. So is the landscapes, for it, also, is a living thing. The opportunities to cater for these needs in the creation of a residential area, are many and varied but requires a recognition of their existence and value to realise their full potential. Without this recognition, planners and designers are still shaping people by shaping their environments but in ignorance to the many needs of people and often at the cost of a satisfactory community. Hall says "both man and his environment participate in moulding each other"¹; but what sort of people are we creating in these environments of Porirua East?





This study is concerned with people and the land they will live on. The first section takes an overview of the living environment - an understanding of people and their living needs (which can be expressed in both conscious and unconscious desires and satisfied in both tangible and abstract form), the design principles of suburban areas, and a brief look at the problems and benefits of developing a hillside site, related to the Porirua/Wellington area in particular. The second section deals with a site that has been zoned residential, understanding it as a functioning, living landscape that can only successfully accept development with as little disturbance as possible to its basic needs.

THE BRIEF

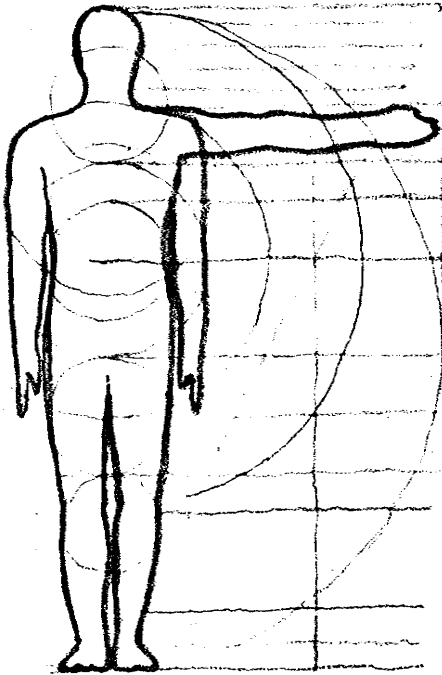
The main aim of this study is a landscape concept for a block of land in Porirua at the sub-division stage, which fulfils the following requirements:

- the creation of a relatively self-contained community on a suitable human scale
- the incorporation and utilisation of existing site qualities (and preservation where necessary)
- an investigation of problems and benefits of creating a residential area on a hill site
- to allow the opportunity for different housing patterns for both physical and social reasons.

I. Housing For People

Perception & space

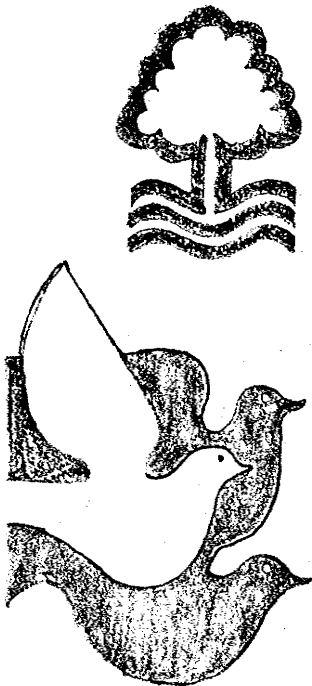
PERCEPTION OF THE ENVIRONMENT



Man's awareness and experience of his environment comes through his ability of perception and man perceives his environment in many ways. These are briefly through his visual, auditory, olfactory, tactile, kinesthetic and thermal sensory aspects. All make up man's relationship to his environment and his sense of space. Moreover, man's senses and his environment are constantly interacting in the further moulding of his sensory apparatus through sensory feedback. Man's growing awareness comes first from himself, second from his environment, then of himself scaled to his environment and finally from the transaction between himself and his environment.

THE IMPORTANCE OF SPACE

The space man lives in, indeed all perception, is dynamic, not passive, and can encourage or inhibit further development of his senses. Varying degrees of quality of space, then, will affect those who occupy and use that space. The experience of a given space will largely depend on what you can do, and what senses you can use in that space. The manufactured environment only allows the body and the spaces they occupy, a limited range of active experiences and these are lacking in excitement or variety. To compensate for this deprivation, the opportunities should exist, in man-made areas and particularly man-living areas, for sensory variation - that is space in which to build a 'kinesthetic repertoire' of spatial experiences.



Space is a universal need of man but is influenced and tempered by a variety of factors. Culture is of basic importance and will pattern most experiences. It will affect how we see, what we perceive and help determine what space is necessary

for physical and mental well-being. The experience of space is through a synthesis of sensory inputs and each is structured by culture. Hence people born into different cultures live in different perceptual and sensory worlds.

Cultural difference continues into the different perception of spatial zones. Hall classifies perceived space into four categories. These are:

1. Intimate space.
2. Personal space.
3. Social space.
4. Public space.

Together they make up the territorial needs of different cultures in both personal communication and public life.

Other significant factors, which add to and detract from the cultural dimension in the use of space, are society, social status and social relations which will have much impact on the perception of space, especially so in Western societies, and the economical and income considerations of a group.

These variables, particularly culture, affect perception of space and determine spatial needs. Thus, when planning for a community, the planner or designer must be aware of the nature of those people that he plans for. In the New Zealand context, the "community" cannot be talked of glibly, and especially on anything approaching a large scale, as one heterogenous block of people. A more realistic viewpoint may see society as a plurality of subcultures. In this light, the Maori culture, for example, provides many communities capable of decision making and community expression and by these means, are capable of cultural expression.

SPACE AND NEW ZEALAND HOUSING

Present housing patterns, particularly state housing, tends to ignore differences and divergencies among the population, apart from the all important economic consideration. New Zealand housing establishes one social climate, that of the middle class, and one cultural base (even the so-called "slum area" of Porirua East is based on a middle-class concept of housing compared with the shanty towns of the third world). Any new or different social-cultural group are only catered for in the respect of being given the opportunity to aspire to the New Zealand way of life. One type of house and living style commendably breaks down social differences and merges social groups into one homogeneous society, producing stability.



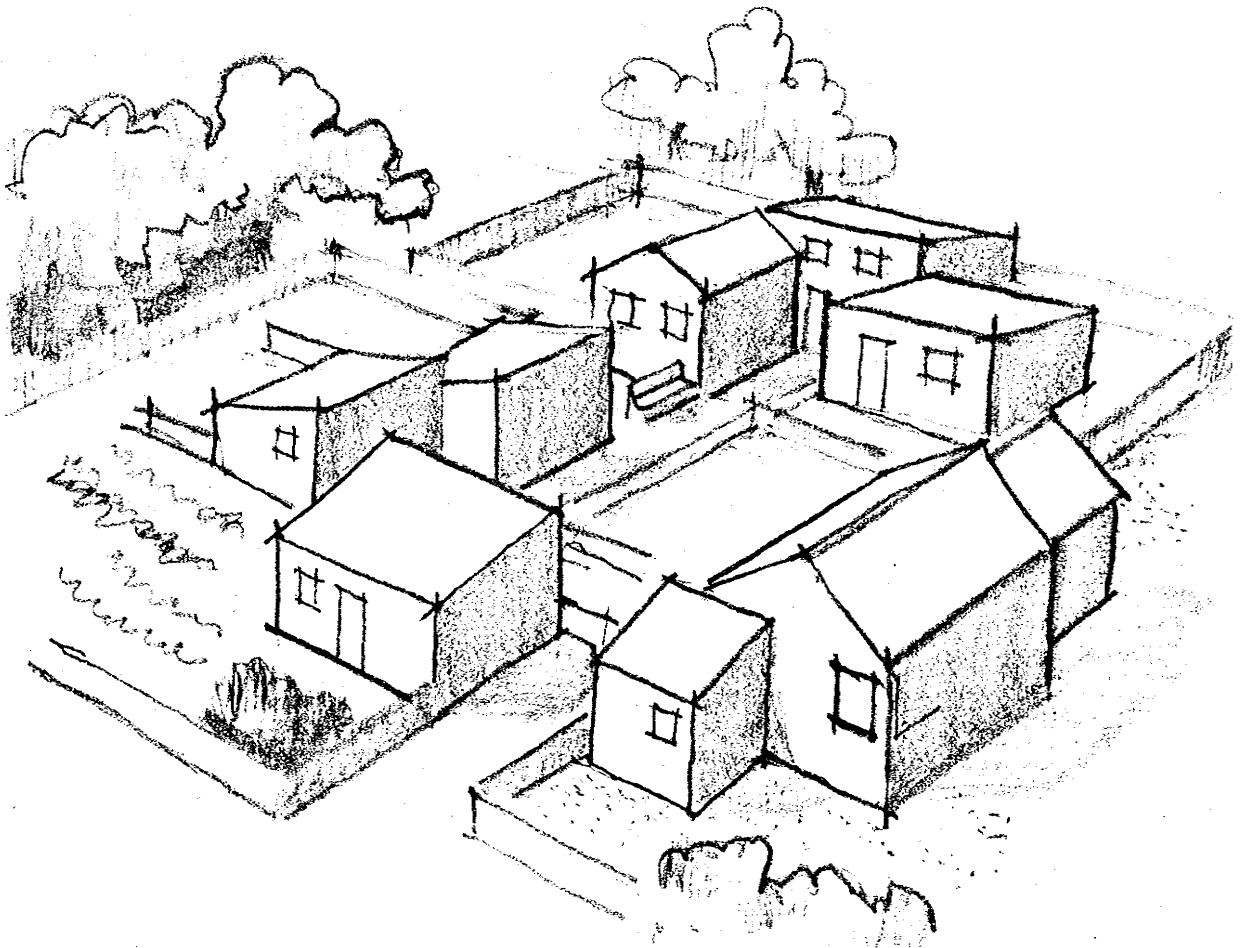
Unfortunately this may not be so. Invariably the effect is one of constraint, of one pattern attempting to provide for all living styles, and producing an ill-fitting, unsuccessful in what demands it is able to satisfy, misunderstood and hence abused living environment. Life lacks variety and richness, and perception of the environment dulled. Furthermore, stability is unlikely to follow. Instead, following the ecological parallel, the reverse may be the case, where a diversity of cultures leads to stability, and... "further, that many of these cultures provide a quality of life we cannot match"?

A more satisfactory solution to the housing demands of the many peoples of New Zealand would be to recognise and accept the differences in housing and living needs but also on a scale that can be used as a base in planning for these groups. One such group is provided in the flow of immigrants, pioneers of a new life style. Austin & Rosenberg

propose to use their separate identity in the view that "sees migrants as utilising aspects of their original culture and environment as a base for an urban way of life of their own"³

EXTENDED FAMILY HOUSING

A model offering a different living style in housing lies in the concept of Extended Family Housing. It accepts the premise that alternative living styles are necessary in the wider community due to diversity in living style, increasing population and the increasing movement of New Zealanders away from the stereotype of the nuclear family. It is also derived from the cultural base of the Polynesian life style of communal living in the extended family - the Whanau (extended family unit) is typical of such a unit.



An Extended Family Housing arrangement

At the same time, this concept attempts to offer solutions to living problems that present stereotypes cannot provide. These are namely the ability to house large families, the retention of social identity through the identity of the family, the satisfaction of individual and social needs of family ties, and the individual desires for alternative living which all creates an opportunity for diversification in New Zealand's living styles. This also means the demand will be taken off conventional smaller housing types through the satisfaction of large family needs, and in turn will aid pensioner housing and day-care centres.

Extended Family Housing is a social answer to a societal problem. Breakdown of family groupings, in many cases aided by the limitation of the families effectiveness through the physical environment, is a breakdown of the social basis of society and this concept seeks to re-establish the functioning of the family unit.

OPEN SPACE SYSTEMS

Cultural needs and identity are important to groups in themselves but are also extremely important to universal man in making up one of the criteria for perception of the environment. As has been shown, awareness and enjoyment of the environment comes with spatial experience. Space in which to perceive the environment, to allow the expression of human spatial needs, to establish territories, to create privacy, to provide freedom or seclusion from whatever is distasteful in his environment, for social interaction, for living. Thus it is desirable to utilise the concept of open space within the residential context wherever possible, as a unit of social value and a measure of environmental quality.

Space will often be prized in urban areas but mostly in terms of utilitarian space, treated as a commodity or cost. This includes space for transportation systems, storage areas and the visible requirement of commercial or civic uses. Space will be treated as a quantity, as a minimal standard that must be provided for adjoining uses, rather than as a measure of quality that satisfies people's needs.



Space for cars, not people at Waitangarua

This may be avoided in regarding open space as a structure in itself, a framework for the total planning of an area. Social values and natural process deem the necessity of such a structure and these natural processes of the land dictate the location of an open space network and the density of urban development. The landscape determines the open space pattern and open space determines the form of urban planning. Space, whether open or closed, is integral to man's living requirements and positively contributes towards the quality of his environment. Its use can be a base of future planning.

SUMMARY

Man's perception and his environment interact with each other and help create his sense of self. Space enables perception to function and will vary in quality. It is a universal need of man but is affected by a number of factors including culture, society and economics. Culture and cultural difference may be expressed through the many communities that make up the total community. This diversity is largely unrecognised by New Zealand housing. One attempt to cater for an alternative life style is Extended Family Housing - a social answer to societal problem. Space is a fundamental requirement but is more often regarded as quantitative rather than qualitative. However space can provide a structure for planning, as an open space system. In such a system, the landscape will determine the open space and open space will determine the form of urban planning.

Residential design

In present New Zealand suburban areas, the quality of life will often be dependant on building regulations, fire regulations, amount of set back and so on. Past experience in housing has shown the detrimental effect that these standard controls have created. The guide of minimum standards has a tendency towards breeding monotony by standardised constraints, becoming entrenched in time because they are rarely changed. Although borne from safeguards for better living, they are now the bearers of conventional stereotypes of residential areas and encourage tight constraints on creative development.

This chapter is about the physical design requirements of a residential area. In the past the physical criteria have served to inhibit the design input through unbending regulations. I shall attempt to show the way in which physical requirements are constructively incorporated into the comprehensive design of an area - using the regulations and standards to satisfy visual, spatial and privacy design requirements.

SUB-DIVISION CONTROL

The average sub-division of the private developer is handled by a variety of controls which ensures responsibility is decentralised. The possibility of a cohesive structure is dispersed by the developer and then by the ponderous control of local body and authorities, each concerned with their independence. This is not necessarily to condemn developers, for it is either their own or borrowed money at stake and they are anxious for proven returns as quickly as possible in this unstable market. What is apparent, however, is the opportunity and need for a strong planning authority, not based on sectional interests but comprehensive development. Such a role can be played by Housing Corporation.

The basis of siting of state housing in Porirua East is the adoption of a limited range of house/flat types to meet a narrow range of conditions.

Construction is sound but arrangement unimaginative and variety lacking. Generally a set pattern or procedure is set forth in which all physical factors influencing layout are outlined and hopefully implemented. However it can hardly be described as a design process but rather ad hoc adjustments, making as good a fit as possible. Intentions are good but the process is lacking and ultimately results in a sterile environment.

PRIVACY & DESIGN

The physical criteria for design is of great importance. This must also include an awareness of privacy which is so often lacking in state rental housing and suburbia in general. One of the failings of many residential areas is that neither concept of community or privacy is articulated or adequately provided"The men, women and children of suburbia are seldom quite together, and never quite alone".⁴ Recognising the value and needs of one concept will aid in the fulfilment of both.

Although subject to different cultural interpretation, privacy in New Zealand terms, can best be provided architecturally - that is by provision of space. Privacy needs will obviously differ, as will the conflicting roles of individual and community. In her survey of Wellington residential environments, Rosemary Barrington found privacy extremely important, whether by distance, physical barriers or design.⁵ The major factors that affected privacy were the background and the past and present living experience of those surveyed, physical barriers, and critical distances between rooms within the house and the area around the house.

I would suggest that at least the opportunity for privacy of individual and family should exist and which may be answered by the creation of various zones for the compliance of both community and privacy needs. Thus privacy and community can both be promoted by the allocation of hierarchies of domains. This is the method of Chermayeff and Alexander and is one that allows for "all degrees of privacy and all degrees of community living, ranging from the most intimately private to the most intensely communal".⁶

DESIGN POLICY

If one is to continue the practice of minimum standards, then they must have an inbuilt flexibility in the manner in which they are expressed and the way they are directed, to be of greatest value. The Essex County Council suggest, as a way of meeting this challenge, the introduction of 'performance criteria' as an alternative to the multi-purpose rule of thumb dimensions. By their example, standards are treated in the context of a comprehensive design policy, which, by definition, includes flexibility. The necessary inclusion of feedback in the design process is also catered for. Moreover, their approach leans toward a quality of life and the idea of community above the ordinary approach of minimum standards for safety, local bodies convenience, or rigid control through emphasis on the individual property.

PHYSICAL DESIGN CRITERIA

Their physical criteria for the design of a residential area may be summarised as:

The House Envelope

Internal space standards

- for floor space: house type: number of people and storage space.

Internal privacy

- privacy is categorised into the public zone - a reasonable degree - and private zone - a high degree - by distance (minimum 'eye to eye' distance of 35m) or design

Sound insulation

Sunlight and daylight

- ensuring adequate daylighting levels within rooms and an acceptable amount of sunlight on each property.

The House Curtilage

Private zone

- privacy of outdoor sitting areas by layout and above eye level structures and walls (including vegetation)

Minimum garden area

- in a 'private zone'

Services

Pedestrian movement

- to be convenient, safe and pleasant by 'pedestrian spine routes' and 'local access footpaths'

Vehicular movement

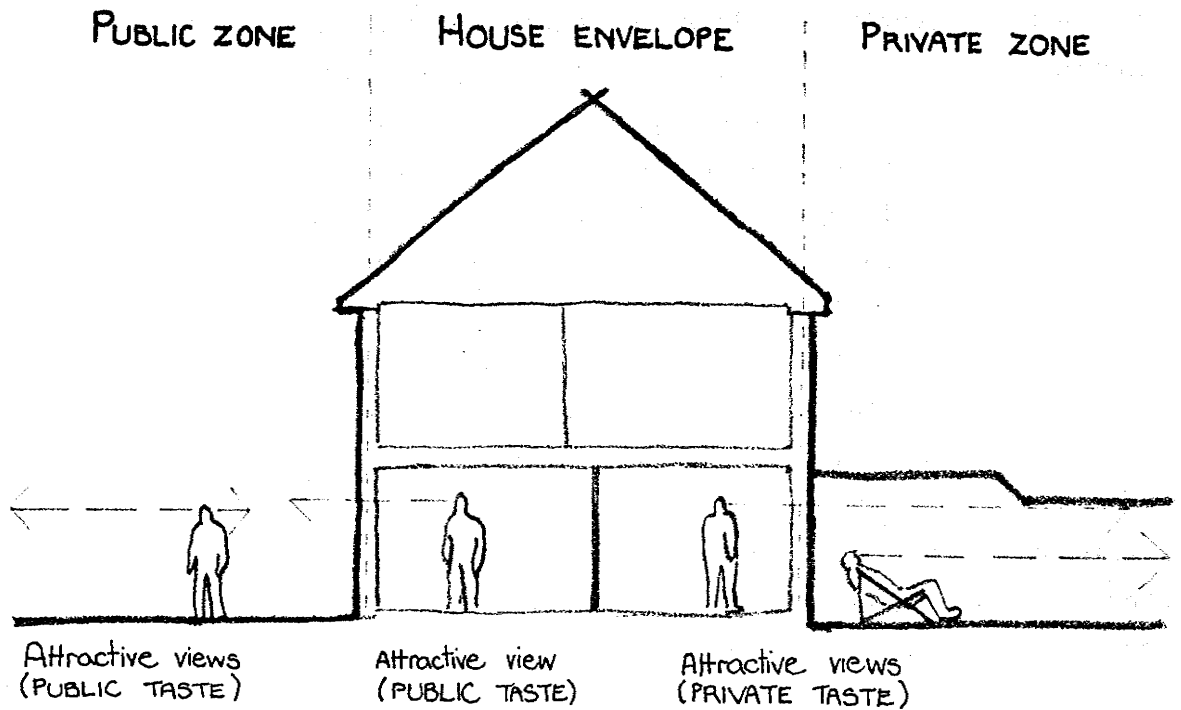
- to be convenient, safe and pleasant by a road system segregated by through traffic flows and a clearly defined hierarchy of routes

Car parking

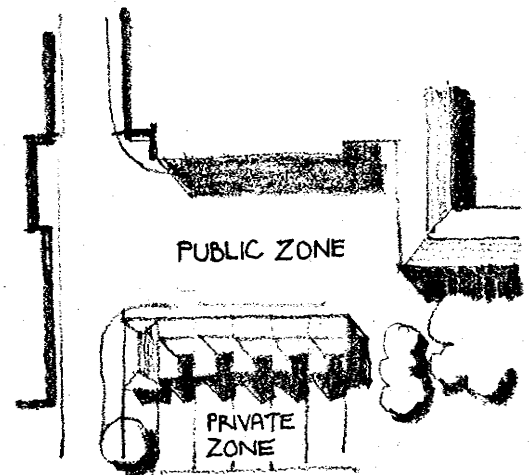
- for residents and visitors that is both convenient and visually satisfactory

Community facilities

- to be provided, especially such facilities as children's play spaces in areas where types of housing restrict space.



*Public and private zones
from Essex County Council*



VISUAL DESIGN CRITERIA

However, in meeting these physical criteria, the design for such an area may still fail because of the visual aspect. To quote the Essex County Council "What constitutes good design has far too often been written off as a 'matter of opinion' or 'taste' with a subsequent cheapening of the visual environment."⁷ Space needs to be organised and the urban framework has to be interesting.

As the Essex County Council point out, the reason why suburbia fails is that it does not articulate space. It falls midway between the two principles of either landscape containing buildings or buildings containing space. Buildings are too loosely grouped or of insufficient height to enclose space yet there are too many buildings for the landscape to dominate. This concept is reiterated by Chermayeff & Alexander "The suburb fails to be a countryside because it is too dense. It fails to be a city because it is not dense enough, or organised enough."⁸ A residential area must represent a positive statement through the adoption of one or other of the approaches suggested by the Essex County Council.

To help establish character and identity, the local colours and materials of the region should be used wherever possible, or failing this, external materials suitable to local character. Visual design also relates to volumes of form and detailing for architectural strength and balance.

All design must be aimed at contributing to the larger composition of the housing environment - in colour, form, line and arrangement. This is not to deny the existence of variety but to stress the more desirable alternative of variety within unity, aided by the guidelines of character. The common situation which should be avoided, is the personal, haphazard statements of private home owners that brings variety to the point of visual chaos. What is also undesirable, is the bleak uniformity that the image of state housing holds for most people. Variety and unity are mutually demanding and their harmony can be served by the unity and structure of the natural environment and visual design.

SUMMARY

Present sub-divisions lack continuity in control and emphasise minimum standards to the detriment of the overall environment. Privacy is very important yet often lacking in residential areas. In New Zealand terms, privacy can best be provided architecturally - by distance and barriers. To aid in the creation of privacy, certain spheres of public or private use may be established. One working alternative to present practice, is the Essex County Council's design policy including both physical criteria and visual criteria. The latter deals with articulation of space, materials and total composition.

Hillside housing

NEW ZEALAND HOUSING RATIONALE

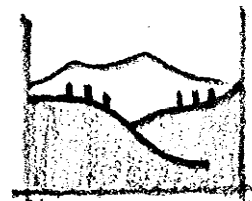
Housing traditionally takes place on flat land. Costs of building houses, transportation systems and utilities are generally cheaper, safer and longer lasting in terms of erosion. Flat sections are more economic than hill sections because of the latter's often substantial earthworks (including high foundations and retaining walls), more involved engineering and drainage considerations and increased costs from curved street and channel construction. Flat land also yields more sections. It may offer less in visual structure but this is a minor consideration: the physical design possibilities tend to be greater on flat land.

The New Zealand ethic of quarter acre housing (even though the quarter acre has diminished, the principle remains the same) is based upon flat land mentality because that is where our cities started. However this colonial concept of space has utilised all convenient flat land and in Wellington's case, this occurred long ago. As demand increases with population, land, almost any land, is considered prospective suburbia, so long as it is conveniently placed and with a not too ridiculous slope. This becomes increasingly apparent considering both the relative shortage of flat land (only 25% of New Zealand's land surface is below 200 metres in elevation), and the economic reluctance to occupy land with first class soils; by definition on flat or gentle country.

HILLSIDE HOUSING PRACTICE

New Zealand's housing sprawls onto the hills without sacrificing our disregard for space. Technology allows flat land, quarter acre section utopia to be introduced to once hilly sites by simply making them flat land. At first, roads in the Wellington region,

had to be cut along the contours, an unwilling concession to the land. The extending of Rongatai airport in 1957, however, represented a new advance in earth-moving and subsequent sub-divisions in Wellington are bull-dozed into submission by the one, singular approach. And regulations created and evolved on flat or rolling sites, not only passively perpetuate flat land house pattern and sub-dividing techniques but are as guilty as the developer, in his quest for maximum numbers of suitable (i.e. flat) sections, in their combined imposition on the land. Widths (house/setback/footpath/road/footpath/setback/house), gradients and curves necessitate earth-moving to contain all of them and determine the housing that will accompany them.



HILLSIDE HOUSING PROBLEMS

The problems of large-scale excavation, remoulding and flattening are many. Perhaps the greatest cause for criticism lies in the fact that one method and one set of standards, is used for all sites, without consideration of individual sites identity and character. They produce stereotypes, of an originally dull pattern, as well as the continuous reproduction of its associated problems.

Problems on the site are scarring, removal of top-soil, exposure of subsoil to erosion and the ugly view that this creates. Minor erosion will have a continuous effect, requiring maintenance, not to mention the possibility of large scale slips and slope failure. Shelter will be lacking, from either vegetation or from the flattened land itself. By creating flat platforms for building, access ways (their width and alignment), and the acceptable grade required of the surface, we are also creating inherent visual problems, that, by their nature, are

very difficult to disguise. These are namely, retaining walls, benching and vegetation removal.

When interfering with the land on such a large scale, problems off the site will also arise. Apart from all else, sloping land is very significant to its surrounding land. The slope, structure in general terms, will be affected by vegetation removal from the land further uphill, which will bring increased water accumulation. The water catchment of the area will be affected, particularly downstream areas, where silt may be deposited. In visual terms, the site will often look incongruous and unbalanced - an artificial collection of man-made lines sitting uncomfortably in a naturally rolling hill setting.

One of the greatest limitations and cause for concern to residential development on slopes is the structure of the slope itself. The slope stability in Wellington is, on the whole, inherently good as there are few areas of sloping ground formed by landslide deposits.

However, there may be large scale instability through man's neglect or ignorance. This is related to the type of soil materials in the Wellington region which are weathered greywacke (the predominant rocks of Wellington), slopewash or colluvium (rock fragments, sand, silt and clay) and loess (soil derived from windblown silt). All, apart from fresh to moderately weathered greywackes, become very unstable when saturated, so that most neglect relates to an inefficient means of draining water off slopes. The extra water in the ground increases the weight and decreases the strength of the soil. This may be brought about by poor design, faulty construction or inadequate maintenance of

stormwater drainage systems or through the existence of none at all. The efficiency of the removal of stormwater must take a high priority, for the failure to do so is usually the reason for slope failure. A second factor which aids the saturation of the soil is the removal of vegetation which allows unimpeded saturation and leads to increase in weight and decrease in strength, of the soil.

HILLSIDE DEVELOPMENT ALTERNATIVES

The solution to hillside housing problems may come with realising the limitations of one approach. More than one approach may be realistic in attempting to solve more than one problem. A range of alternatives of use of hillside areas has to be known. These may be presented as being:

1. Keep the landscape as it is
2. selected the use to fit the site
3. design the physical impacts of use to be in sympathy with the landscape
4. allow the use to dominate the landscape.

With the proviso that the adoption of only one attitude will seldom proffer a solution acceptable to all problems. A balance of attitudes will best reflect the true character and interests of the land.

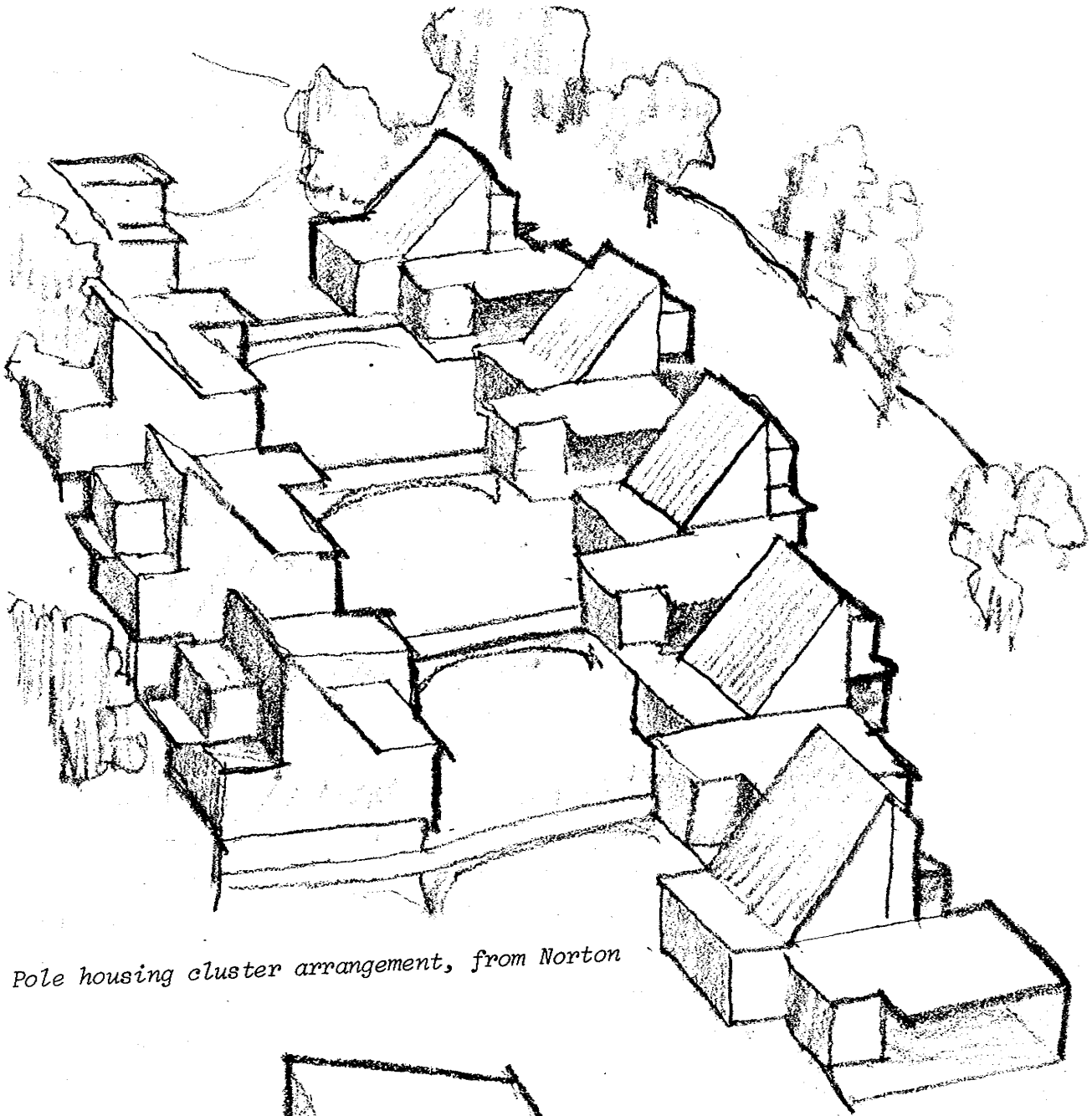
Under the first classification, the landscape may be regarded as a whole - for instance visually very prominent land or unstable land best left undeveloped. Or the landscape may be interpreted as key functions or features of that landscape - water courses and catchments, or valuable community assets, such as native bush remnants, worthy of retention as reserves. These may be the basis of future open space networks.

Selecting the use to fit the landscape will depend on an understanding of that particular landscape. This will, in turn, determine the individual options that are open - which pattern of use will best suit and/or enhance the site's qualities. A relatively recent variation to building on steep land is pole housing.

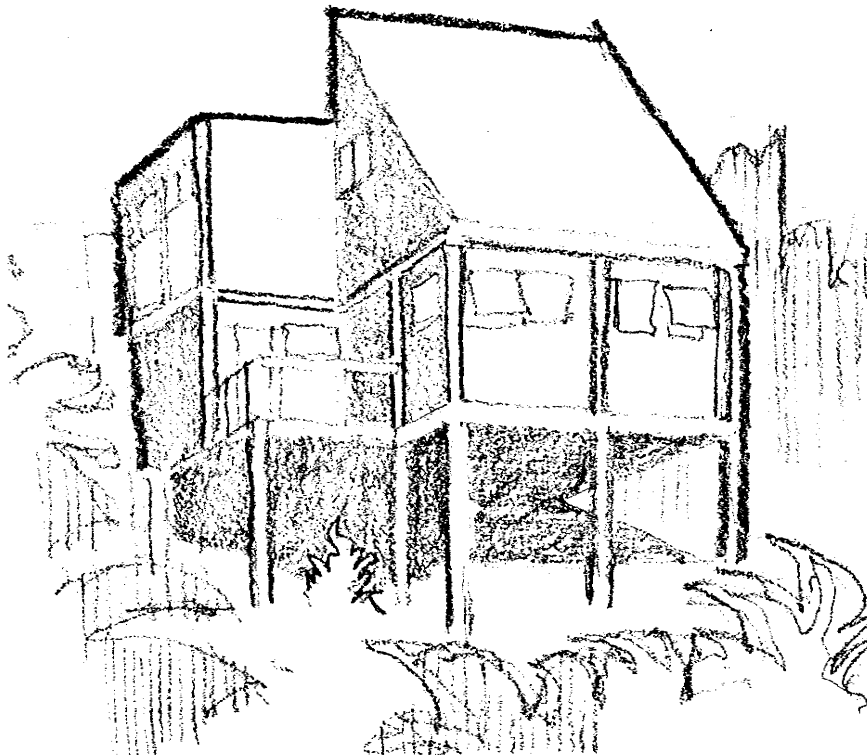
Pole frame housing has many advantages in the context of the landscape. It is possible to preserve a natural setting and so retain the site's uniqueness and individuality. But this also generates two points of concern.

As an expression of concern for the landscape's form, pole housing will often be successful because it implies a minimum of earthworks, less vegetation removed and hillsides need not be destroyed. But because it is so adaptable, it can also be used haphazardly and indiscriminately. There must be an associated responsibility to the site, particularly in the preservation of drainage channels and other landscape functions. Pole housing can go on marginal land that would not tolerate standard housing and this possibility must be questioned especially when garages may be cut into the vacant land underneath.

The second point concerns the benefits of pole housing as an innovation. The overriding consideration must be directed at its suitability to the site. The temptation to standardise any innovation is great, as past New Zealand experience will show, and so the steep land/pole housing concept should hopefully be avoided as an automatic connection. By being innovative, it assumes a design input which is creditable because individuality is stressed.



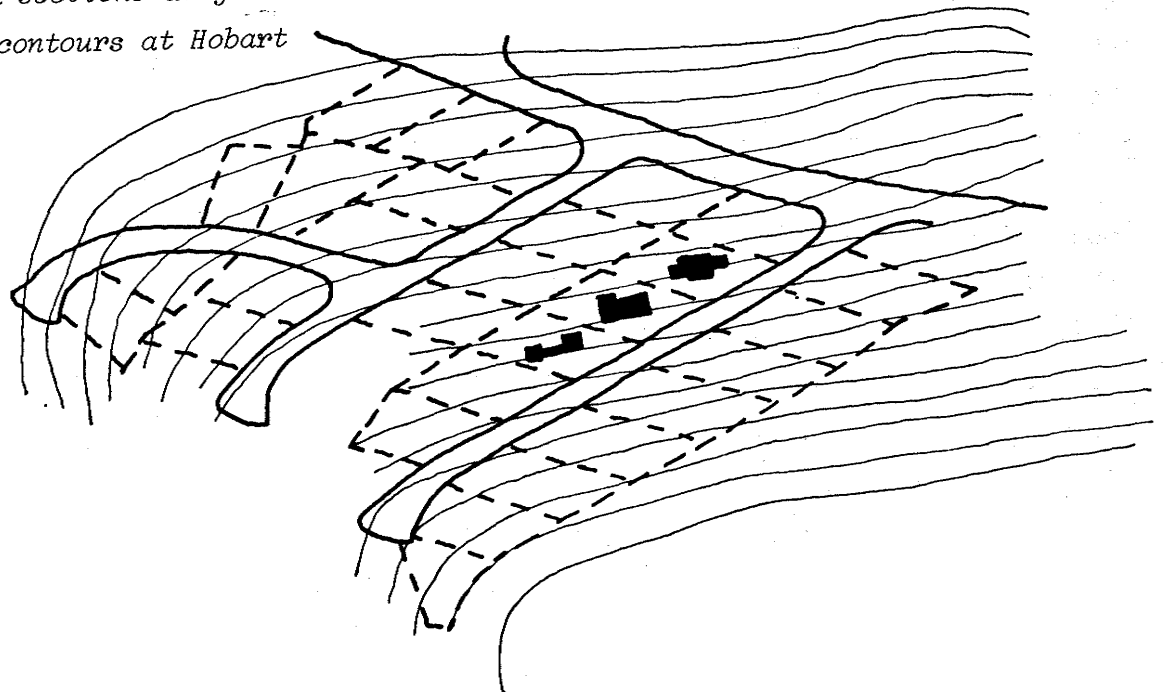
Pole housing cluster arrangement, from Norton



Although the design input will mean added expense there are social and economic reasons for greater utilisation of pole housing. An expense in design may be more than adequately compensated for by a savings in materials and a very likely saving in maintenance due to less likelihood of erosion problems. Pole housing may be able to be brought into a social sphere of higher densities or clusters. In this way, roading can be limited and be made more sympathetic to contour line and overall development. The value of land retention under pole housing schemes must be questioned when accompanied by traditional roading and its associated widths, slopes and earth moving - often signifying landscape capitulation to machinery.

The methods of sympathetic use with the landscape can be many and will again be dependent on the site. For hill sites, generally, there are guidelines available such as Hobart's approach as described by Bill Meek.

*Roading and sections diagonal
to contours at Hobart*



This briefly entailed utilising sympathy with contour lines by roading, services and section access being placed along contours. Section size and shape were altered, if necessary, to best conform to the lie of the land. Leaving natural ground and site features was encouraged and all land that was too steep, was pooled into an open space system or foci, that made up the 5% contribution to reserves.

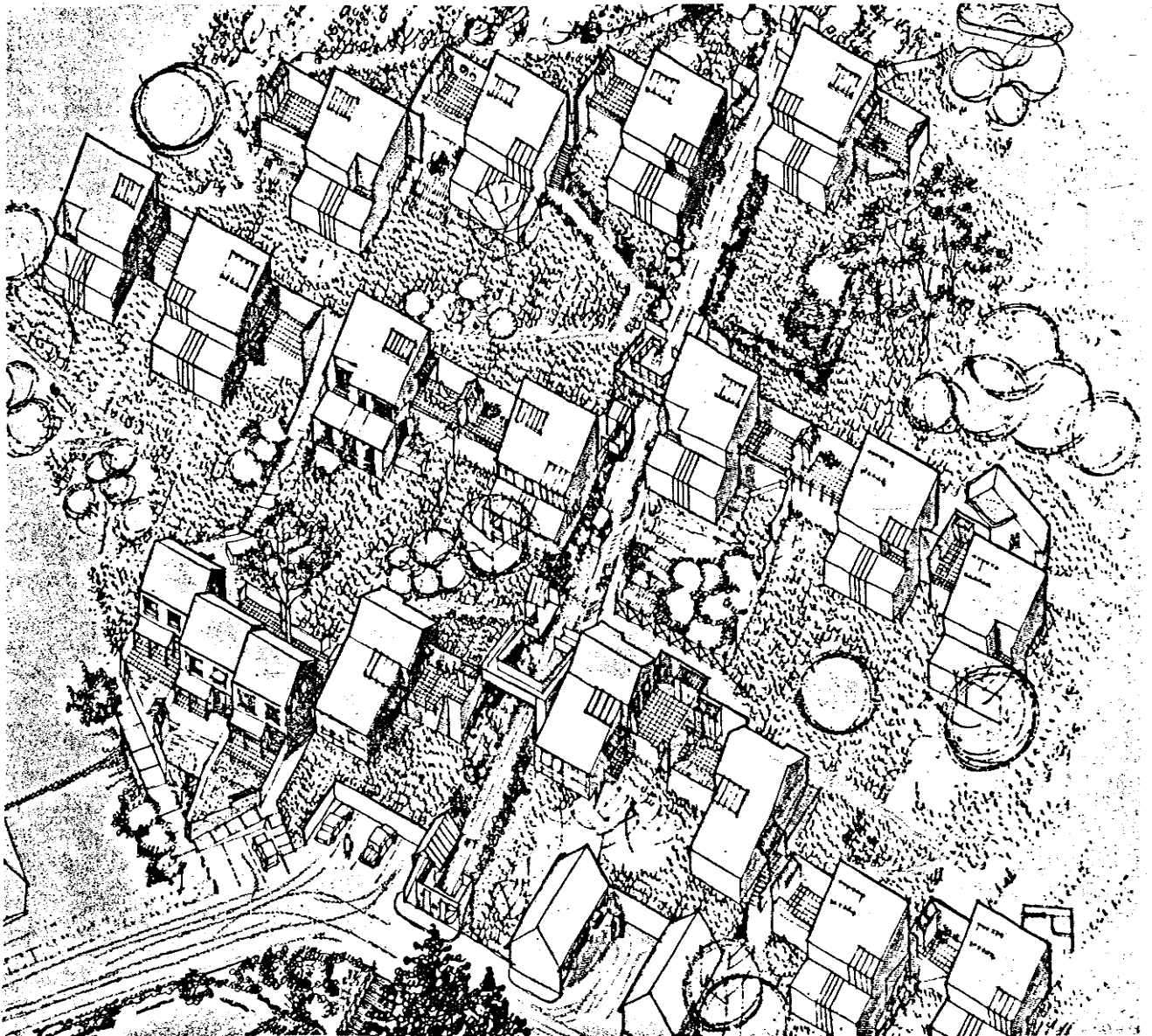
Obviously, there are positive advantages that hillside landscapes will offer residential development. Bending flat design development to meet contours ignores inherent values that the hillside offers, such as variety in breaking up monotonous structures. Changes in level can aid enclosure, as well as providing privacy, particularly from the street. The hill offers easier incorporation of garages and in transportation, vehicles are very easily separated from pedestrian traffic.

On hill sites, one of the problems of selecting the use to fit the site, as in pole housing, may be to concentrate on housing styles while the associated and more important factors of transport and service networks are taken for granted. Types of roads, layout, widths, car parking facilities, service access, refuse collection and how they are accommodated will probably be the major determinants in the development of the hill site. Apart from dictating the house pattern and structural form of development, they aid in the formation of the open space system.

The placement of garages will be very important. Drive on access is a flat land luxury that will have to be sacrificed in some cases, for better utilisation of land. Communal garage courts is a method of more concentrated land use. Access to houses

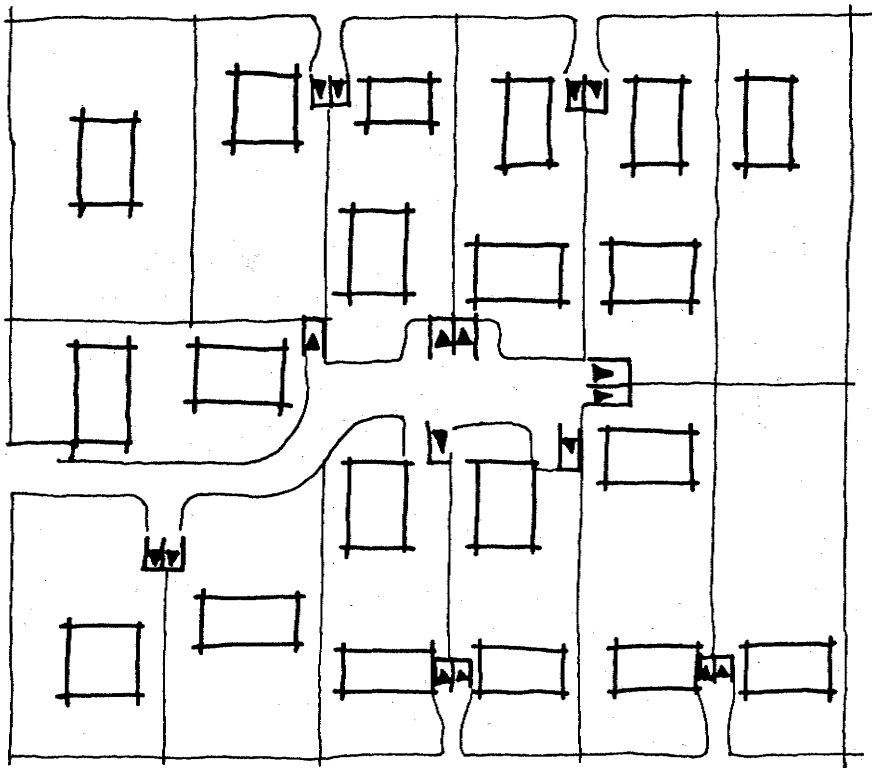
for all services may be possible from common areas where road penetration may be limited. One suggestion from the Buller Grove housing competition, was the use of cable cars, as a substitute for the car. Its use on steep slopes could be used in conjunction with footpaths and accessible to cars by garage courts at the foot of the cable car.

Cable cars and housing

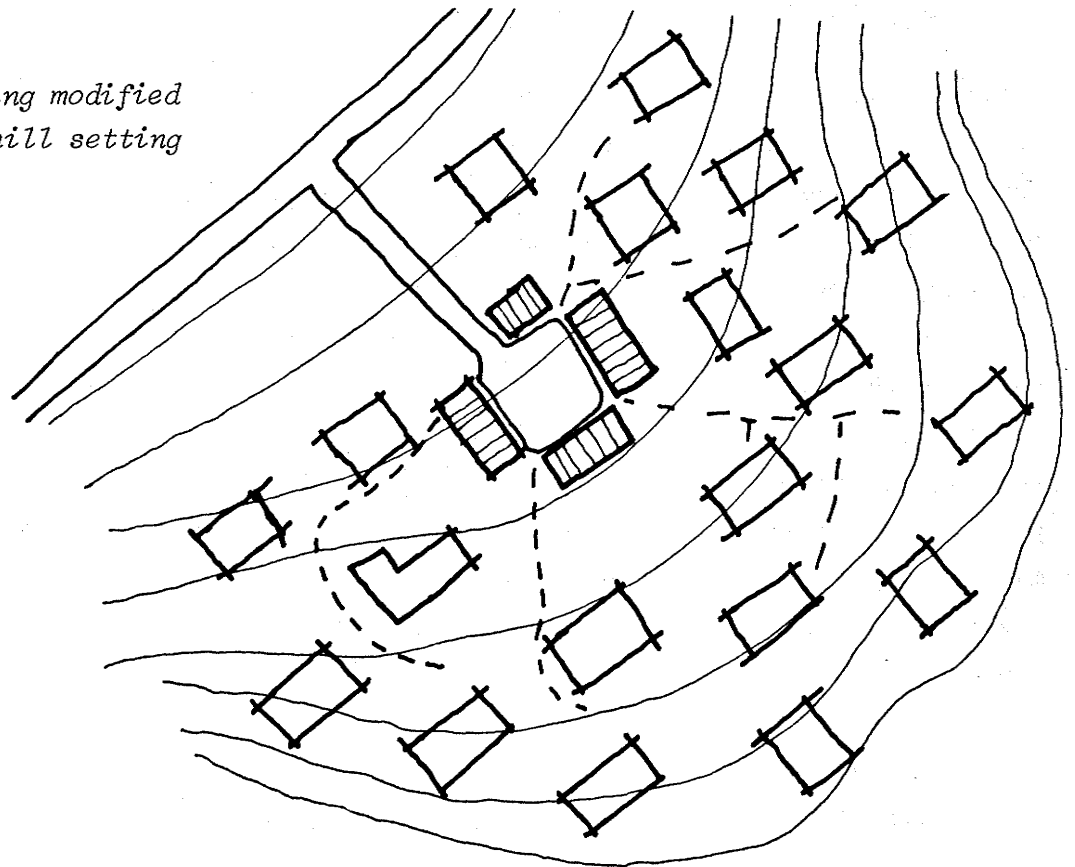


The emphasis on the car widths of this dimension, turning circles of that dimension, may have to diminish, if the advantages of the hillside are to be preserved. The following ideas show that access can be maintained from key common points without the intrusion of roads.

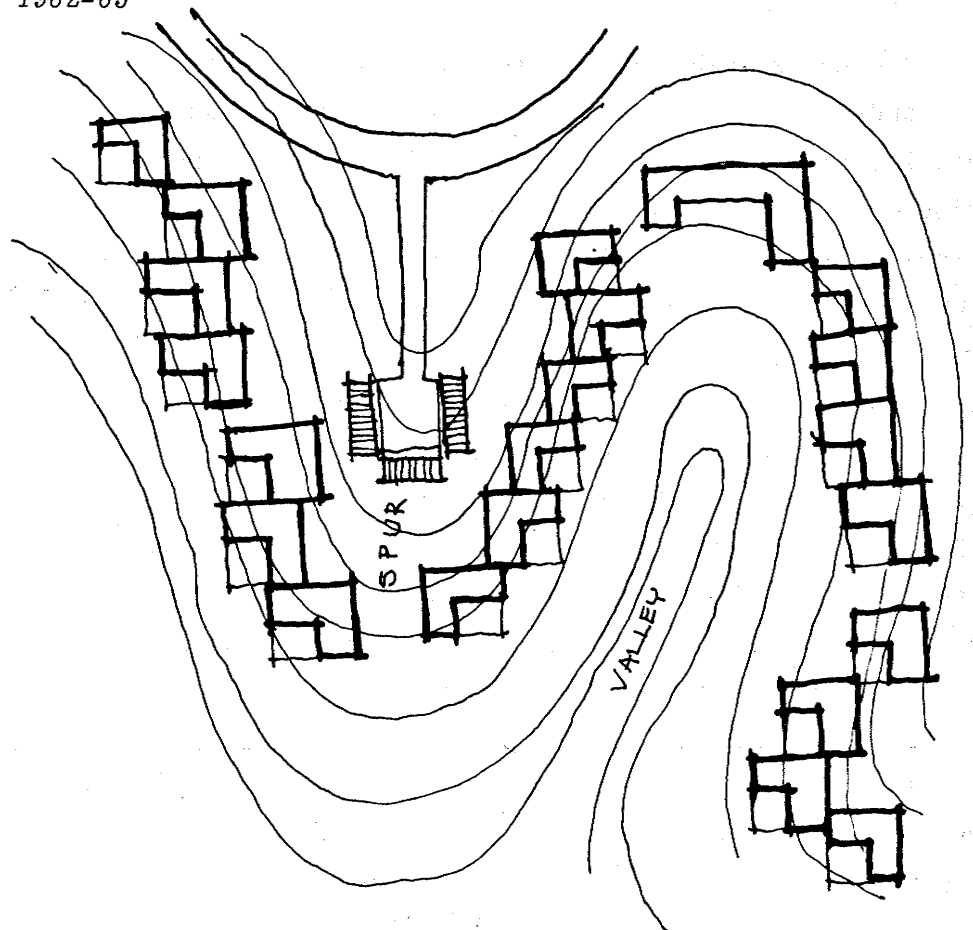
Cluster housing



*Cluster housing modified
to a hill setting*



*Danish community housing
at Fredensborg 1962-63*



Services will be of major concern, as will the movement of the handicapped and the aged. The latter could be housed in close proximity to the access points, as their movement from cars will be limited. The further away one lives from the access points or where the car will come up to, the more one has to walk and the further one has to carry the rubbish. But then, this is a characteristic of some of Wellington's more established and aesthetically pleasing hillside suburbs. In any case, inconvenience may be compensated by the enjoyment of a more natural environment, greater seclusion and perhaps larger properties.

The result of sympathetic use should be a reflection of the site's character - by materials, arrangement of housing and road, and colour, in appearance and through a structure that does not interfere with the land processes, in function.

In some cases, urban spaces created by a domination of landscape by urban form, may be acceptable and add identity. The location of such areas - where slope stability, water catchment and courses and visual criteria allow this to be practicable - will be of chief importance.

In Wellington, population pressures alone force present and future development to occupy the hills - there is very little choice. However the way in which this development spreads does offer us a choice and one that should not be neglected in the simplistic approach of one answer to all ills. The landscape is a complex, multi-functional organism and must be recognised as such. By imposing one system of development, without due consideration to all factors, we create a large number of problems, directly proportional to the amount of factors that we

initially ignore. Needs and results of developing a site, often many and varied, call for a parallel adoption of more than one approach, to satisfy balances of nature, living needs and visual impact.

SUMMARY

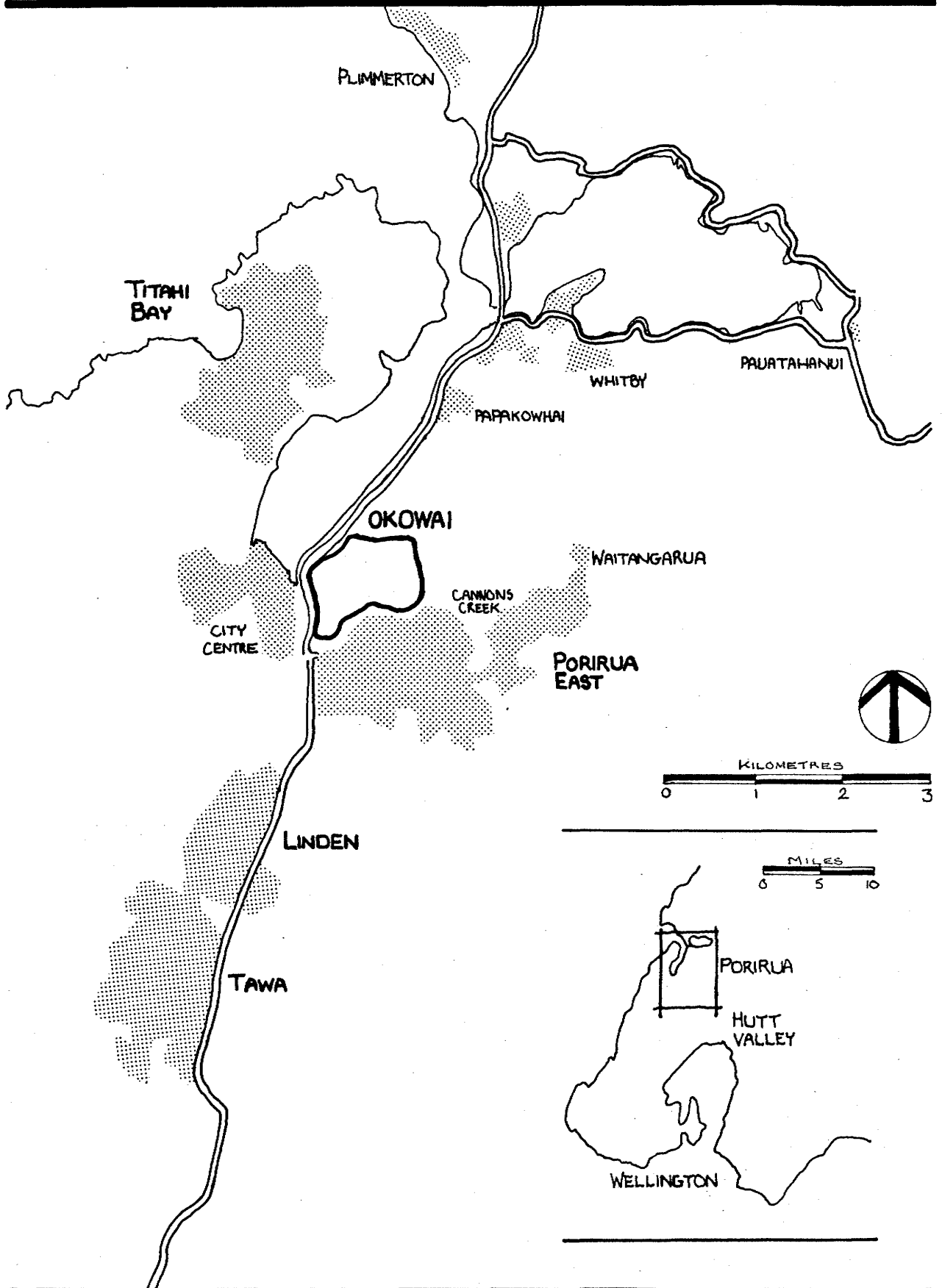
Flat land is used for housing before hillsides because of economic reasons but social pressures now force urban sprawl onto the hills. This means development patterns and regulations, designed on the flat, are transferred to the hill at the expense of the latter's inherent qualities. A standardised, singular approach creates many problems, mostly by earthworks, both on the site and off the site.

Slope stability is one of the obvious considerations to be investigated. A more realistic alternative to one approach could be presented as four options:

1. Keep the landscape as it is.
2. Select the use to fit the site - such as pole housing.
3. Design the physical impacts of use to be in sympathy with the site.
4. Allow the use to dominate the site.

II. The Site

Location



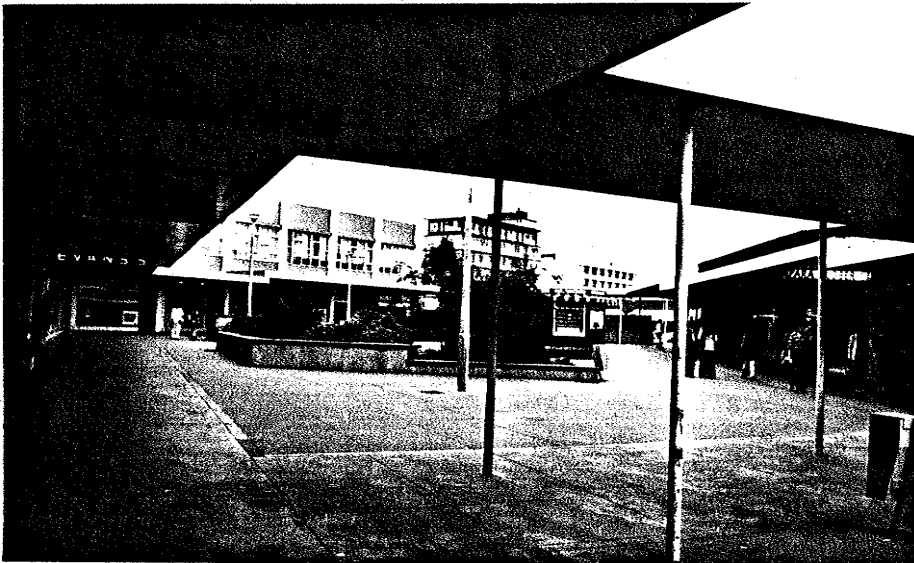
The study site lies within the Porirua-Tawa basin, immediately adjacent to Porirua East. Porirua is one of the satellite communities of Wellington, enclosed by topography or the Porirua harbour (see map).

PORIRUA HISTORY

Originally the area lay under forest - a broadleaf-podocarp association of rimu, rata, tawa and hinau and the coming of the Maori had little effect upon its dominance. A succession of tribes, the Ngati-Tara, the Ngati-Ira and lastly, the Ngati-Toa, settled in small concentrations, on the shoreline and isolated patches of cultivation took place here. The land use pattern changed drastically after the arrival of the first European settlers when rural pastures replaced the forest cover for most of the area, slowly before the 1860s but more thoroughly between the years 1865 and 1924. The area, for this period and after, was regarded as little more than "a rural outpost of Wellington".⁹

In recent times, the Tawa-Porirua community has grown out of the four historical villages - Tawa/Linden, Porirua East and Titahi Bay. The post war housing growth of Wellington was chosen to expand in Porirua's direction and so Porirua emerged as a planning guinea pig; a New Zealand new town, similar in concept to the British new town. Local government, however, remained divided, with the Tawa borough council choosing to stay outside of Porirua City. The area is still, socially and economically, Wellington orientated, but the creation of employment and the establishment of the City Centre have helped shift the city towards a growing self sufficiency and build an accompanying identity of diverse cultural communities.

Porirua City Centre



Urban development has spread in the directions of Titahi Bay, Porirua East and Tawa while many centres beyond the site to the North, have expanded rapidly in the last fifteen years. New suburbs have been created at Papakowhai and Whitby. The region contained 47,858 people in 1971, projected to be 73,300 by 1986. Porirua East contained 18,538 people in 1971 and Plimmerton is predicted to have 14,800 by 1986 and Pauatahanui 25,000. Local industries such as Todd Motors have been established and new industrial areas south of Porirua Hospital will generate more employment for the area and for those outside of the area.

*Todd Motors and Okowai
as the backdrop*



The reasons for Porirua's planned growth were to relieve congestion in Wellington and the Hutt Valley, which was rapidly filling up, to accommodate new or expanding industry and to provide the opportunity for improved social conditions and living standards. The last reason was not as pressing as the former; it was rather a necessary inclusion in planning procedure, but it has become the main criteria for judging the success or failure of Porirua. The availability of large scale, new housing was Porirua's main attraction and the reason for most of the population going there. Thus the quality of the housing has been the yardstick that most people have measured Porirua by. And for most, Porirua's housing has not been a success.

PORIRUA HOUSING

The establishment of Porirua as a new urban area has had its problems. The initial concern, as in the British new towns, was in creating a community identity and spirit from the artificial impetus of planning, for both existing and incoming population, for, as Murray observes, "People cannot be planned into courses of action".¹⁰ Porirua has grown extremely rapidly, perhaps too rapidly, to allow social roots to develop and grow with the community. Neighbourhood consciousness is lacking for the Porirua area as a whole, but improves on the level of the four communities. Differences between the private housing of Tawa/Linden and Titahi Bay/ Porirua East's state housing and their implication of lower-class transitional population, have accentuated the division.

Porirua's rental housing comprises approximately one third of all housing. However, nationally, the Housing Corporation lends on roughly 45% of all new domestic construction and this figure is likely

to be higher in Porirua. This means that similar social groups to those provided with rental accommodation are being financed into housing. The tenants in rental housing have a relatively large turnover - from a total of 4,780 units in Porirua, approximately 1,000 are relet every year - about 20%. At the beginning of 1977, 20% of the population were solo parents and it is tentatively assumed that a further 75% are nuclear families.

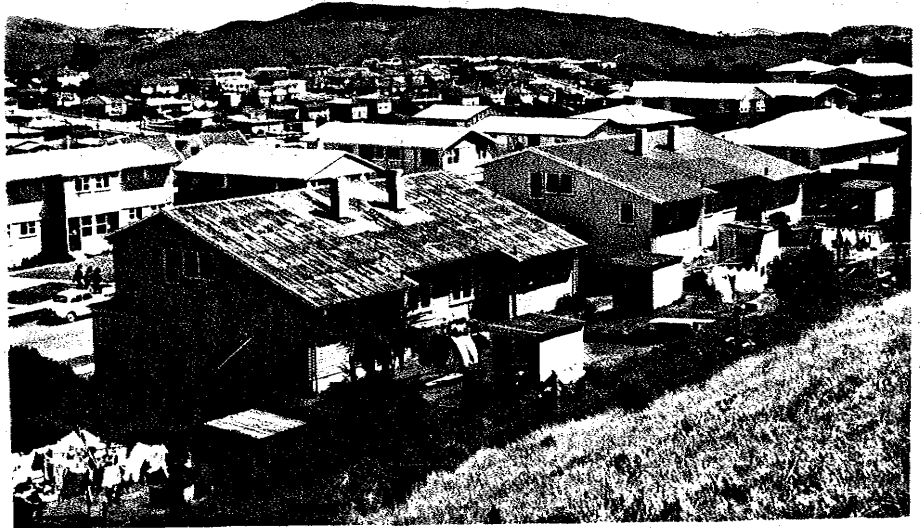
Porirua East



PORIRUA'S SOCIAL PROBLEMS

Porirua East's housing problem is one of uniformity. As shown, it is largely state housing and through its foundations, has been open to largely one social unit - young married couples and their children. Most of its population had applied for State rental houses and had been granted a tenancy because their needs were adjudged greater than those of other applicants. "As is to be expected from the manner of its recruitment, the population of Porirua consists largely of younger married couples and their children". It also has a sameness in function - that is, a dormitory suburb.

Porirua backyards



As is widely recognised and as previous Housing Corporation studies have shown, a uniform population structure lacks variety of attitudes, aspirations and abilities that make up a stimulating community. Young populations lack community leadership, especially in early development, as new families decide other commitments. The range of social opportunities and experiences available to residents is limited, particularly to children and those with limited mobility, such as solo parents and the old. Porirua is dissected by a young population that "must look inward to themselves - they cannot do other when families are young".¹²

As well as exhibiting these characteristics, Porirua East attracts the automatic stigma of a state housing level. State housing in New Zealand, is not for the average citizen, but its presence acts as a measure of his status as a private home owner. While the need is accepted (for quantity not quality), it is for those who cannot aspire to own their own home, that is, those not able to comply with "the inbuilt western cultural ethic of standing on your own two feet".¹³ State housing is, by definition, inferior housing.

PORIRUA'S PHYSICAL PROBLEMS

A poor physical environment accompanies these social problems. Along the guidelines of the British new town, Porirua was to be divided into distinct neighbourhood areas, each of a few thousand inhabitants. Dwellings were to be adequately spaced so that relatively low housing densities and ample space would result. Further land for open spaces and playing fields was allocated. Unfortunately, the product is a poor, sterile, physical environment.

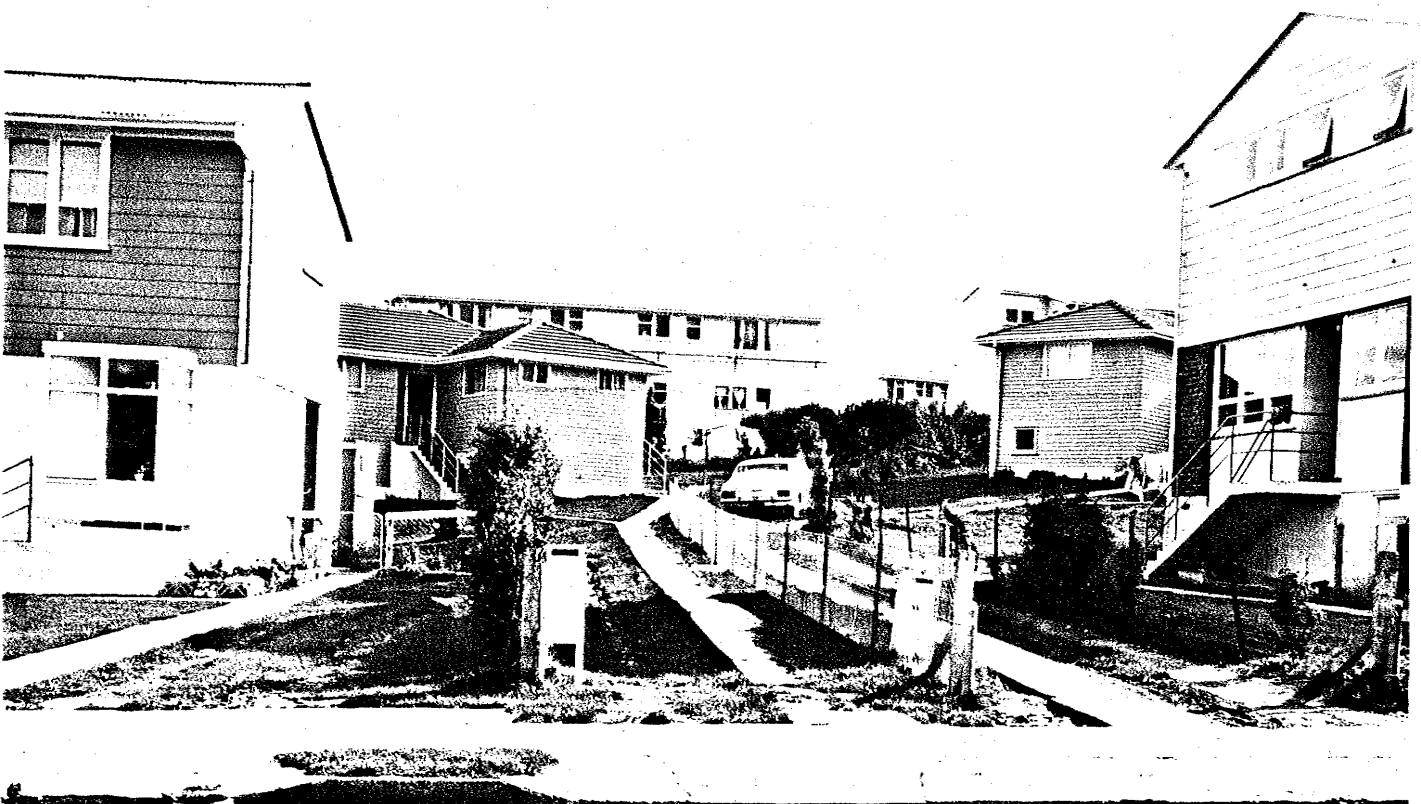
The concept of neighbourhood areas may have been creditably desired but in Porirua East, the scale is too large for it to function. Areas such as Cannons Creek have more than a few thousand (a number too large for identity anyway) and present blank, faceless areas which one can barely relate to. The large scale is continued by the large shopping mall, such as that at Waitangarua, which exists at the expense of the smaller, local shops. Transport, already limited and difficult for the aged and solo parents, is further emphasised in order to reach the mall that caters for a larger area.

*Waitangarua
Shopping Mall*



Porirua's state housing lacks both privacy and space. Buildings are stacked too closely together for distance to act as a visual barrier, walls are lacking and neglect plus poor soils and climate prevent early establishment of vegetation. In this situation, the space around buildings can only break down privacy, working against people's needs... "It is not possible to be unobserved in a Porirua garden because the houses have eyes, as it were, in the back of their heads; as a result people tend only to work in them (mow lawns, etc.) rather than laze unself-consciously in the sun".¹⁴

Porirua East



Porirua's medium density flats are lacking in space proportional to the amount of people they house. The types of units in Porirua are star flats, Duplex and semi-detached. Star units (12 flats) go on half acre sections which means approximately sixty to eighty people per acre. The Duplex contains four units and occupies about forty perches, about the same density as the star flats. The semi-detached unit areas are as follows; two units on 32 perches, three units on 40 perches and four units on 50 perches. They are all long units and face the street. None of these types of flats are used in new construction. Overall, the gross land realisation is four units per acre and occupation for rental housing is 4.2 persons per dwelling. This compares with 3.5 or less persons per dwelling for private housing.

Densities of 60 - 80 persons per acre are higher than private housing but are increasingly necessary for New Zealand's urban areas. The problems of urban sprawl must be challenged and attitudes are already changing, as illustrated by the growing popularity of town houses. And one method of better utilisation of our urban structure is greater densities.

However this need not be at the expense of usable space and need not follow Porirua's example of wasted and poorly allocated space. The space within Porirua's medium density housing is not successful because it is not organised. Passage-ways become storage areas and junk spills out onto the property. Common areas such as foyers are abused. Outside space is only used negatively as a place of storage or car maintenance. Human spatial needs are not considered. Cultural alternatives are not provided.

Neighbourhood space may exist in plan form but is not fully utilised. This is partly because of the poor drainage that characterises most of the area and results in a covering of mud, making surfaces unable to be used. The poor soils, largely clay and little topsoil, makes vegetation difficult to grow and contributes to poor drainage. This causes health problems and affects surfaces such as concrete paths, lawns and playing fields. The parks tend to be large and because of the large scale, muddy areas and lack of vegetation, they do not appeal to a mother as the place to take her children or to the individual as the place to take a leisurely walk.

In Porirua East, the roads provide the basis for the open space system. For a pedestrian to go anywhere, they must follow the route of cars and share the noise, space and scale that has been designed for a machine travelling at 50 km/h., not for people walking at 5 km/h. Walking to shops, community centres, etc., is not enjoyable, and is not safe. Separation of vehicular and pedestrian routes is less hazardous to people especially young children and the advantages of separation can be seen in the different circulation networks and underpasses of the nearby Whitby development.

Porirua's roadways



Encouraging people to walk also encourages contact with other people. The car isolates oneself from personal and environmental experience. Fostering pedestrian routes, which become neighbourhood space, creates a simple method of meeting people at a level and pace that ensures involvement with, and attachment to, the community. Porirua's open space network of roads leading to shopping centres or parks neglects human scale and minimises awareness and experience of the environment. It also continues the isolation from human interaction, achieved by the car. Emphasising pedestrian networks, apart from their other benefits, helps create and reinforce local neighbourhood identity.



Living in Porirua East presents many problems of scale, privacy and unresolved spatial and cultural needs. Rapid growth, plus factors unknown or ignored by planning have contributed to a poor environment. Uniformity excludes the advantages of variety. Different cultural communities exist but are contradicted by the dull sameness of their houses. Space, which allows the functioning of territory, privacy, freedom or seclusion of the individual, social interaction and perception of and interaction with the environment, has not been fully organised. It has barely been recognised.

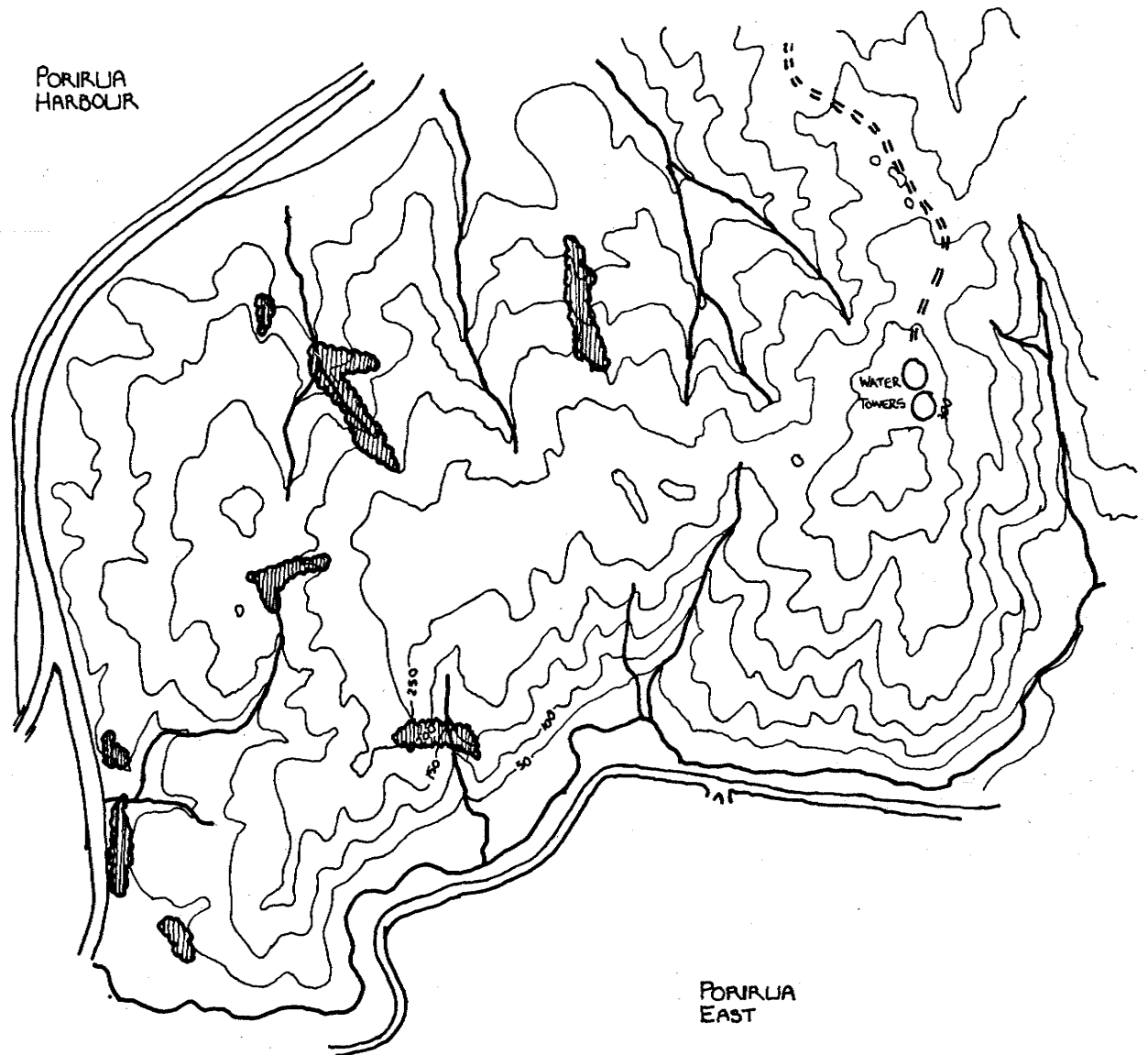
Improvement in the living environment will come with the acknowledgement of these needs and the full awareness of the people that are being planned for.



SUMMARY

Porirua is a satellite community of Wellington, previously featuring sparse Maori settlements within the dominant forest cover and transformed by European settlers into pasture. Since 1945, this, in turn, has been replaced by a residential cover a New Zealand new town to cater for the region's increased population, new industries and better living conditions. Porirua has faced inherent social problems of uniform population structure and state housing stigma. The physical environment has been neglected in terms of scale, privacy, space and pedestrian consideration and has been further limited by poor drainage. The subsequently poor total environment is a reflection of many people's dissatisfaction and abuse of their individual environment.

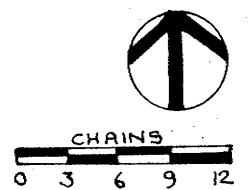
Okowai: survey

Okowai



-  SHELTER BELTS
-  DRAINAGE COURSES

CONTOUR INTERVAL IS 50 FEET



As seen from the location map, the site lies immediately north east of Porirua City Centre and north west of Cannon's Creek. Bought in the late 1940s or early 1950s by the Housing Corporation as part of a large block of land, the site is at present being farmed. Its Maori name is Okowai (which roughly translated means oko : wooden bowl and wai water, liquid) and is bounded by housing, harbour and rural land.

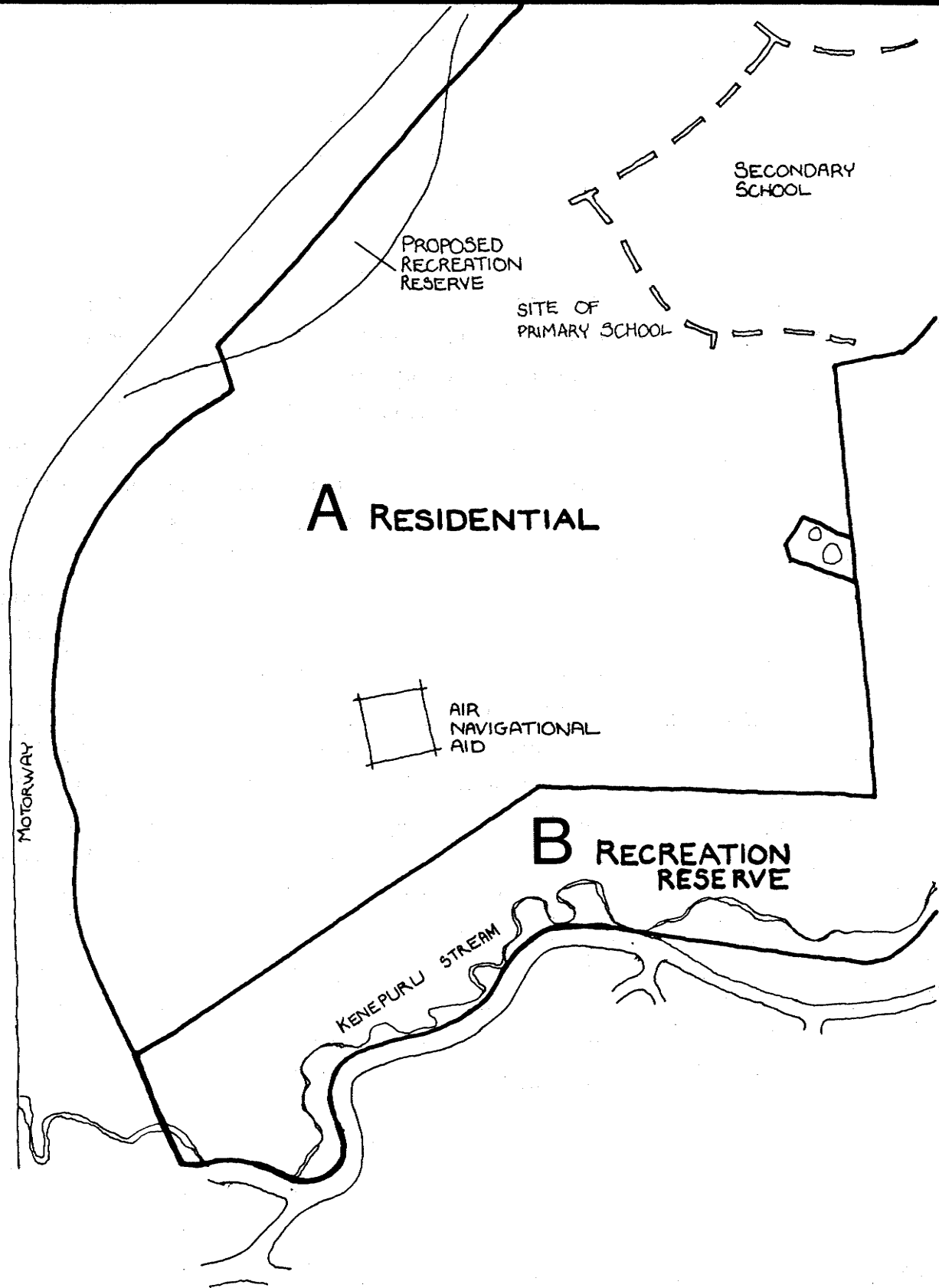
It is proposed that the site shall absorb part of Porirua's urban expansion and already, on the adjoining site referred to as Block 16, a secondary school (Aotea College) is being constructed. The Porirua City Corporation's district scheme has zoned most of the area residential and the southern slope reserve (see map). Points of access are also noted.

The development of the site for housing faces many difficulties. Apart from the intrinsic physical factors of slope, and this site is particularly dissected offering many problems of slope stability and drainage, the site is visually noticeable from a wide area including the main highway from Wellington and the City Centre. It will also be surrounded by mostly urban and suburban development in the future. If retained as a park, it has the potential of being prized as a refuge of open space - a green space concept perhaps similar to Christchurch's Hagley Park. However, Porirua's housing location alternatives are limited and as the area has already been designated housing, the major aims of this study remain.

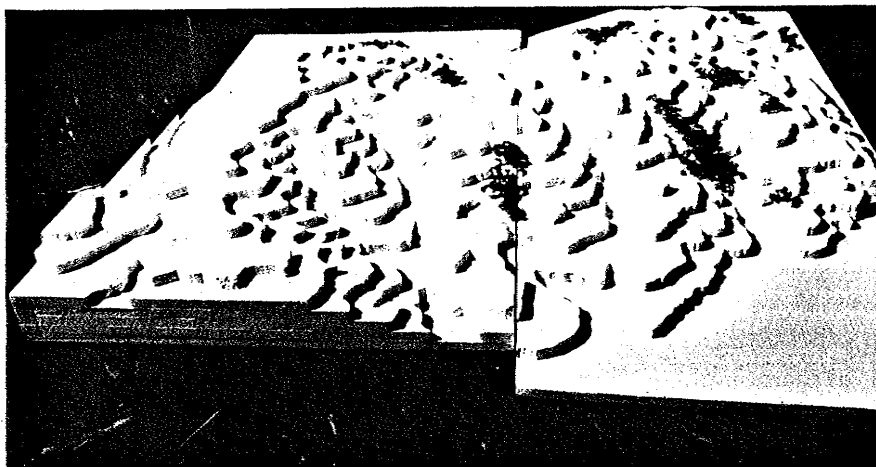
TOPOGRAPHY

The topography of the site is characterised by a main ridge which runs from the north west and tapers to sea level in the south east. The highest point is 368 feet on the eastern side above the two reservoirs that serve Porirua. The secondary pattern of small

District Scheme



The site



steep sided gullies run at right angles to the main trend, and breaks up the site into small units of high relief. There is consequently little easy land. Most of the southern slope is greater than 1:3 and has been zoned reserve. The rest of the site also has a large proportion of 1:3 slopes particularly on the gully sides, but these are associated with the gentler slopes on ridge and spur line.

From Baxter's Knob



GEOLOGY

The site is made up of greywacke base rock in keeping with the Wellington region's hills. The New Zealand Geological map describes the site as alternating dark grey argillite and greywacke sandstone; deformation complex; intensely sheared and semi-schistose (probably Warepan and Otapirian in age) Wellington Greywackes. Porirua's evolution is summarised by Murray as:¹⁵

1. Triassic deposition of greywacke.
2. Folding of area in Rangitata orogeny.
3. Marine and sub-aerial erosion leading to planation.
4. Smoothing of the plane surface and probable widespread deposition of marine sediment.
5. Kaikoura orogeny of block faulting.
6. Block faulting continuing to present day, together with smoothing of landscape by periglacial action including solifluction and contemporary erosion.

The last phase has contributed to overlaying the greywacke base with a relatively thin layer of soil material from local erosion and sea materials blown in by westerly winds. There are small outcrops of base rock on the site. Information from published material show there are no faults within the site although the Ohariu fault (one of Wellington's main faults) runs adjacent to the site, underneath Porirua Harbour and an old fault lies at the site base along Kenepuru stream. There are a few dips and strikes present (indications of direction and degree of folding) and the area is subjected to earthquakes.

The folding and shattering of the greywacke means that it can be moulded and flattened by earth moving equipment. The D.S.I.R. has published a table for recommended angles of slope in relation to Wellington's greywackes hills and is presented here.¹⁶

HEIGHT OF CUT



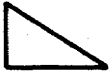


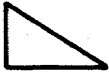






COMPLETELY WEATHERED
(YELLOW-BROWN; EASILY
CRUSHED IN FINGERS)

HIGHLY WEATHERED (YELLOW-
BROWN; PARTLY CRUSHED IN
FINGERS)

MODERATELY WEATHERED
(BROWN; BROKEN EASILY
WITH HAMMER)

SLIGHTLY WEATHERED
(GREY, PARTLY BROWN;
BROKEN WITH
HAMMER)

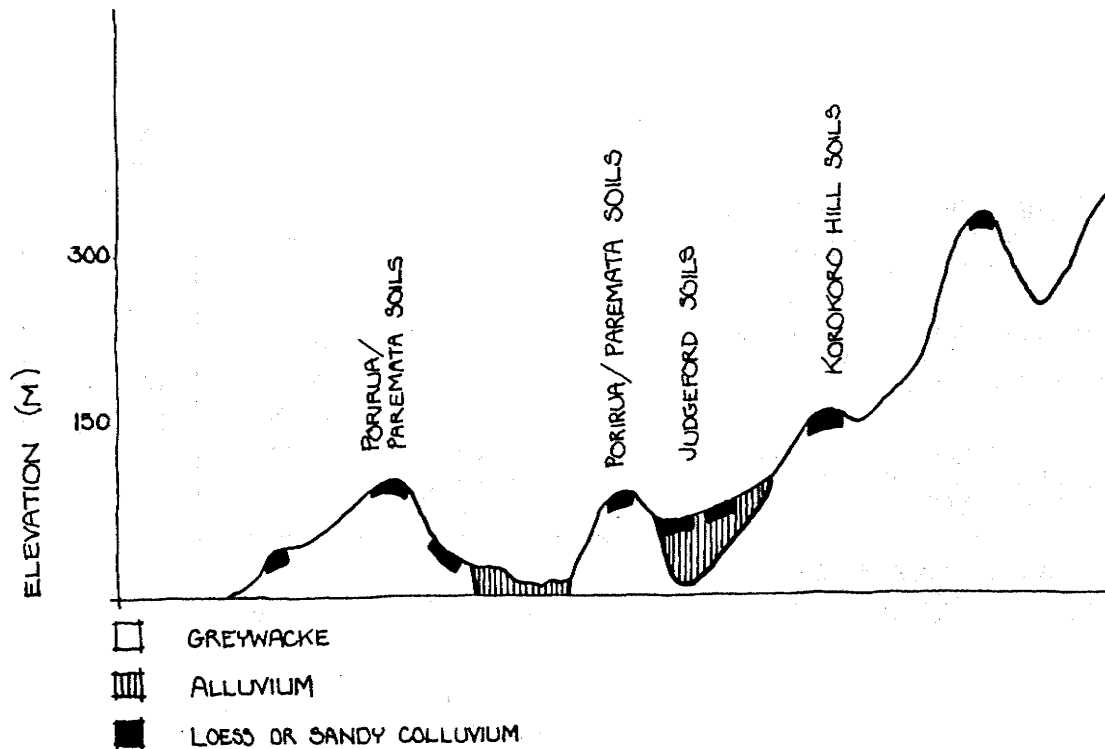
FRESH (UNWEATHERED;
GREY; BROKEN ONLY
WITH HAMMER)

	UP TO 6M	6-10M	10-16M
COMPLETELY WEATHERED (YELLOW-BROWN; EASILY CRUSHED IN FINGERS)	1 ON 1 	1 ON 1 	2 ON 3 
HIGHLY WEATHERED (YELLOW- BROWN; PARTLY CRUSHED IN FINGERS)	4 ON 3 		
MODERATELY WEATHERED (BROWN; BROKEN EASILY WITH HAMMER)	2 ON 1 	2 ON 1 	
SLIGHTLY WEATHERED (GREY, PARTLY BROWN; BROKEN WITH HAMMER)	4 ON 1 	2 ON 1 	
FRESH (UNWEATHERED; GREY; BROKEN ONLY WITH HAMMER)	4 ON 1 	2 ON 1 	

Most of the geological information including the table is on a general level and must be used with caution when applying this information to the site. If geological data were to be of full value to housing development, a special survey would have to be undertaken to supplement the geology presented here.

SOILS

The soils have been summarised as being either central yellow-brown earths, yellow-grey earths or yellow-brown loams. Their general location, in cross section, is typified in the diagram taken from an adjoining soil survey.¹⁷



1. Central yellow-brown earths and yellow-brown loams (Judgeford Hill Soils).
 - they are moderate to well drained, derived from loess and colluvium. They are typically brown friable silt loam over brownish yellow firm silt loam. Compaction makes little difference to either density or strength and there should be no significant problems for earthworks. Erosion is slight soil slip and sheet.

2. Central yellow-brown earths (Korokoro Hill Soils).
 - the soils are generally shallow, well drained and derived from loess and colluvium. The greywacke is commonly strongly weathered up to 1.5m, particularly on the rolling tops of broad ridges where the soils are not so shallow. The more highly weathered greywacke is much less stable than the slight to moderately weathered greywacke. Erosion is slight to moderate sheet and slight soil slip.

3. Intergrades between central yellow-brown and yellow-grey earths. (Paremata Hill Soils & Porirua Sandy Loam Hill Soils).

- Paremata soils are derived from loess and colluvium and imperfectly drained. The sub-soil clay may offer some problems for earth-works. This clay, even in an undisturbed condition, has a large potential shrink-swell behaviour.

- Porirua soils are derived from moderately weathered wind-borne sediments blown from the north west. They are moderately well drained and their internal drainage is slow, as they are formed from overlying compact clay loam. Weathered greywacke occurs at 3m to 6m and the soils are easy to excavate. Erosion for both soils is moderate earth slip and sheet.

WATER

The site is broken up into small catchments served by permanent and semi-permanent streams. To the south, the site is bounded by the Kenepuru stream which carries the run-off for the Kenepuru valley catchment. As already described, soils are relatively well draining. Damp or puggy areas were observed within shallow basins and the beginnings of gullies but there have been no major landslips in recent years. It is planned to direct drainage off future development on the western watershed of Baxters Knob, into Porirua Harbour.

Although there has been no specific hydrological survey on the site, certain factors shall be assumed. Drainage channels for most gullies are insignificant. However, in times of heavy rainfall, their water course will expand outwards and further up the gully. When the infiltration capacity is not limiting

and these soils have free draining characteristics, the contributing areas in short storms will be stream channels and the immediately surrounding riparian zone. For storms of longer duration, water travelling from the passive zone will also contribute to total run off. Thus the ability of water courses to cater for run off will be strongly influenced by the treatment of the riparian zones. These zones have been determined as far as possible.

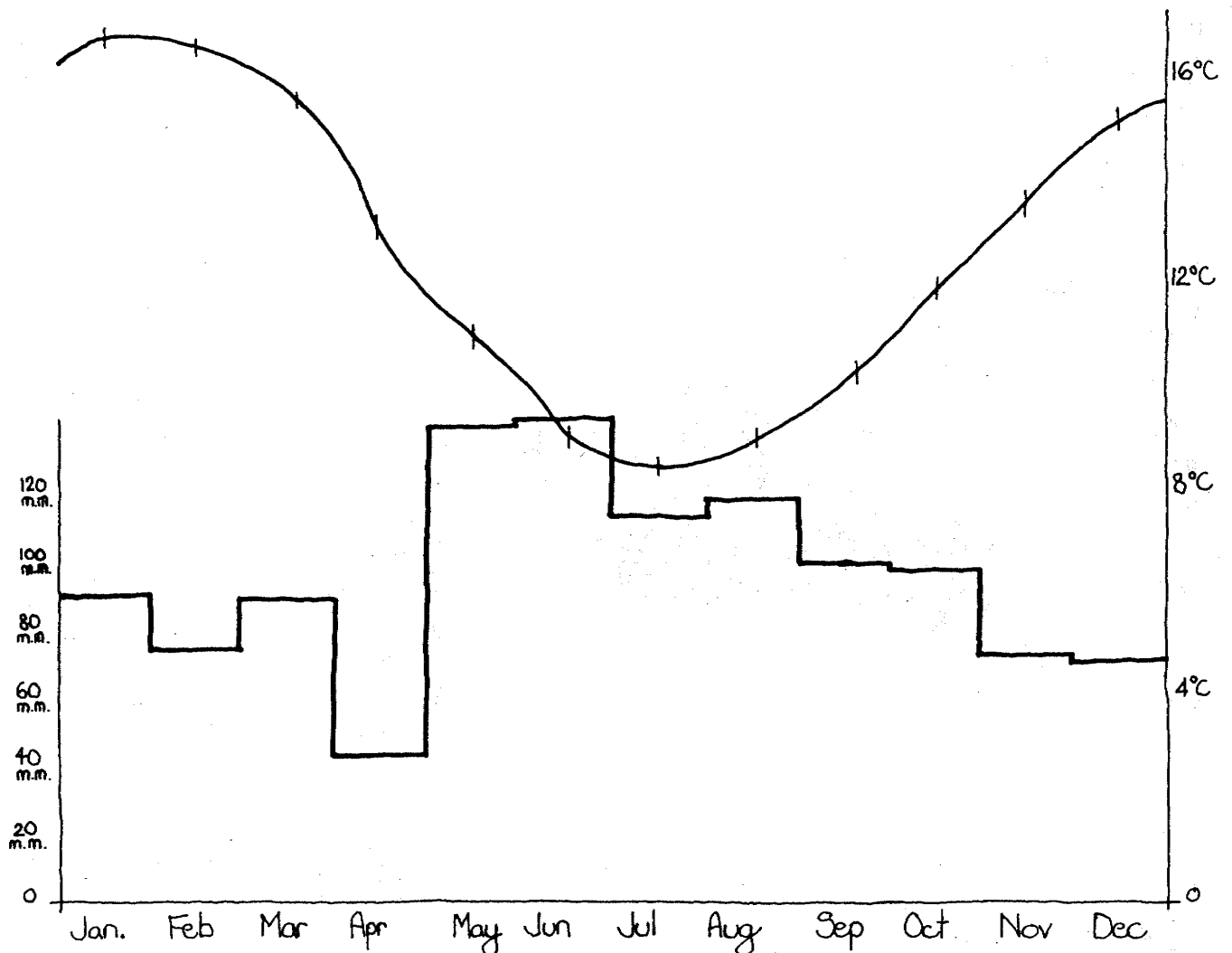
CLIMATE

Porirua is exposed to strong north westerly winds, which are probably the most significant climatic factor. The winds are both blustery (from surrounding relief) and persistent (from exposure to most directions) and there are few calm days. Because of the winds, slopes could become quickly dessicated in summer. The winds' strength and persistence indicate the importance of shelter.

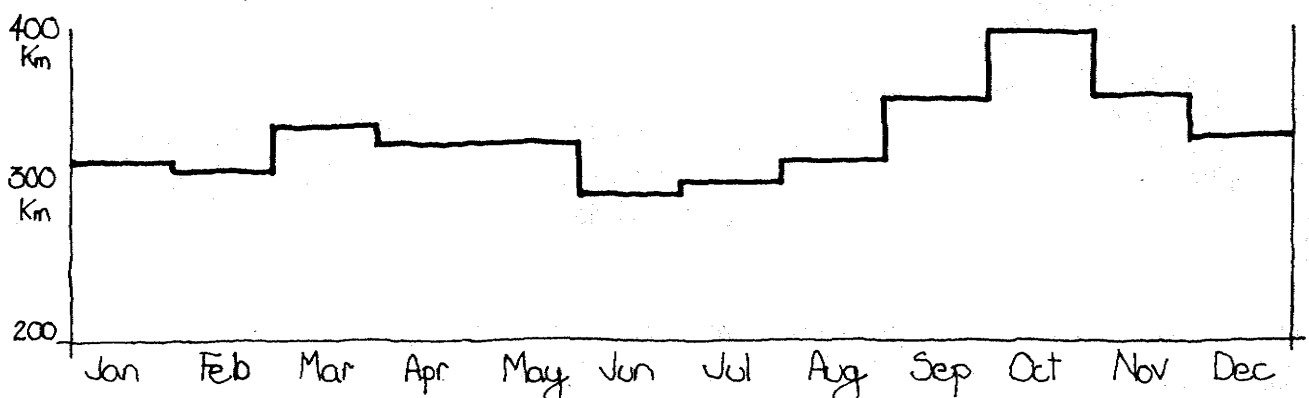
The temperatures, however, are generally mild and there are few extremes of hot or cold. The mean annual temperature at Porirua is 12.7°C with a mean daily range of 7.5°C. Frosts are infrequent and light. Average annual rainfall is 1146mm (occurring mostly in winter), which is less than much of the Wellington region.

North facing slopes, which occupy a large proportion of the site, will receive most sunlight and the southern slopes receive negligible amounts and are much cooler. The small amount of west facing slopes will be cool in morning and warmer in the afternoon.

Mean Monthly Temperature (°C) & Rainfall (m.m.)
At Porirua 1971-1975



Mean Daily Wind Run (Kilometres)
At Pauatahanui 1971-1975



VEGETATION

As the site is now being farmed, there is little vegetation present apart from grass cover. There are a few, although visually significant, shelter belts of either pine, macrocarpa or mixed and some patches of manuka are recolonising in the gullies. Typical pasture elements are brown top, cocksfoot and danthonia with occasional thistle weeds and cushion plants.

Existing shelter belts of pines



Manuka at the western base



Adjoining land is similarly rural although it will also be developed. There is a large isolated stand of pines, macrocarpas and gums to the north of the site, and manuka is regenerating in relatively continuous belts of scrub on slopes less exposed to summer sun. A variety of native forest margin shrubs and small trees, such as mahoe, ngaio, five-finger and others, are associated with this regeneration. Radiata pines and macrocarpa grow within areas of scrub and overtop the bush in patches or singly. Baxters Knob, the local high-point of the area, has been designated reserve and recently planted in pines and cypresses.

*Visual significance
of the shelter belts*

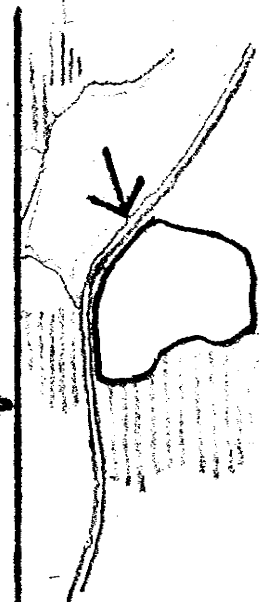
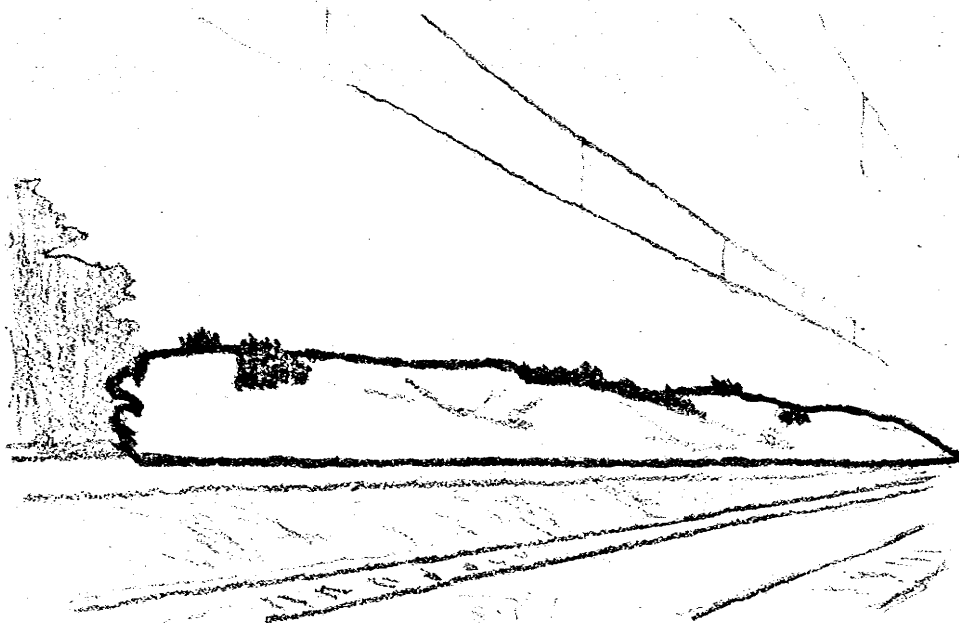
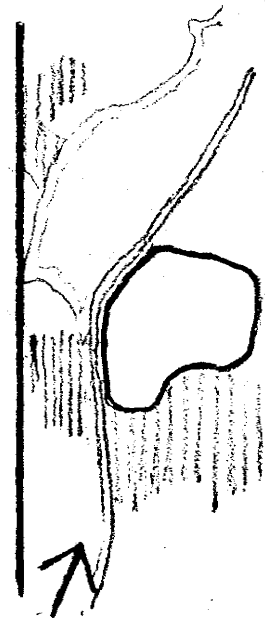
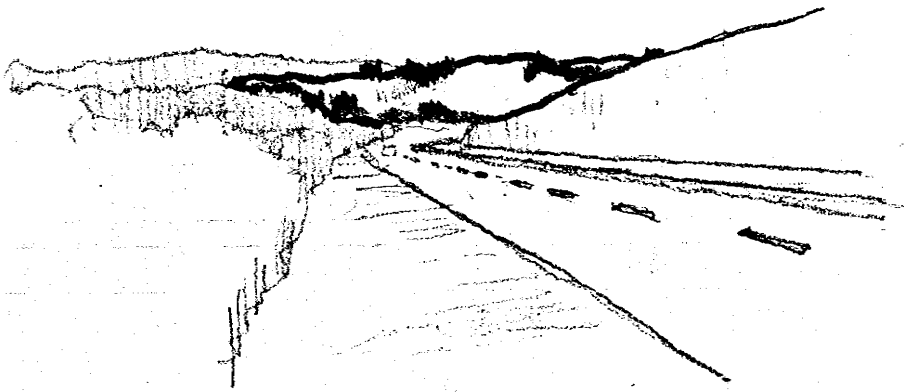


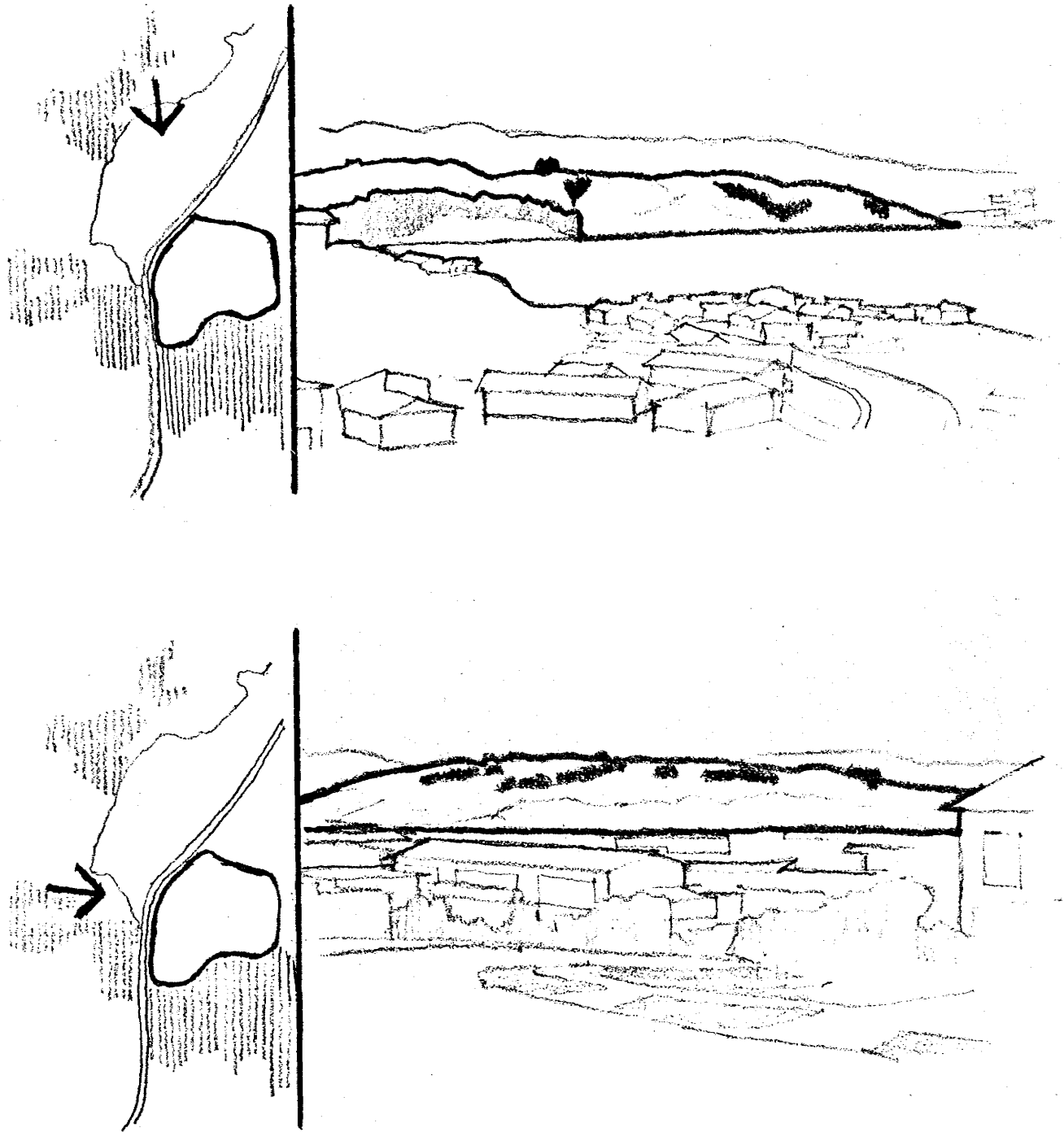
WILDLIFE

Birds such as sparrows, fantails, waxeyes and magpies frequent the area. Mallard ducks have been seen in the small lagoon between the motorway and northern side of the site and also in the Kenepuru stream. Some trout have been reported in the stream and rabbits were twice observed on visits to the site. The stream areas will be most important for wildlife as the source of food, water and shelter.

SOUND AND VISION

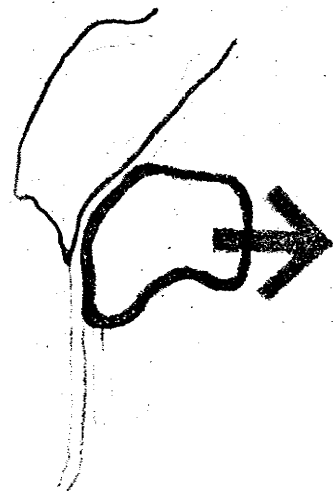
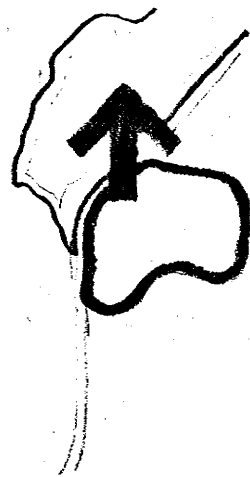
The site is conspicuous to most of the Porirua area, from almost all sides. It is a dominant background to the western portion of Porirua East, and becomes a focal point for motorists arriving on the motorway from Wellington and commuters on the railway units, travelling both north and south. The site's hills are very close to the City centre and noticeable to most development on Porirua's east facing slopes up to Titahi Bay, as well as to the main road north and adjacent hill country.





The views out are many and varied. From the main crest sweeping in an anti-clockwise arc, the views of the harbour are dominant (interrupted by the sweep of motorway and the railway line with its overhead electrical system), changing to views of the City Centre and hills beyond, then to the motorway and Porirua East. Views continue on to development

further up the valley to Waitangarua and to Baxters Knob on the adjoining rural land. The quality of views seems highest when looking onto the harbour, that is from the north and west facing slopes, and less attractive when looking onto Porirua East, especially the treeless new development.



The spaces experienced on the site fall into three categories. The enclosed nature of the small steep sided gullies have an individual confined identity. The slope sides and faces, particularly the southern face are as steep but are exposed. The easier, flatter plateaus of the west, north and of the main ridge have another character of open spaces.

Okowai gullies



The southern slope



The open tops



The noises of cars on the motorway and railway units were very evident on the north facing slopes, particularly the lower reaches. These sounds can be heard over a wide area, even on days when the wind is not blowing from the north and north west.

Construction on the motorway at the western base of the site will probably extend this intrusion onto the western slopes in the future. The higher points and slopes facing Porirua East receive negligible amounts of noise.

These survey factors and their inter-relationships shall be carried through to the next chapter for their evaluation.

Okowai: evaluation

The object of the survey has been to determine the site's natural functions so that the intended development can be implemented in accordance with them. This has resulted in a series of constraints which, interrelated with the social requirements, provide the framework for development.

SLOPE

Critical slopes for housing are those of 1:3, as shown on the slope analysis map. The location of steep slopes will be very important in deciding the general pattern of development. Some earthworks will be necessary in adjusting the pattern on the smaller scale, however the degree of earthworks should be kept to a minimum. Because the steeper slopes provide more problems of stability, the earthworks should be concentrated on easier slopes and on spurs rather than valley floors because of drainage considerations.

WATER

The drainage of the site at present is more or less stable, in the volumes of water it has to cope with. However when the site will be developed as a residential area, the hydrological situation will change, bringing a decrease in permeable surface and an increase in hard surfaces, mainly roads. This means that run off will be greatly increased and that there will be less land to absorb this water, which, in turn, places emphasis on the streams' capacity to remove the added stormwater. The major water problem will be in deciding how the stormwater will be taken off the site. Simply discharging into existing stream channels creates problems of flooding, scouring and undermining of slopes.

The alternatives will probably be decided on economic grounds but certain guidelines may be established.

- avoid directing stormwater drainage into one large channel. This is dangerous, being on an unnecessarily large scale. When storm problems of flooding occur, it is better to have them decentralised, making for easier control.

- avoid hard seal around discharge areas including the riparian zones as these are most vulnerable to any excess water and directly contribute to stream expansion and flooding. Five to ten metres is an approximately safe distance for small floods (frequencies of less than once in every twenty years).

- planting for water absorption will only be effective when carried out in riparian zones. This may be the only preventative measure against flooding that is necessary in smaller gullies.

- avoid, as far as possible, crossing drainage channels with roads, as the latter's accumulated run off will discharge into the stream, multiplying the volumes of water it normally handles.

The methods of catering for extra water run off, then, can be summarised in the following ways:

If existing stream courses are to be used, one must avoid using the natural channel, as it now exists, for discharge. Increased water will lead to scouring so that if it is to be used for suburban stormwater discharge the channel must be protected.

They may be armoured in steps with concrete drop structures or with boulder strewn, screened by trees. Similar methods are gabian mattress, a smaller boulder net, or gobi block and grass mat which is a finer surface pegged down onto the stream bed.

An alternative to strengthening the channels, may be piping the water off the site. This is more flexible as water can be piped anywhere, but is more expensive and pipes can be easily blocked with debris. It may be possible to pipe water underneath existing stream channels.

Detention dams may be practical at the top of the catchment or where roads cross the channels. The dam face can be fitted with varying pipes at set heights, which will release the water at a gradual rate. The time lag allows a longer period for discharge. The dams can also become the centre of recreation activities and the water may be used for irrigation purposes.

VISUAL ASPECTS

Because the area is so conspicuous, certain visual observations and guidelines should be made. Ridge lines or skyline is extremely noticeable from a distance. Therefore, their development should be kept to a minimum and as two dimensional as possible. This may include roads but excludes housing (although roads are accompanied by poles and other street furniture so it may be preferable to keep them just below the ridge line). Housing should fit in the landscape, not on and may be unified, especially from a distance, by similar roof colours.



*The road beneath the ridgeline
creates a pleasant visual effect*

*Nearby housing
on the skyline*



Ridge lines and knobs are important focal areas and should preferably be kept free as open space. Buffer zones, notably on northern and western slopes, are needed to separate housing development from the view and sound of motorway and railway.

*Housing beneath
the skyline*



VEGETATION

Planting of trees for shelter will be essential to the success of housing in this area, as winds are strong and persistent. The planting of vegetation will also be important in simply covering the soil to keep evaporation down and prevent dessication of slopes. This may be done by spraying clover on the most difficult slopes as a nitrogen fixer and then planting into this base. And the vegetation will also provide the expression of an open space system.

The main obstacle to planting on the site will be lack of shelter from winds. Buildings may provide this shelter but natural areas for successful growth are the valleys and gullies. Once established, they may be extended out onto the spurs and ridges.

In planting for shelter, two options are possible which stem from the two divergencies of planting on areas around the site - that is natives or exotic trees of pine, macrocarpa, etc.

The quick growth of pines and macrocarpas (which are already present on the site) suggest that they would be successful as initial shelter, planted, perhaps, in larger blocks which would be relatively easier to manage than conventional planting. After a period approximately 15 years when especially the macrocarpa will begin to look untidy they could be taken out when secondary growth, planted in the pine or macrocarpas shelter, will be strong enough to survive. This approach has the advantage of a rapidly growing height which will be important for providing scale and visual significance.

Pine trees providing scale



Experiments on the adjoining land have shown tree lucerne as a very hardy initial shelter to wind and Ngaio is able to grow behind it. Other natives will follow from this protection. Another method is to densely plant flax and toi toil as the first shelter. Quick growing and slow growing vegetation may be planted together. The main problem in planting natives for protection is their lack of initial height and the length of time needed for eventual significant height, as compared with the taller pines and macrocarpas.

OPEN SPACE

The survey factors of slope, water and visual spaces tend to break up the site into landscape compartments. The overall design should be responsive to these units and they should also be the basis of the open space network.

The land form, water courses and vegetation structures can be used and interrelated to both accentuate the features of the site and enhance the quality of open space. This physical framework may then involve the infiltration of urban development, which will include roads and circulation patterns, for communication is very much a part of open space systems, whether hard or soft, wooded or paved, large scale or small scale.

The sociological inputs of open space are just as important as the physical demands of open space. The design should be directed towards their compatibility for the health of the community can be served by the landscape. Social space is important to the community for human interaction, as well as experience of the environment, but it must be in places of use. Most people, to some degree, need to be part of the community and when people can utilise open and closed space they can become involved on a local scale. Conversely, space can be detrimental when it is not used, where one is unlikely to meet others and where climate and scale only produce spatial desolation. One way of ensuring use is to duplicate use for community purposes, such as school grounds. Multi-use and activity will be heightened if there is social space on points of interaction, such as pedestrian routes, shopping and community facilities, schools and so on.

Topography can be used to break up development into separate communities, creating identity and structure. The open space will act as a physical division of structures on the small scale and of groups of houses on the large scale.

Okowai: concept

The concept involves the incorporation of the aims of the study, as set out in the brief, and the tempering guidelines that have arisen from the subsequent survey and analysis. The latter have evolved a framework upon which the design concept can be based. The fact that the concept tends to be relatively restrictive is an indication of the site's unaccommodating acceptance of use or, perhaps, merely the inappropriateness of the intended use. However, by the same token, the site's topography represents a very strong structure which future development should incorporate and which site design should naturally stem from, rather than ignore.

A summary of these points is as follows:

Open Space

An open space network within the site can provide spatial variation and scale while contributing to the overall structure of development. Open space also acts as a link to surrounding development. The space should be multi-use to enhance the community and preserve the land processes, in particular the valleys. By avoiding development in the valleys, open space, as well as the natural drainage areas, can be preserved.

Housing

Differences in housing arrangements should exist. These differences will depend on the

site's physical qualities and also on the nature and cultural differences of the new population. The structure of urban form will be important in the spaces that are created and the social demands that have to be met, such as community spaces and privacy. To help establish identity, a local community focus will be necessary, in the form of shops and a community centre.

In overall terms, housing is best suited to north facing slopes for reasons of orientation to sun, views and the relatively gentle slopes as compared to the steeper southern slopes.

Circulation and Services

Roading should be minimised. This may be achieved through cluster housing, where the proportion of roads to houses is less, or simply by smaller road widths. (In new housing developments in Australia, cul-de-sacs were 3.6m wide in Canberra and 5m wide in Albury. This compares with the general New Zealand minimum cul-de-sac width of 7m on flat or hilly country.) The minimum road widths will depend on a hierarchy of routes.

Pedestrians should have an independent pathway system, which can be closely related to the valleys, establishing a spinal structure to development.

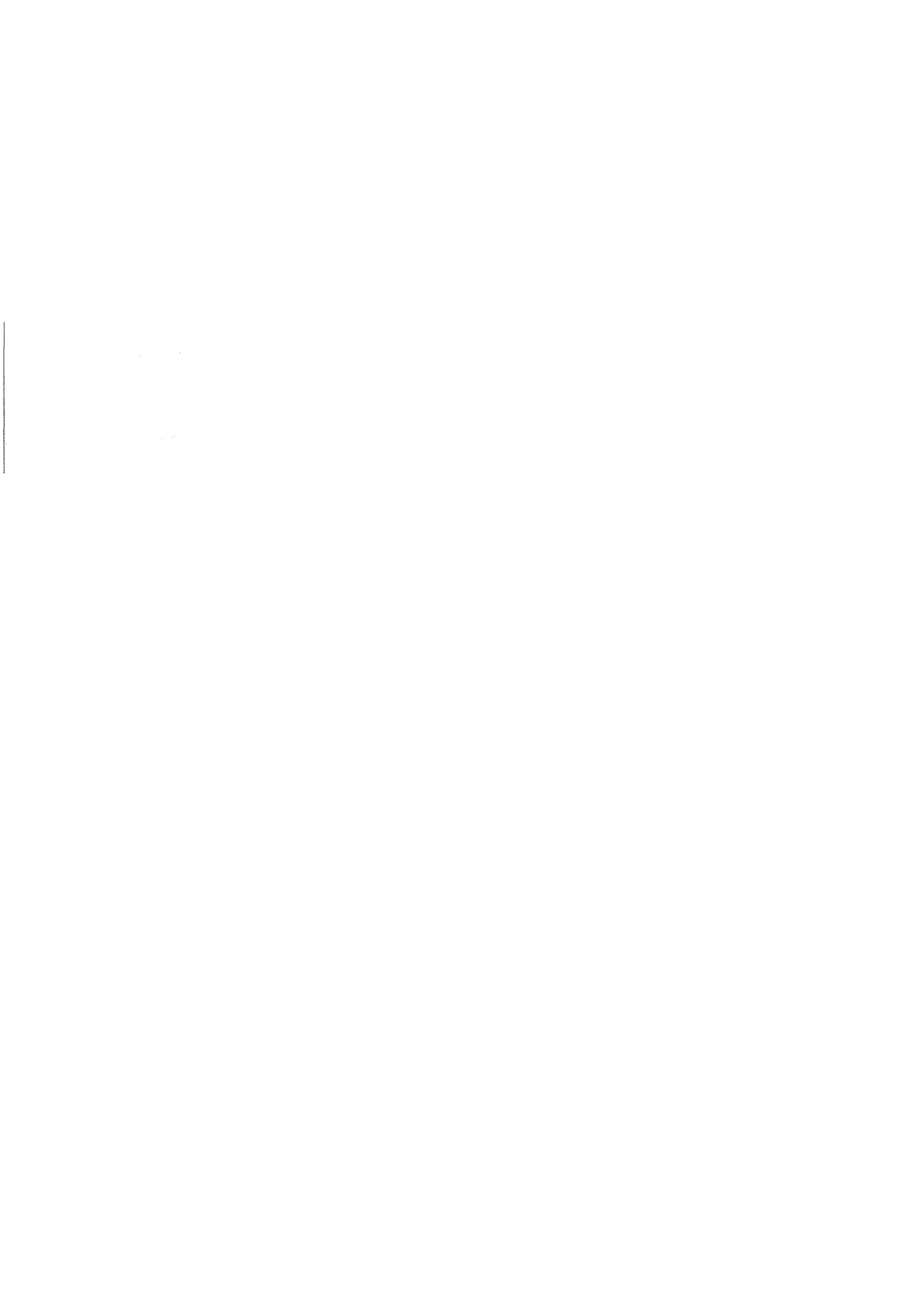
The sewage system is generally located on similar alignments to roads, but where this is not possible, the sewage pipes can be laid under open space. Remaining services should be laid underground and, depending on street layout, need not be on both sides of the road (in cul-de-sacs especially).

Planting

Establishing vegetation has several advantages, as has been pointed out in the evaluation. Trees will improve the micro-climate, and in particular, will lessen the effect of winds, provide scale and unify the structure of development. The boldness of topography will need to be complemented by a strength in planting layout.

It is inevitable that the existing rural character of the site will change with the intended housing development. However, the planting may retain a continuing degree of unity, with the surrounding hills while establishing its new character.

Buildings, as a part of all design, should relate to site features and site functions, for the land cannot be ignored. At the same time, people must be involved with the use of these buildings. When one body can initiate comprehensive development, as the Housing Corporation is in a position to do at Okowai, the onus lies with that authority to co-ordinate these relationships of houses to land and people to housing.



Notes

- 1 Hall, p.4
- 2 Rapoport, A. (1970), in Austin & Rosenberg, p.182
- 3 Austin & Rosenberg, p.182
- 4 Chermayeff & Alexander, p.63
- 5 Barrington, p.36
- 6 Chermayeff & Alexander, p.37
- 7 County Council of Essex, p.61
- 8 Chermayeff & Alexander, p.64
- 9 Murray, p.20
- 10 Murray, p.86
- 11 Robb, p.9
- 12 Murray, p.87
- 13 Melling, State Housing, p.7
- 14 Melling, State Housing, p.7
- 15 Murray, p.5
- 16 Taylor, p.55
- 17 Northey, p.8

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