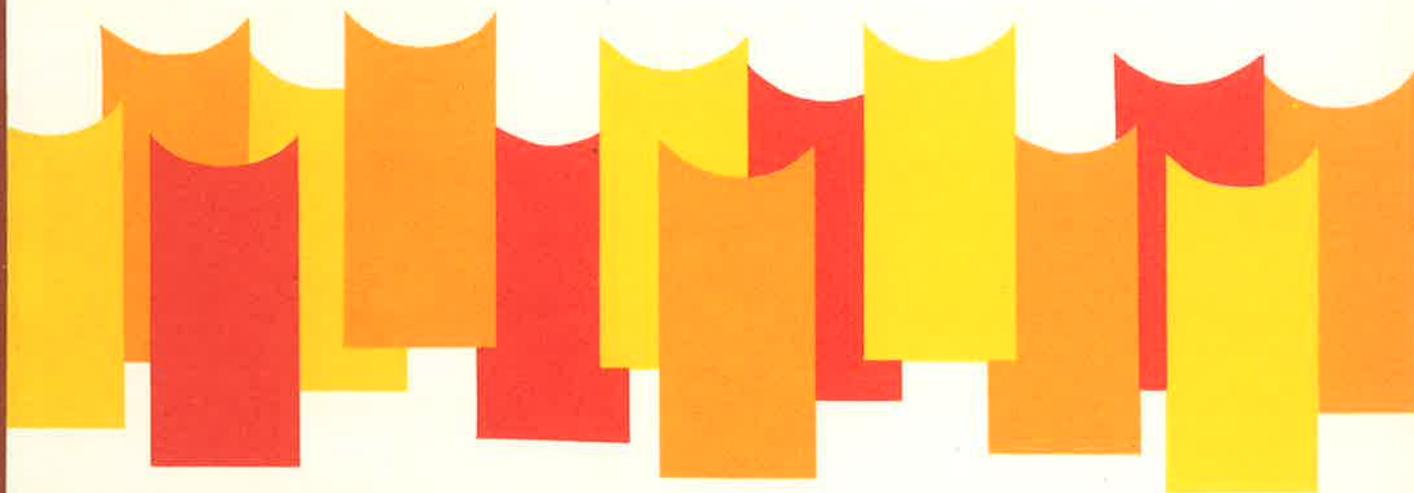


# ***WATER & SOIL***

**MISCELLANEOUS PUBLICATION**

**No. 40**

**Peatlands Policy Study:  
reports and recommendations**



**NATIONAL WATER AND SOIL  
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## **Peatlands policy study: reports and recommendations**

**Water & Soil Miscellaneous Publication No 40. 1982. 48p. 158N 0110-4705.**

This publication contains the reports of the North Island and South Island Working Parties and the recommendations of the Steering Committee on Peatlands Policy Management. The reports indicate the directions which future research on peat and peatlands and making of policy and management guidelines should take.

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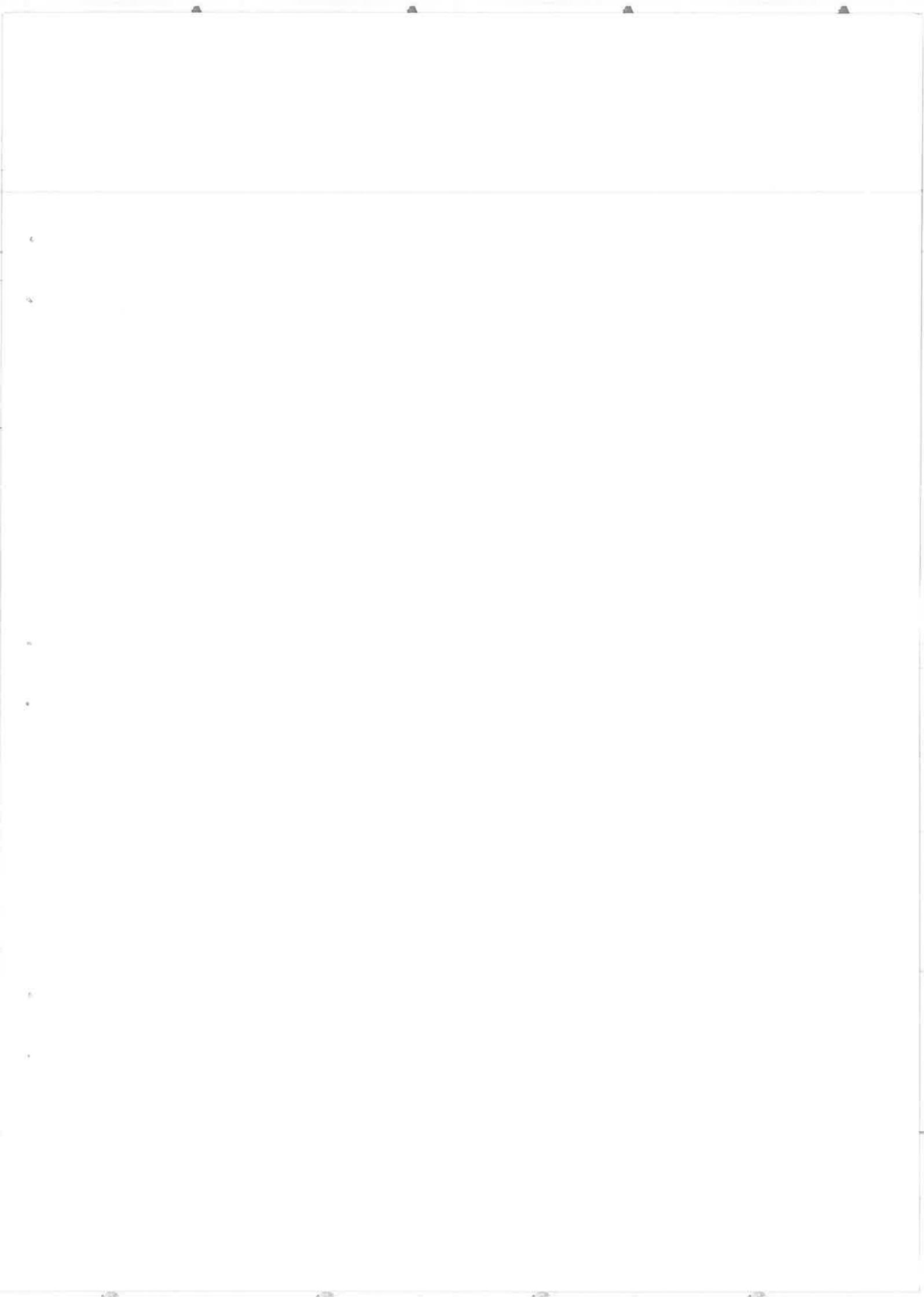
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# Preface

With the objective of developing a policy on peat and peatlands, the National Water and Soil Conservation Organisation (NWASCO) convened an interdepartmental meeting on 15 April 1980. The organisations represented and those who attended are listed in Appendix A. At this meeting a paper by H. Joll (Appendix B) which reviewed the state of peatland management and use was discussed.

The meeting looked at a number of relevant issues, including the lack of a national policy which would be practical at a local level and the need to consider town and country planning issues (controls at the regional level and public participation). It found that the export of peat was not acceptable to all interested parties but that economics were an important consideration if peat is to be a viable mining operation. It looked at the conflicts with other land uses and at the effects of over and under drainage.

The Chairman pointed out that these conflicts and peatland management generally were causing difficulties in the administration of water and soil conservation legislation. He proposed that two working parties (one each for the North and South Islands) and a steering committee be formed.

The meeting agreed and established the steering committee and working parties with the broad aim of identifying conflicts, and requirements of different uses (compatible and incompatible): the working parties would operate at the local level and the steering committee would co-ordinate the local and national interest. (The terms of reference agreed to by the meeting for the committee and working parties are given in Appendix C and the membership of each is given in Appendix D.)

By August 1981, the working parties had completed their reports. These were sent by the steering committee to a number of interested organisations with a request for comments for consideration by the committee. Because there was some urgency to finish the present phase of study, the committee was not able to provide an opportunity for comments by the general public.

In December 1981 the steering committee considered the reports and the comments it had received and made a number of recommendations to NWASCO. One of these was that the report be published, to stimulate further discussion and to allow for comments. Because its work was completed the steering committee was then disbanded.

The reports of each working party are given in Sections 1 and 2 of this publication; the recommendations of the steering committee are in Section 3.

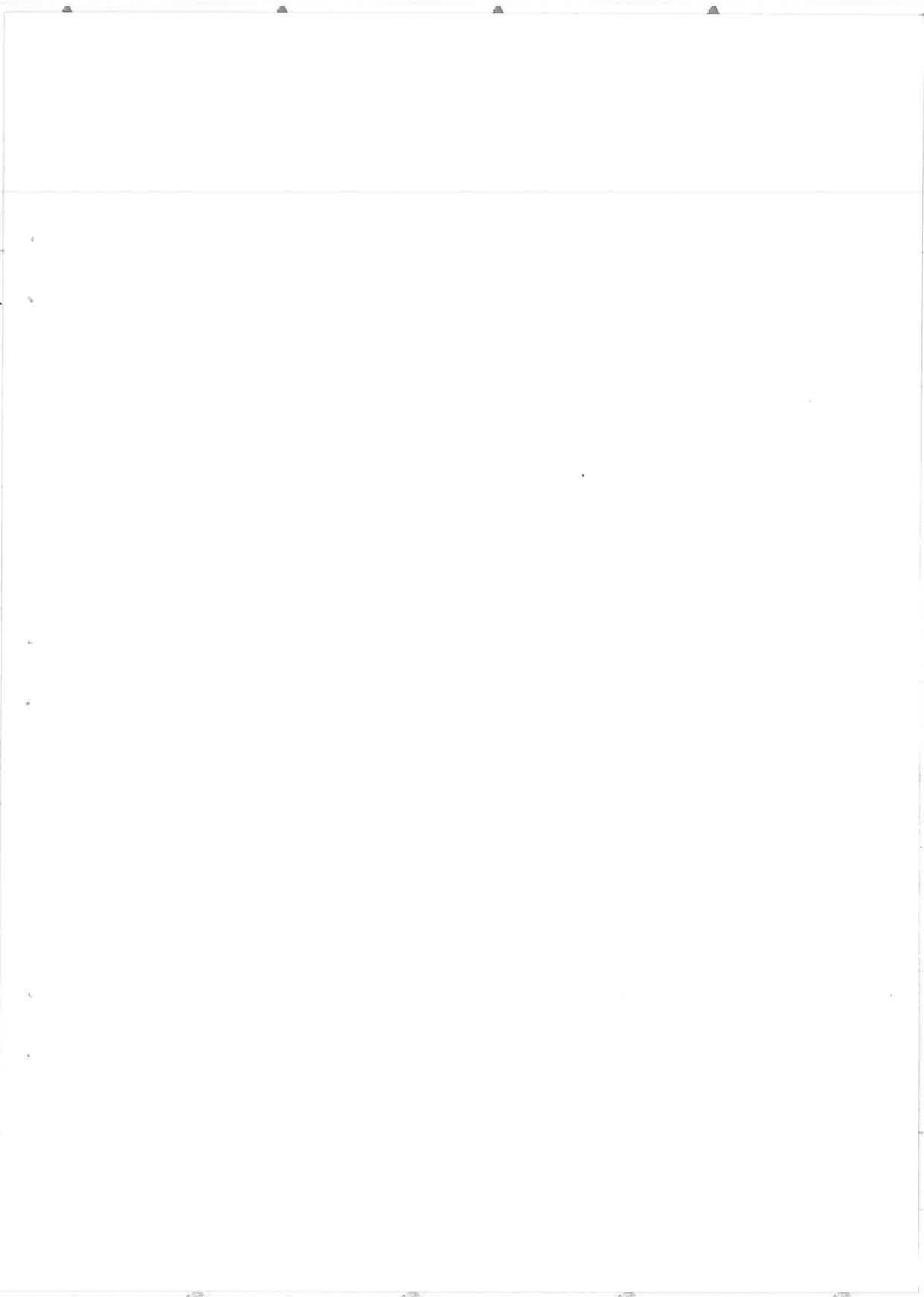
Comments and submissions relating to this publication are now invited and should be directed to:

Director of Water and Soil Conservation  
Water and Soil Division  
Ministry of Works and Development  
PO Box 12 041  
WELLINGTON

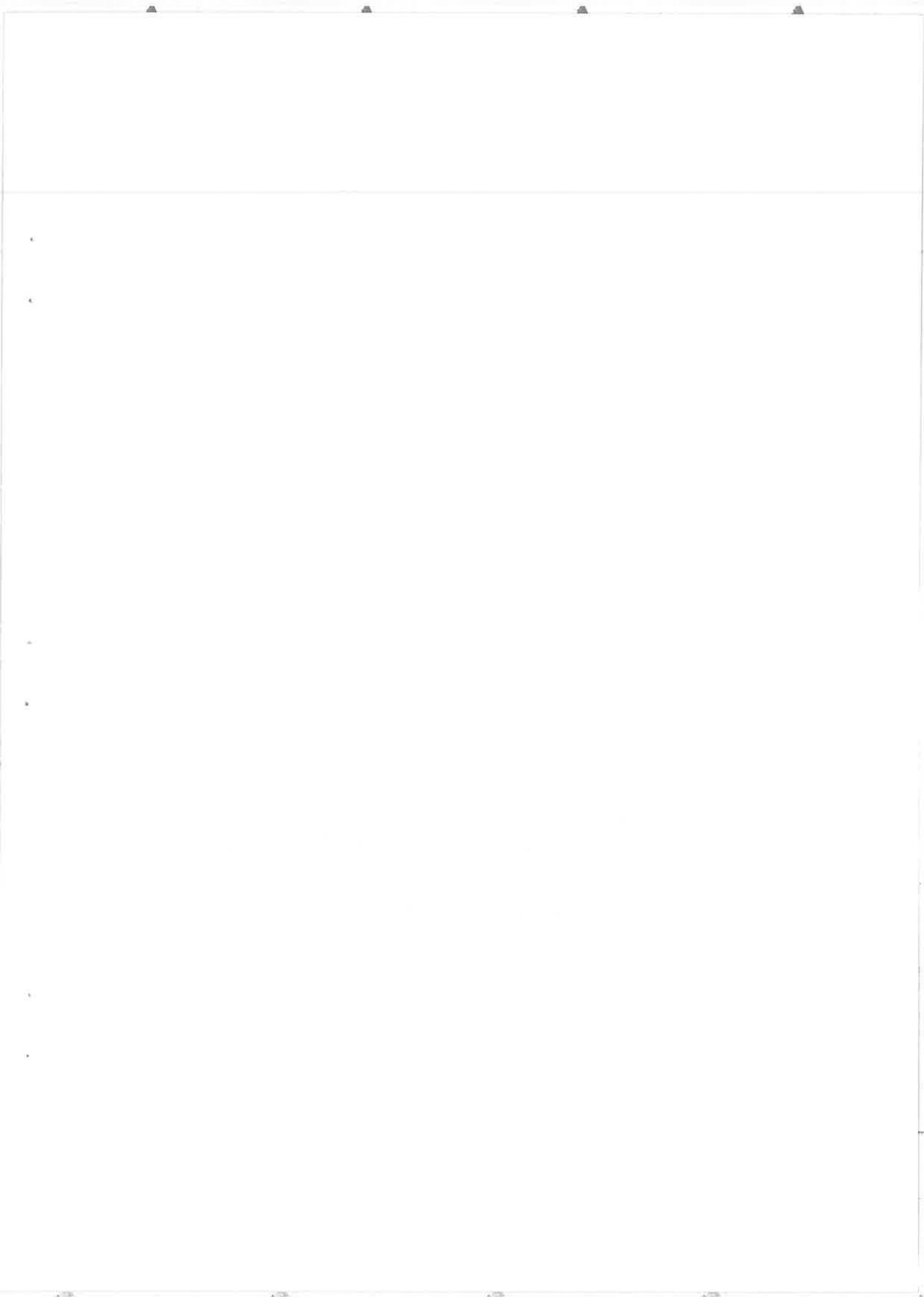
The next phase of study will be for NWASCO to consider implementation of the steering committee's recommendations.

My thanks are due to all members of the steering committee and the working parties and to the people co-opted to assist at various stages of the study. Thanks are also due to the various district offices of the Ministry of Works and Development, catchment authorities and private organisations who made their facilities available for meetings, field work and report compilation.

R. K. Howard,  
*Chairman,*  
*Peatlands Policy Study Steering Committee.*



# **1. Peatlands Policy Guidelines: The North Island Working Party Report**



## Introduction

The North Island Working Party is made up of representatives from the Catchment Authorities, Ministry of Agriculture and Fisheries, Ministry of Works, Wildlife Service of Internal Affairs, Soil Bureau of D.S.I.R., Mines Division of the Ministry of Energy, N.Z. Counties Association and Department of Lands and Survey. A representative of the peat mining industry (Mr. R. A. Martin of Hauraki Peat Ltd) was invited to join the party. Mr. K. Thompson of the University of Waikato, also a member, is out of New Zealand until early 1981, but replied to the working party by post.

The working party members are all based in the Waikato or Auckland and meetings were held at the Waikato Valley Authority offices in Hamilton. A preliminary meeting was called (31 July 1980) to allow members to talk over the suggested terms of reference. Subsequent to this meeting members were asked to submit their comments on aspects of peatland management in which they have expertise. The comments were forwarded to the convenor and copies of all submissions were distributed to all members prior to a second meeting (26 September 1980) where the terms of reference were discussed in greater detail and with reference to the members' comments. A field trip for members was run on 25 September visiting an area of peat mining and a Lands and Survey development block (pastoral farming) at Ngatea, a private horticultural venture at Maramarua, and the Whangamarino swamp (undeveloped peat swamp) near Meremere.

Participants are involved in a variety of fields related to peatlands management and therefore are interested in promoting the multiple use of peatlands. In order to be able to determine the most suitable or best use of any piece of peatland the working party agreed it is necessary to understand the functions and properties of not only the piece of land itself but also the properties of the whole peat body surrounding it, and indeed the peat resources of the whole of New Zealand.

Although, during working party meetings, the terms of reference were discussed in the sequence given by the Steering Committee meeting of 15 April 1980, the order has been rearranged in the following report so that continuity is maintained. During discussion the working party suggested that wording of term of reference number 8 be changed to read:

“To consider existing legislative and administrative controls over peat and whether:  
(a) all parties . . .”

If the statement is considered in this form, bodies that are concerned with administering the legislation (e.g. Planning Tribunal) are included. Otherwise the terms of reference covered all aspects that were of concern with provision made in number 10 for points not specifically mentioned.

The following document is a synthesis of points discussed at the two meetings of the North Island Working Party incorporating the comments of individual participants as submitted, and also including points made at meetings of the Steering Committee and South Island Working Party.

## Critical factors in Peatland management

Discussions stem from peatland uses and therefore the third of the terms of reference will be dealt with first.

“To identify critical factors in the understanding of peatlands.”

The meeting of the Steering Committee of 15 April 1980 discussed a number of functions for peatlands which were listed according to whether they have specific area and/or volume requirements. The working party agreed with these categories and the following uses and/or functions of peatlands were discussed.

**Pastoral farming:** This is traditionally dairying backed up by physical location factors of peatlands (flat land near large towns). Other practices such as stock fattening, stud farming and deer farming are also carried out.

**Horticulture and cropping:** Blueberry production is a crop which has generated a good deal of interest in peatland management with present high prices. Market garden crops such as pumpkin, onions and asparagus are also grown taking advantage of some of the properties of peat soils, though these crops can be grown in other soils. Fodder crops such as maize and barley are also grown.

**Peat mining:** This is covered in detail later. Only certain types of peat are suitable for mining, depending on the peat-forming material and proportion of mineral soil. In New Zealand peat is mined for the nursery industry (bulk peat, peat pots and mixed with sand, bark etc. for potting mix). Although peat is used as a fuel in other countries it is unlikely to be used in New Zealand because of the limited resource.

**Nursery:** Peat is used *in situ* as a nursery for plants.

**Hydrological purposes:** The function of peatlands in catchment hydrology is very poorly known and it is therefore difficult for the working party to make recommendations. Overdrainage leading to drying out and shrinkage has occurred in the past. In many instances large areas of undeveloped peat swamp serve to maintain a constant summer flow, act as a ponding area during floods and act as a 'sponge' which stores ground water. Such functions are a feature of the individual peat swamp and vary widely.

Large peat areas notably in Hauraki (Waihou/Piako scheme) and the Waikato (Lower Waikato scheme) are important for flood control. Kopuatai Peat Dome forms the watershed between the Piako and Waihou Rivers and as such prevents water flooding from one system to the other. Flood waters are absorbed by and accumulate on the peat, eventually draining through canalised waterways thus bypassing valuable farmland.

Whangamarino Swamp provides some 10 000 ha of ponding area for the design flood of the Lower Waikato scheme—water that otherwise would inundate farms and towns on the plain.

High water tables, saturated soils, and drying out and shrinkage of drained peat are properties of peatlands that pose serious problems to developers and engineers. These aspects need investigation and identification in order to assess potential problems that may be encountered by developing peat areas.

At present a single peatland area is often administered by several drainage boards. It was felt that, as drainage and water storage aspects of peatlands are a function of the whole area the bog should be considered as a single entity. In order to achieve this, co-ordination of drainage schemes should be undertaken by the local catchment authority (where this is not already done) though works may be undertaken on a local basis. Hoe-o-Tainui peat dome (Waikato) forms the watershed between the Piako and Waikato Rivers. Even though water drains in different directions on the two sides of the peat bog development on either side may affect the water table on the other. In such a situation the two catchment authorities would also need to co-operate to maintain satisfactory drainage control.

Water table control and drainage aspects of peatlands are critical for all uses and should take priority especially since there are many unknown effects. Once peat has been overdrained it needs expensive irrigation to maintain a good moisture balance. If it dries out it is extremely difficult to re-wet and the value of the resource is lost.

**Scientific and ecological reserves:** Unmodified peatland areas set aside as scientific reserves would provide information both of scientific interest and of use for future peatland management. As mentioned above relatively little is known of the hydrological processes operating in peat. Studies designed to investigate such processes would be useful to agriculture, mining, drainage operations and construction on peat.

Unmodified peat reserves could allow for biological and ecological studies. Some plant and animal species which are found in peat swamps are rare and warrant protection. Ecological studies of plant/animal/environment interactions are of scientific interest. Such interactions are very complex and depend on such parameters as vegetation, exposure, food sources etc. It is generally the unmodified peat areas that are most useful for this purpose though animal life may be more diverse on the margins of such swamps.

Studies on environmental aspects may be conducted utilising observations of variation in peat composition, peat type, pollen analysis and volcanic ash layers etc.

Such areas can have a general educational value, depending on their diversity and access. Access however needs to be controlled to avoid modification of the natural state by visitors.

**Recreation:** Both active (e.g. hunting and fishing) and passive (e.g. scenic) forms of recreation were considered uses of peatlands.

**Other uses:** There are a number of uses for peatlands that are not currently practised in New Zealand. That is not to say that these may not be viable in the future. Wax extraction, kauri gum extraction (from northern swamps) and possible oil extraction have been mooted.

Critical factors for investigation clearly vary for different uses and therefore all parameters need to be investigated if the multiple use option is to be considered.

## Present status and future needs of Peatland research in New Zealand.

The second listed term of reference asked members to:

“examine ‘A Survey of New Zealand Peat Resources’ . . . to determine if:

- (a) the bogs surveyed were a representative cross-section of the various types of peat bogs in New Zealand;
- (b) there are areas not included in the survey that require documentation to give a complete coverage;
- (c) the descriptions and classifications of the bogs provide adequate details on the peatlands;
- (d) further surveys and detailed investigations are required.”

Although the report presents a cross-section of New Zealand peatlands it is not, nor was intended to be, a complete coverage and several large areas which were included in other surveys have been omitted, for example the peatlands of Manawatu and Wellington (described in an earlier D.S.I.R. (Soil Bureau) publication), Kaimaumu Swamp in Northland, described in a Lands and Survey investigation, and several smaller peatlands that may be locally very important. Even if all these small areas are not surveyed to the detail given in Technical Publication No. 14 they should all be listed to give a complete coverage of the peat resource in the country—information which is notably lacking. A preliminary list is given in Table 1.

The present form of the survey gives a good background description of each area and usually a selection of peat profiles. It does not, however, give sufficient detail on all parameters that are required for management decisions or for all of the peatlands. Several aspects in particular need further investigation. There is wildlife and fisheries information given for only two peatlands. When protection aspects need to be taken into account for local planning decisions, the information is simply not available and decisions may be made which are detrimental to the environment. Some significant peatland wildlife habitats were omitted from the survey because they are insubstantial in size or are on shallow peat.

Physical aspects of peat type and quality could well be expanded in an extended survey in order to provide accurate background information so a decision can be made on the most suitable use for a peat body. It is especially critical in areas such as Hauraki, where there is a high demand for peatland for mining and that these uses be given priority consideration. It was suggested that detailed assessments of depth, peat composition, surface vegetation of unmodified peat areas, and quality of peats is required to be mapped on as large a scale as possible. Clearly such investigations would involve a large input of time to cover all peatlands but the working party felt that areas of conflict over land use at present under discussion should be investigated first.

Some areas could be set aside as scientific reserves to study processes operating in peatlands. Scientific studies suggested by the working party included investigations on the effect of man's activities on peat (such as changes in surface level after drainage, effect of depth of drains, different methods of farming) as well as ecological and hydrological studies. These studies will help in the understanding of peatlands and in turn provide information for peat management.

The peat resources report does not give any information on land tenure of the peat areas surveyed. The working party feels that this information is needed and that tenure should be investigated for all areas (see Table 1). Problems associated with tenure are discussed in a later section of this report.

A more detailed, extended survey of New Zealand peat resources will allow the economic benefits of different uses to be assessed. This would need to be reviewed from time to time as demands and the economic situation changed.

As was noted above, different users are interested in different properties of peatlands, but, in order to allocate the best use or combination of uses, all aspects need to be investigated for each area.

At present such an investigation is under way for the Whangamarino Swamp in the Waikato. Surface vegetation, wildlife, fisheries, land use (present and potential), flood control requirements, land tenure and soils are being investigated and this information will be analysed to produce management guidelines for the unique physical and socio-economic conditions of the area.

Although most of the peatlands surveyed were areas that are undeveloped or in the process of being developed (e.g. mined and being put into agriculture), other areas which are already cleared, drained and well established should also be considered as peat land, and studied with interest as the processes operating in these areas are the result of past and present management techniques.

**TABLE 1: NORTH ISLAND PEATLANDS.**

<i>Peatland</i>	<i>Area (ha)</i>	<i>Ownership</i>
Sweetwater	5 000	C + P
Hikurangi	2 500	
Kaimaumu	2 000	C
Waipu	790	
Te Raite	100	C
Rangiputa	150	C
Aka Aka/Otaua	4 800	C
Tuakau		
Te Kohanga	2 000	P
Mangatawhiri	1 300	P
Motukaraka	3 700	P
Papakura		P
Clevedon		P
Whangamarino	10 000	C + P
Ohinewai	1 500	P
Kopuatai	9 000	
Hauraki	10 000	P
Te Mimiha	1 100	P
Hoe-o-Tainui	1 450	P
Orini	1 470	P
Kainui	1 420	P
Komakorau	21 600	P
Ohote	640	
Kaituna	3 540	
Waihi	2 300	
Rukuhia	6 420	P + C
Moanatuatua	8 470	P + C
Tarawera	3 000	
Poukawa	890	
Te Aute	460	
Turangi		
Lower Hutt		
Woodville		
Foxton		
Ngamatea		
Pahipahi		
Rangitaiki		
Te Kawa	2 500	P
Whangape	2 000	C + P
Waahi	200	P
Ratapiko	250	P
Midhurst	300	P
Ngaere	700	P
Ahukawakawa	300	C
Mt. Damper	90	C
Waitaanga	?	C

P = Private                      C = Crown

Information taken from Lands and Survey records and Technical Publication No. 14.

## **Spatial requirements for economic use of Peatlands**

Point four of the terms of reference suggested that the working party:

“identify and make recommendations on the minimal areal and volumetric requirements for different uses of peatlands.”

This goes beyond the qualification made above that mining and the nursery industry have specific requirements for quality and other physical factors.

As mentioned above, water content and drainage aspects should be given first priority when considering allocation of peatlands and land use management. Areal requirements for such hydrological uses will vary widely depending on the nature of the peat area and its catchment. For example 10 000 ha is set aside for flood water storage purposes in Whangamarino Swamp. This is a function of the total catchment area, surface topography of the swamp and surrounding area, the volume of water in the Waikato and the design of the flood diversion scheme. If more flooding of other ground could be tolerated then a smaller area of swamp would be needed for flood storage.

Some uses, particularly agriculture, do have minimum requirements for economic operation given local conditions. The following notes were provided by the Ministry of Agriculture and Fisheries representative. They are average North Island requirements and include comments on physical requirements that are limiting for that crop. These are not defined in any other section and were not specifically requested in the terms of reference but are included here for completeness.

Agriculture, usually pastoralism, is the main use for developed peatland. Usually peatland is farmed after being mined.

**Open ground nursery stock:** (e.g. on mineralised peatlands at Clevedon and Kumeu, near Auckland). Location of nurseries is dependent on access to the market, and climate and also on physical qualities such as depth of water table and peat quality. Ten hectares is the minimum size which allows for rotation. Nurseries also use mined peat so are vulnerable to shortages.

**Blueberry cropping:** This is a relatively new venture that has aroused considerable interest. The minimum area is about six hectares with drainage and fertilisers needed to sustain production (see Table 2).

**Orchards:** The minimum area is about 10 ha on mineralised peat. Citrus, persimmon and kiwifruit have been grown successfully. The latter requires supporting structures as recommended with extra bracing necessary in some instances. Choice of species depends on climate, location and water table.

**Vegetables:** A minimum of 20–30 ha is required for commercial cropping on peat. Cropping is restricted by climate and, more importantly, water table depth. Pumpkin, onions, sweetcorn and asparagus have been grown.

**Farm Cropping:** (e.g. maize, barley). Rotation cropping of maize (three years pasture) requires a minimum of 40 ha on a 120 ha farm, and two years cropping of barley alternating with a greenfeed crop requires a minimum of 40 ha on a 120 ha farm. Drains about 0.6 m deep are needed.

**Pasture:** The minimum area is 60 ha which needs drainage and fertiliser (see Table 2).

Costs for preparation, particularly drainage of peatlands for any sort of agriculture, are very high.

Developing peatlands for agriculture depends on a number of factors which, in summary, include:

- water level, and the degree to which the water table fluctuates seasonally and whether it can be maintained at a suitable level. If the water table cannot be controlled then usefulness for horticulture is limited.
- climatic requirements, access and proximity to markets—factors beyond the soil quality limitation.
- economics of breaking in the land.

**Mining:** The nursery industry requires about 50 000m<sup>3</sup> bulk air-dried peat per year, harvested from approximately 10 ha per year. The depth to which the peat is mined (i.e. volume) will depend on the depth of the peat body and presence of any restricting layers (stumps etc). Quality of peat also restricts use. Mining, as well as depending on type and quality of peat also needs to take account of drainage. Some areas of minable peat have been destroyed by overdraining for agriculture in the past and mining can pose a threat to subsequent use if overdraining occurs during the operation. Legislative controls at present in operation should prevent such a condition occurring.

**TABLE 2: REQUIREMENTS FOR PEAT USES.**

<i>Use</i>	<i>Area</i>	<i>Physical requirements</i>	<i>Fertiliser requirements</i>
Nursery	10 ha	Access, climate, quality of peat, water table control	
Blueberries	6 ha	Drains 50–60 cm deep, 100 m apart	200 kg serpentine super 50 kg sulphate of potash in spring 50 kg sulphate of ammonia + 2 kg copper sulphate every 3 years
Orchards	10 ha	Access, climate, water table control	

Vegetables	20–30 ha	climate, water table control, mineralised peat	
Maize, barley	40 ha on 120 ha unit	Drains 60 cm deep	8 tonnes/ha lime 500 kg– 1000 kg copperised super when seeded
Pasture	50 ha	Drains 60 cm deep	as for maize
Forestry	160 ha	Climate, access, water table control—depends on species	
Hydrological	?	Depends on catchment characteristics, climate etc.	
Reserve	?	Depends on purpose, characteristics, location undeveloped	
Mining	10 ha/yr	Quality—land prepared for further use after mining Depth of mining depends on topography, quality and timber layers—about 1–2 m	

New Zealand Forest Service should be consulted on identification of areas suitable for afforestation. Physical aspects such as access, climate and particularly water level will determine suitability and species. About 160 ha is the minimum area for commercial forestry (2 ha is the minimum area for financial assistance for farm forestry).

It is difficult to define actual areal or volumetric requirements for other peatland uses such as wildlife, fisheries, scientific or scenic reserves. There is a size below which the peatland cannot support a large and diverse population and therefore is not truly representative, but this cannot be generalised. Diversity of plant and animal species is found to be greater in areas with a partly mineralised soil, generally on the margins of true peatlands. Reserves need to be large enough to protect the character of the peatland, to provide a buffer zone from the adjacent land (usually pasture), and also to accommodate any other recreational uses the reserve may serve (e.g. hunting, bird watching). The buffer zone is in order to 'absorb' encroaching effects of the neighbouring land use (e.g. drainage altering the water level and therefore the variety of plants, upland bird species using vegetation for shelter; grazing animals entering the peatland; and seeds carried into the swamp).

It is difficult to rate wildlife values of an area because a variety of species are present. Whereas an area may have outstanding value for one particular aspect (e.g. fish) it may be quite undistinguished for another (e.g. birds), or may be valuable for diversity rather than presence of a particular rare species.

Generally larger habitats can support larger numbers of individuals or species and a larger area will be more likely to maintain these numbers. The numbers will decrease with increasing distance from another, similar habitat. Thus a single, large reserve is preferable, from a wildlife point of view, to smaller, separate ones. The area required to support a species or community varies with needs of the species. When an area of peatland is cleared leaving a small area as reserve the numbers will gradually decline until a state of equilibrium is reached. A specific size cannot be allocated for such purposes without investigation into the needs of the populations and the physical properties of the peatland.

## Peat as a Mineral Resource

The seventh term of reference requested that the working party:

"discuss and make recommendations on the role and use of peat as a mineral and industrial resource."

The working party agreed that mining is a legitimate use of the resource. Sequential development from unmodified peat swamp through mining to agricultural use was mentioned on numerous occasions throughout the discussions. As development to farming may destroy peat quality for mining, but mined areas can subsequently be farmed, mining of suitable peat should take priority over other developments. To achieve this end all peatland areas need investigating to determine quality and quantity of peat and areas of minable peat should be identified.

A number of points were made regarding mining peat in order not to destroy the resource. As was noted above protection of the water resource should be the primary consideration in peatland development. Peat mining therefore should not extend below a certain depth determined by the local water table and requirements of neighbouring users. Periodic levelling, to be undertaken by the mining company, should be made a condition of the mining licence.

Rehabilitation of a mined area is of particular concern. The working party decided that the term "prepared for an improved land management" best represented the final aim and should be included in the conditions contained in the mining licence. This terminology was adopted because the working party felt that the land is usually in a better and more usable condition after the clearing and draining that is involved in mining peat, than when the operation began, thus rehabilitation does not apply and it would not be acceptable for the land to be left to revert to scrub swamp, for example. Such a condition on the mining licence would encourage further development towards cropping or grazing.

A point was raised regarding funding. Whereas agricultural development (e.g. Lands and Survey development blocks) benefits the local community (e.g. produce sold at local markets, services required) mining royalties are paid into the Consolidated Fund and do not directly return to the local community. There could be a possibility of this money being 'tagged' and subsequently used in future development of the land. This would also act as a safeguard if a mining company was to go bankrupt.

Mining the whole or a restricted area was also discussed. This is especially relevant in the example of Kaimaumu Swamp (Northland) where mining would be for extraction of kauri gum. Such an operation may destroy the resource for future use and the question needs to be asked if such mining is beneficial to the district in the long term.

Applications for mining licences for peat mining need special consideration as some five years is involved in preparation of a site before mining can begin. Approximately 10 ha of peat is required per year for present production needs. Permits need to be issued for 10 ha each year though that particular block will not be mined for five years. Peat mining legislation will be discussed in a subsequent section.

## Tenure

As noted above, the survey of New Zealand peat resources did not include any information on land tenure—information that is necessary for formation of management decisions. One of the terms of reference (6) asked the working party to:

"identify problems associated with tenure".

Most of the large peat areas in the North Island are Crown Land with some areas around the margins in private ownership. The reverse is true for the South Island. Table 1 shows the main areas of Crown Land in the North Island.

The first major problem considered is that as a peat bog is a single living entity, it should be controlled and/or managed by one body. This point cropped up earlier in discussion as to fragmented drainage management but can be extended to relate to all aspects of peatland development, regardless of tenure. Undeveloped peatlands particularly suffer from a conflict of interests. There is pressure for mining (if suitable quality), agricultural development, recreation and for preservation in the natural state.

Co-operation among local bodies would undoubtedly be an advantage in peatland management. For example at Ruku Farm Settlement unco-ordinated land development on Crown and privately-owned properties has led to increased water runoff and a comprehensive drainage scheme has to be installed before development can be completed.

Management plans for an area should cover the whole of any peat area as the effect of any kind of development cannot be isolated. Some examples of this sort of co-operative investigation are under way. The resources survey of the Whangamarino Swamp mentioned above is one. A working party was established to investigate all aspects of land use on Kopuatai Peat Dome (Hauraki) which led to recommendations as to reserving the peat dome until further investigation and a management plan could be established.

The working party concluded that the problem does not lie in the land tenure itself but rather in a lack of co-ordinated management and administration. It would appear that local bodies concerned with drainage or land use allocation would be best to co-operate where boundaries cross a peatland area.

## Legislation

As part of preparing management guidelines for peatland, existing legislation needs to be considered and possibly amended to suit the particular case of peat development or preservation. This was set out to be discussed by the working party under the terms of reference and generated a great deal of comment and suggestion from participants. There are several shortcomings in the present legislation regarding peatlands such that it does not allow any binding regulation of peatland development.

It was noted that nowhere in the statutes that exercise controls over peatlands, is there a clear definition of peat. A legal definition is required, especially with reference to the Coal Mines Act. The working party compiled a tentative definition of peat based on peat uses as well as properties of the material. There is a difference between "peat material" which can be mined as well as used for other purposes and "peaty soils" which contain an element of peat. Depth is considered an important attribute for peat material.

'Peat material: An accumulation of organic material formed under anaerobic conditions, over 50 cm thickness.'

This definition therefore also takes into account the situation where a body of peat material is overlain by a mineralised soil, but does not include thin layers of organic matter such as are found in a forest soil. A description of peat types and peat soils is given in 'Soil Survey Method' (N.Z. Soil Bur. Bull. 25, 1970). "A Survey of New Zealand Peat Resources" classifies most of the swamps surveyed by this method.

Peat was classed as a mineral under the Coal Mines Amendment Act 1972 and is included as "coal" under the Coal Mines Act 1979 and is therefore under the control of the Ministry of Energy.

**Land drainage and development legislation:** Development of peatland may involve a conflict of interests as to the use of any drainage scheme which is initiated. Drainage schemes are for control of the water table but this usually involves removing the excess water with less consideration to the optimal water table level for all uses. The existing legislation needs to be considered with regard to such conflict.

Legislation which refers to peatland drainage is:

Land Drainage Act 1908

Local Government Amendment Act 1979

Soil Conservation and Rivers Control Act 1941 and Amendment 1959

Water and Soil Conservation Act 1967.

The overall intention of the Land Drainage Act (1908) is drainage for prevention of flooding by removal of excess water from the land. The Act offers management control of peatland drainage by creation of drainage districts and areas. The Local Government Amendment Act (1979) has a similar function and enables control of drainage of peatlands by local bodies. However the administration is limited in that land drainage is not a mandatory function of local bodies and the mechanisms for creation of drainage districts are subject to ratepayers' polls. The major problem with drainage control through the two Acts is that control is limited to water removal for flood control only.

The Soil Conservation and Rivers Control Act (1941) provides for soil conservation and prevention of flooding and erosion. The Act's provisions for undertaking works are similar to the above. However in this case the powers are mandatory insofar as the purpose of the Act is concerned. The Act also charges catchment boards with the overall supervision of any drainage works. Primarily control is over flooding and erosion. Although the term "soil conservation" is introduced it is not clearly defined. Land can be protected from flooding under the Act but it is not clear within the Act whether any effect of drainage works on the soil body would be included under soil conservation under this Act. The 1959 amendment expanded the Act by introducing controls over land though again only regarding flood and erosion control. Broadly speaking protection from overdrainage could be seen as preventing soil erosion as overdried peat becomes very loose and can be easily eroded by wind.

Under the Water and Soil Conservation Act (1967) the purposes of prevention of flood and erosion damage and promotion of multiple uses of natural water (e.g. drainage, water supply, ecological uses) are most pertinent to peatland development. Control mechanisms are provided by way of water right procedures. In the case of peatlands development these would predominantly involve rights for diversion and discharge of natural water and damming of streams. There is no provision in the Act for overall statutory management control.

The above Acts do not provide adequate administration of peatland uses. There is no provision for enforced water table control in an overall scheme and overdrainage and thence deterioration of