

# REPORTS

BY

## THE INSPECTOR OF SURVEYS.

*(Return to an Order of the House of Representatives, of the 4th day of August, 1869.)*

“That there be laid on the Table of this House, Copies of all Reports made by the Inspector of Surveys since the last Session.”

*(Mr. Rolleston.)*

WELLINGTON.

—  
1869.



## REPORTS BY THE INSPECTOR OF SURVEYS.

### No. 1.

Memorandum as to certain Surveys executed by Messrs. WILLIAMS and GRAHAM.

9th November, 1868.

At the commencement of 1868, a large number of surveys of extensive Native land claims at Poverty Bay, had reached this office in the ordinary course, surveyed chiefly by Messrs. Williams and Graham, McDouall, and Bousfield. As these maps generally showed no connections, I was wholly without the means of compiling them together or checking them.

On the 14th January, I received from the Native Secretary's Office a copy of a letter addressed to Captain Biggs, informing him that he could not be relieved of very large advances made to him, until the surveys for which these advances had been made had been submitted to me. This letter also showed that Mr. Locke had in some way been employed by Captain Biggs to get these surveys done. Up to July I had received no information about these surveys; then finding that Mr. Graham, who I learned had been employed about them, was in Auckland, I communicated with him with a view to learn where I might hope to receive the information required. He wrote me a letter intimating in substance that he and the surveyors who had done the work had only received from Mr. Locke a small sum on account, and that they declined to give up the maps until they were assured of being paid the balances they claimed. I forwarded a copy of this letter to the Hon. the Native Minister, and in reply was informed that a sum of £1,800 had been paid to Mr. Locke for these surveys, and that the surveyors had agreed to furnish the general map required.

In the meantime the Native Lands Court had been opened at Poverty Bay, and in the ordinary course all the maps of claims were sent to the Court from this office. These maps having been entered on the books of Record in this office, and having on them my certificates and memoranda, were, as I have always maintained, official documents, the property of the Native Lands Court, and, as in every other case, ought not to have been allowed to go out of its custody. But when the Court adjourned, Mr. Preece, now Mr. Graham's partner, got possession of all the maps, and, on the plea that they belonged to the Native claimants for whom and at whose expense they were executed, refused to give them up, and Mr. Fenton did not feel in a position to compel their restitution.

I have at length received from Mr. Graham the general map so long promised, but I find that it is simply a compilation of some of the Native land claims referred to which were formerly in this office, and which I maintain are its property. Nor can I find on the whole map any work except that which must have been executed in ordinary course for the Native land claimants, except a few roads, the cost of surveying which, supposing them to have been laid out at the orders of the Government, could hardly have exceeded £250 at the outside.

It appears therefore to me—1st, That the surveyors in the ordinary course executed these surveys for the Native land claimants. 2nd, That finding that the claims were not going to pass through the Native Lands Court they possessed themselves of the maps, and charged all the work to the Government, and, as I understand, got paid for it.

If this be so then the surveys belong to the Government, and now at least the original maps ought to be restored; and if the claims are after all brought into the Native Lands Court, then the surveyor's ordinary charges for the survey ought to be charged to the claimants, and be secured as usual by a lien on the Crown Grants, to be repaid to the Government so as to recoup their outlay.

I have some reason to believe that this is not in accordance with the views of the surveyors, and that they still hold the Natives their debtors; if this be so, I am utterly at a loss to know what work has been done for the £1,800 paid by the Government, a sum twice as great as all the Taupo and Bay of Plenty surveys have yet cost.

THEOPH. HEALE,  
Inspector of Surveys.

### No. 2.

Copy of a Letter from Mr. T. HEALE to the Hon the NATIVE MINISTER.

Inspector of Surveys' Office,

Auckland, 26th November, 1868.

SIR,—

I am now about to proceed to Tauranga with a view to testing and checking the triangulation in the Bay of Plenty District and especially its closure with Tauranga, and to arrange the operations of the several parties now resuming the work of last year. It appears to me, however, that this work being now in full progress, and its success demonstrated, especially in the proof it affords of the great economy of the system, it is not desirable for me to again undertake the carrying it on in person, as I apprehend that my services may be required in other parts of the Island.

Simultaneously with the triangulations initiated by me, I understand that similar works have been carried on from Hawke's Bay, towards the cost of which the General Government has advanced a large sum of money. Extensive surveys have been executed for the General Government at Poverty Bay. A sum is annually paid to the Provincial Government at Wellington to aid in the same work, and triangulation has also been commenced at Taranaki.

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Since the private negotiations with Natives for runs are still going on in many directions, the necessity for extending the surveys is increasing, and it is clear that, as peace returns, the whole country will come under the operation of the Native Lands Courts; and the surveys now being pushed inland from the different parts of the coast will soon meet in the interior of the Island.

It becomes then of great importance that the various trigonometrical surveys should be correctly initiated, and that they should be conducted on such principles that when they close together no inordinate error shall appear, and so that, at all events, the geodetic elements resulting from them all shall be of the same nature, so as to admit of comparison and check, and that they shall all be such that the corrections for the earth's form can be applied to them, and the quantities resulting from them be resolved into differences of latitude and longitude with some approach to correctness.

I am unaware whether the Provincial Governments, to which advances have been made, have come under any engagements as to the mode in which their triangulations are to be carried on. There are, however, a few broad principles which are essential to the nature of a geodetic work, and I apprehend that the undertaking a triangulation at all implies that these principles shall be followed. They are—

1. That a suitable base cleared, and levelled, shall be measured with a properly compared standard chain with all the necessary precautions.
2. That all primary stations shall be so constructed and marked as to be permanent.
3. That all angles shall be taken with an instrument of suitable size and quality, the readings of all verniers be actually read and recorded, and the observations be repeated so that the ultimate angle shall result from the mean of not less than six readings.
4. That no angle of a primary triangle shall be less than  $30^\circ$ , nor more than  $100^\circ$ .
5. That the direction of the meridian at the starting point be truly determined astronomically, and the observations and calculations recorded for reference.
6. That the unknown sides be calculated from the known logarithmically to seven places of decimals.
7. And, finally, that the co-ordinates of each side be similarly calculated, and the distance on the meridian and perpendiculars of the unknown apex of the triangle be obtained by the mean from the two previously known points. That these distances be applied seriatim, so that the work may result in a complete table of distances on meridian and perpendiculars from a starting point, the position of which in latitude and longitude is known.

I conceive, then, that any triangulation towards which the General Government has contributed, or may contribute, ought at least to come up to these requirements, and it appears to me important to ascertain whether they do so or not.

I have already informed you (by Memo., 9th November, 1868) that the surveys at Poverty Bay submitted to me are nothing but a compilation of a number of traverse surveys of runs or land claims. Assuming all this work to have been done for the Government, its cost is about  $2\frac{1}{2}$ d. per acre—six times more than that of any triangulation I have conducted.

With regard to the Hawke's Bay triangulation, I was directed in a letter from Mr. Rolleston, 9th October, to put myself in communication with the Provincial Surveyor at Hawke's Bay, with the view of obtaining full information of the actual state of the surveys on which £1,200 had been paid. In answer to my applications information was promised, but to this day I have not received any.

For the Taranaki survey I prepared a set of detailed instructions. I have no reason to doubt that these have been acted on, but I have no information on the subject; nor have I as to the triangulation in the Province of Wellington, towards which I understand the General Government pays a subsidy.

I think that these facts show a necessity for some general inspection; but before that can be properly exercised, it must be determined whether the principles I have laid down as essential to the nature of a geodetic triangulation are admitted to be so, and whether, therefore, they ought to be insisted on before credit is allowed for any advances made for work of this nature.

If the circumstances admit of it, it would be better, with a view to future work, to go a step further, and to lay down detailed rules to secure accuracy and uniformity; but it is clear that such rules would be useless unless the observance of them be made binding on the different departments conducting surveys, and unless the results of their surveys are duly furnished to this office, and an occasional inspection exercised to secure their uniform working. In short I venture to submit that the time has come when it is essential to combine the major surveys of the North Island into a system, and that if it is not done now the utility of all the work being carried on disconnectedly will be almost destroyed for any general purpose.

I have, &c.,

THEOPH. HEALE,

Inspector of Surveys.

The Hon. the Native Minister.

## No. 3.

Copy of a Letter from Mr. T. HEALE to the Hon. the NATIVE MINISTER.

SIR,—

Inspector of Surveys' Office, 17th February, 1869.

I have the honor to forward herewith the (original) maps of Poverty Bay and of East Cape, furnished by Mr. W. Graham and Mr. Winter. I have also prepared a copy of the Poverty Bay map for transmission to W. S. Atkinson, Esq., at Turanganui, as directed in Mr. Halse's letter of the 10th instant.

I am not in possession of any other maps belonging to the Government or showing European claims; but there remain in the custody of the Native Land Court, twelve maps, as per list enclosed, of Native land claims, which were forwarded to this office by the surveyors in the years 1867, 1868, along with a great number of others, all of which except these twelve were suffered to pass into the possession of Mr. Preece, as stated in my memorandum of 9th November, 1868.

I have, &c.,

THEOPH. HEALE.

The Hon. the Native Minister.

## INSPECTOR OF SURVEYS.

5 D.—No. 20.

## Enclosure in No. 3.

List of Maps of Native Land Court Claims remaining in the custody of this Office.

Name.	Where situate.	Surveyor.	Area.
Mangaheia ... ..	Tolago Bay	W. McDouall	Acres. 10,000
" No. 1 ... ..	"	"	18,442
Te Kopuni ... ..	East Cape	"	454
Paremata ... ..	Tolago Bay	"	9,462
Te Arai ... ..	Poverty Bay	O. L. Bousfield	10,366
Katuri ... ..	"	"	2,690
Pakawhai ... ..	"	"	4,950
Maraetaha ... ..	"	"	14,622
Whakatari ... ..	"	"	39
Kohanga Kariaria ... ..	"	"	152
Ruahineatu ... ..	"	"	8
Terewa ... ..	East Cape	G. Winter	145

Inspector of Surveys' Office, Auckland, 17th February, 1869.

## No. 4.

Memorandum by Mr. T. HEALE.

ON the 9th October, 1867, I was informed by letter from Mr. Rolleston, that a sum of £1,200 had been advanced to the Province of Hawke's Bay, on account of the triangulation of the country and other expenses connected with surveys under the Native Lands Act, and I was directed to place myself in communication with Mr. Weber for information respecting it.

In answer to my application Mr. Weber wrote, on 18th December, "I shall have much pleasure in complying with your request, to furnish you with the triangulation work executed in this Province, as soon as the late extension has been properly compiled and checked, which I trust will be likewise done within the next six months. At the same time I bring to your notice that the triangulation has not yet been extended to the block to the north and east of Napier, where by far the larger quantity of Native land is situated," &c., &c.

I have never yet seen any triangulation work from the Province of Hawke's Bay, and Mr. Weber's remarks above, with other facts, lead me to suppose that very little, if any, has been executed there for the furtherance of the Native Lands Act. The advance of £1,200 appears, therefore, to be still unaccounted for, and while that is so it is impossible for me to certify for any further sum. It appears to me immediately necessary that the past work in relation to Native Lands Court surveys at Hawke's Bay and Wellington should be investigated, and that the results should be compiled together after such completion or check as may be found necessary and practicable, so as to render them available for connection with the Taupo triangulation, and for the construction of general maps and records, as has been done in this Province; and that steps should be taken to secure the entry of all Native Land Court surveys on those record maps, and for carrying out the functions of the Inspector of Surveys more regularly and efficiently than has been hitherto done.

It seems probable that this can only be effected by establishing in each place a branch of this Department acting independently of the Provincial authorities. I append copy of a letter lately received from the Chief Judge of the Native Lands Court, expressing the same views.

It is impossible for me to give detailed information of what is required, nor how it can be done, until after investigation of the state of the surveys at Wellington and Napier. I propose, therefore, subject to the sanction of the Hon. the Native Minister, to proceed to the South for this purpose at the earliest possible date. The unsatisfactory state of the surveys at Hawke's Bay, and of the payments on account of them, was pointed out in my report of 26th November, 1868.

8th April, 1869.

THEOPH. HEALE.

## Enclosure in No. 4.

Copy of a Letter from Mr. F. D. FENTON to Mr. T. HEALE.

Native Lands Court Office,

Auckland, 17th February, 1869.

SIR,—

I have the honor to transmit to you the enclosed copy of a letter addressed to me by Mr. R. C. Robinson, a licensed surveyor.

I beg to request your serious consideration of the arrangements made with regard to inspecting surveys in the Provinces of Hawke's Bay and Wellington. I do not know whether the statements in the before-named letter are all correct, but there is a strong impression on my mind that the duties of Deputy Inspector are not discharged by the officers of Hawke's Bay and Wellington in a punctual and satisfactory manner.

I have, &amp;c.,

F. D. FENTON, Chief Judge.

The Inspector of Surveys, Auckland.

## REPORTS BY THE

## No. 5.

Copy of a Letter from Mr. T. HEALE to the Hon. the NATIVE MINISTER.

SIR,—

Inspector of Surveys' Office, 29th April, 1869.

On 9th November I forwarded, through the Hon. the Resident Minister, a memorandum setting out all the information I possessed respecting the payment for surveys at Poverty Bay and East Cape, and stating my conclusions that these surveys, though originally made for Native claimants, had been turned over to the Government, and have been paid for, and therefore that if the land should revert to the Natives, the cost of surveys ought to be recovered for the Government. Against these conclusions I have received a very angry remonstrance from one surveyor, and I find that claims for cost of surveys have been sent in by the surveyors, and that they have been referred to the Commissioners about to investigate land claims at Poverty Bay.

It appears to me that it will be impossible for the Commissioners to come to any decision on such claims without taking evidence as to what has been paid towards survey by the Government; and since the whole case seems one eminently calling for judicial investigation, I have the honor to suggest that it would be desirable either to refer to the Commissioners the whole question of survey of these lands, whether for the Government or for Native claimants, or else to have the former previously decided, and to furnish the result to the Commissioners for their guidance.

If the first course should be decided on, it might be proper for me to attend the investigation, and for Mr. Locke, as well as the Surveyors, to be summoned as witnesses.

I propose to proceed to Wellington by steamer of the 5th May, from whence I shall be prepared, if so instructed, to go to Poverty Bay.

I have, &amp;c.,

THEOPH. HEALE,

Inspector of Surveys.

The Hon. the Native Minister.

## No. 6.

## REPORT on the INSPECTOR of SURVEYS' DEPARTMENT.

SIR,—

Wellington, 9th June, 1869.

The operation of the Native Lands Acts, by which landowners in any part of New Zealand are enabled to obtain for their possessions the security of tenure and the immutability of boundaries implied by the issue of Crown Grants, necessarily gave rise to a condition precisely similar in respect of surveys to the system which is well known as free selection, but without the check generally afforded under that system, which compels selectors to take their claims in blocks of certain sizes and forms with rectilinear boundaries, and otherwise in subordination to survey rules, whereas a Native claim may be of any size, and they commonly pursue the most sinuous and ill-defined boundaries. The object of the Acts was to define and to certify by the most authentic of instruments, the previously vague land claims of the Natives, and since purchasers cannot reasonably doubt the validity of a Crown Grant, the Government has become responsible for securing as far as in it lies that the land the subject of the grant exists, and is correctly described, which involves the necessity of record maps being maintained, and a general supervision of the private surveys being exercised by a Government Department.

It is obvious that the only way in which such surveys can be satisfactorily dealt with, is to triangulate the country, and to compel the estate surveyors to base their surveys on the triangulation; but at the time when my office was instituted, it was impossible to adopt suddenly a system which involves work preliminary to the detail surveys, and a practice of surveying to which unfortunately the great majority of surveyors for the Natives were wholly unaccustomed.

Many hundreds of maps of detached pieces of land, had already accumulated, and the work of surveying claims scattered all over the country was rapidly going on, and could not be checked; it became therefore necessary to adopt for the time a system of "building up" these topographical surveys by the aid of such information as could be obtained from all sources, and especially to establish some supervision over the work of the surveyors for the Natives, and to compel them to furnish connections with prior surveys when possible.

The functions then of the Department at the head of which I have been placed are divided into three classes:

1. The custody and due recording of the original survey maps of Native land claims in all parts of New Zealand, and their reduction and transfer on to the certificates of title.
2. The collating and checking these, as far as possible, by the very imperfect means of "building up," and such other safeguards as the circumstances admit of.
3. The extension of triangulation all over the North Island, with a view as early as possible to arrive at the condition from which all surveys ought to start, and so to be enabled to place upon the general map with precision every detail survey made in any part, and so ultimately to arrive at that complete determination of the geography of the country which is essential to every civilized government.

Now the earlier surveys for Native claimants were in general adjacent to blocks of land which had been bought through the Government; and such survey information as existed concerning these was only to be found in the Provincial Survey Offices, where the maps lay in great numbers, and generally in considerable confusion. The collating the Native Land Court surveys, therefore, could only be performed at the respective Provincial centres, and some part of the duties of my office had necessarily to be carried on by delegate at Wellington and Napier.

The head office was established in connection with the Native Land Court Office at Auckland, where the majority of Native land claims were going on; and there, with an establishment of two draftsmen, all the functions under the first head have been performed; there, also, a system was promptly established of keeping district maps, on which every land claim in the Province is invariably

laid down before a certificate of title is issued—a rule which has never been broken, and which alone has preserved us from any overlaps, or regranting the same lands, although the old surveys on which they abut are in a state of extreme uncertainty and confusion.

In order to get these duties performed in other Provinces, you made arrangements with the Government of Wellington, and the Provincial Surveyor there was appointed my deputy. I have understood that some similar arrangement was made at Hawke's Bay, and I have trusted generally to the Provincial Surveyor at Napier for the comparison of maps with adjacent ones, or with his triangulations. An endeavour was also made last year to obtain the temporary assistance of the heads of the Provincial Survey Departments in the South Island in checking the surveys of the few Native claims adjudicated on there; this attempt was only partially successful, but the excellent state of the surveys generally in the Southern Provinces enabled me to collate the Native land claims with the published lithographs sufficiently to make the issue of the Crown Grants safe.

I have only within the last few days had an opportunity of inspecting the state of the surveys in Wellington and Hawke's Bay. I find that in the Province of Wellington the Native Land Court surveys have been compared with Provincial surveys with some care, and they seem to have been generally kept in fair order, notwithstanding a good deal of recalcitration of the past of some of the private surveyors; but the compilation of every survey on a general map, which I look upon as the essential condition of safety, and as necessary for the maintenance of the records in a state of efficiency, has not been uniformly acted on, and in some districts its want is beginning to be severely felt.

The triangulations have been conducted on thoroughly sound principles, and are works quite suited to become part of a Colonial system; it will, I hope, very early be practicable to extend them by way of Rangitikei and the Patea Valley, as well as by Hawke's Bay, across the Rimutaka Ranges, so as to connect at two points with the Taupo surveys, by which a very large step will have been made towards the establishment of an accurate basis for the geography of the Island.

Since these triangulations were certainly not instituted or extended in any particular direction to forward the operation of the Native Lands Act, but are absolutely necessary for the proper administration of the lands of the Province, it seems clear that the utmost claim for a contribution towards the expense of them which can be legitimately made against the General Government is a rateable proportion for any land included in them which belongs to Natives, or which may become subject to the action of the Native Lands Court. Since the area of the whole triangulations is 1,700,000 acres, and it does not include the Otaki District, where the most numerous Native land claims lie, the share fairly chargeable to the General Government must be but a small fraction of the whole cost, especially if the Native Reserves, which the Province was bound to survey at its own cost, are not allowed for; it would however be a pity to be parsimonious in the support of so excellent a work, and it might be proper, therefore, to allow the cost of triangulation over all Native lands, without exception.

I find that a claim has been made by the Province of Wellington, amounting to the very large sum of £1,913. This claim was not referred to me, nor was I aware of it having been made until my arrival here last week, and in the meanwhile a gentleman in Wellington was called in to audit the account, without regard, apparently, to the rules or requirements of the Inspector of Surveys' Department for which the services were rendered.

The referee recommends that £1,482 should be paid. Of this sum £752 is the amount agreed by the Hon. the Native Minister to be paid for services of the Wellington Survey Department in carrying out the Native Lands Act for the year 1868-9, and is therefore beyond question (except as regards the due performance of the collating and recording); but since that agreement was distinctly intended to cover all services of the year, I cannot conceive it justifiable to claim, in addition, a contribution towards the salary of the Chief Surveyor who was to perform them; and the other item of £200 for copying plans must, it seems to me, have been passed by the referee under a mistake of facts. It seems sufficient to ask for whom these copies were made? Certainly not for the General Government, since my Department possesses the originals. They are most elaborate facsimile copies on drawing paper, and may well have cost a considerable sum; but it is clear to me that they were made solely for the convenience of the Provincial Government, and they are certainly of no service whatever to the General Government, and were not made by its direction; and the compilation which was agreed to be made would really have been of service, while these copies are not.

The remaining sum of £850 19s. 8d., which is claimed for services prior to 1868, consists of three items, of which two being for surveys of old Native Reserves, which in any case the Provincial Government was bound to make, the referee seems to disallow, the remaining sum is again for these copies, for which the General Government cannot be liable in reason and justice. It appears clear to me that, in considering this claim by the Provincial Government of Wellington, there are but two principles on which the audit can be based: one is to consider the agreement contained in Mr. Richmond's letter of 21st February, 1868, as final and conclusive, and to allow its amount in full payment for the year ending on 1st March, 1869, on proof of the due execution of the services provided for in it; the other to consider the whole case on its merits, and to assess the value of the services rendered entirely independent of the agreement.

The whole number of claims adjudicated on in the Province of Wellington which have reached my office is 195, out of 1,418 in the Colony; of these 195 I believe one-half have not been included in any triangulation, and no compiled map of any of them has been furnished to or prepared for the General Government. These facts and figures show the excessive character of the claim of £1,482 for local services in checking these surveys; calculated at the same rate, the 1,056 claims dealt with in the Province of Auckland would have cost upwards of £10,000.

I have elsewhere stated that, in my opinion, the complete and invariable compilation of every survey on a general record map, prior to the issue of certificate of title, is essential, and that any payment to the Provincial Survey Department ought to be conditional on such a compilation, the property of the General Government being maintained, as was contemplated in the agreement referred to for the payment of £572 annually to the Province of Wellington.

In the Province of Hawke's Bay, the surveys for Native land claimants have in most cases been

either within or abutting on to Provincial surveys; the system adopted has been that of boundary traverse only to magnetic meridian. Triangulation has been carried over a small part only of the Province, and even in these parts does not seem to have been made (at all events not systematically) the basis of the topographical surveys; nevertheless, the district being compact, and some supervision having been exercised over the surveyors in the field, and the whole tied by numerous road-lines, the maps seem to have closed together pretty well, and no difficulties or disputes concerning past work need be apprehended.

The amount charged, however, against the Native Lands Court funds for supervising these surveys is very heavy; and since the result has been simply to keep the surveys of the Province in fair order, and nothing whatever, not even a compilation of the Native land claims surveys, has been supplied to the Colony,—since, also, the services rendered, putting aside the triangulation to which I shall presently refer, have been performed by Provincial officers not specially employed or paid for these particular services, but taking them up occasionally as circumstances permitted, and in the midst of other duties,—it appears to me that the claim is open to question as a matter of right, and, if admitted, can only be considered in the light of a compromise.

The triangulation was made under a contract entered into with Mr. M. FitzGerald on 3rd September, 1866, a date previous to the institution of my office. It can hardly be said, even at the present time, to be finished, since doubts exist as to its consistency with itself to the extent of at least nine or ten links per mile, and no tabulated results seem to have been prepared, nor even a complete diagram of the work. At best, even if finished according to contract, it could only have served to connect, and in some degree to check, detail surveys within its area, as its plan would not furnish elements capable of extension or of being united into a system of geodetic survey. It is difficult to believe that this work was undertaken to forward the working of the Native Lands Act, since it is only an extension of an old triangulation commenced, as I understand, by Mr. Thomas FitzGerald, and is in the very heart of the Province. As I have never been able to obtain either a map of the triangulation or a compilation of the Native land claims, I cannot say what proportion of the land the triangulation covers has come before the Native Land Court, but I believe it to be but small. It is clear, at all events, that it has never been of any service whatever in carrying out the provisions of the Native Lands Act. Its cost, amounting to £460, was paid wholly out of General Government funds. I am informed that its area is about 160,000 acres; I do not think so much is actually included in the triangles.

The account of the Province with the General Government in relation to Native land claims surveys seems to stand thus:—

	£	s.	d.
Charged to General Government for triangulation south of Napier ...	460	0	0
Ditto in aid of Survey Department of Napier for supervising Native Land Claim Surveys ...	740	0	0
Claimed for ditto ditto, to near the present time ...	437	12	1
	<hr/>		
	£1,637	12	1

—a sum not far short of the cost of the whole Taupo and Bay of Plenty Survey, which extends over an area nearly treble that of all the Native land claims in the Province of Hawke's Bay.

Very little more land in the Province is likely to pass through the Native Lands Court, and if the compilation of all the existing land claims surveys were furnished to my office, and steps taken to continue the Taupo triangulations down to the coast, I see no difficulty in transacting any remaining business in the Auckland office, possibly with an occasional reference to the Provincial Surveyor. I therefore strongly recommend that any terms entered into with the Hawke's Bay Government may be based upon a distinct engagement, that complete maps shall be furnished of all the work for the supervision and collation of which such considerable sums of money have been paid.

#### *General Triangulation.*

Contemporaneously with the arrangements before named for arresting to a certain extent the confusion which must have arisen from a practice of issuing Crown titles to land on the faith of unchecked and unconnected surveys, and for carrying out the duties imposed upon me by "The Native Lands Act, 1867," attention was turned to instituting triangulation in the northern and central parts of the island, by which alone the surveys could be made safe as a basis for Crown Grants, and ultimately available for the determination of the geography of the country.

As I was not free to make any commencement until April, 1867, when the winter season was setting in, I confined myself in the first instance to a small connection across the island, from the coast of the Bay of Islands to Hokianga.

This was rendered especially necessary by the absolute impossibility of constructing district maps for the compilation of the very numerous Native land claims in that district, owing to the inordinate distortion which had occurred in the Provincial compilation of the old surveys, by which contiguous estates had come to be mapped several miles apart. This little work was so far completed in the winter of 1867 as to eliminate the grossest errors from the maps, and to furnish a starting point from which triangulations could be extended to the north and south.

In February, 1868, I started upon a work of greater magnitude and importance. A number of Native claims had been sent in for land in various parts of the great district which extends from Lake Taupo to the shores of the Bay of Plenty. This country was wholly unknown, except by a sketch made by a traveller or two. No surveys had been made in it, and the land being generally of a poor pastoral character, it was likely that the claims would be of extensive area, and it was certain that if the land should be leased by the Natives it would only be at low rentals, such as would not enable the claimants to pay the heavy price which had ordinarily been charged for chain and compass survey, which seems to have averaged at least 2d. per acre, and often to have cost several times that sum; besides, the district being extensive and occupying the centre of the Island, its accurate survey would evidently afford the means of ultimately connecting the surveys until now detached in Provinces; and would so furnish a substantial groundwork for the geodetic survey of the whole Island. It was determined, therefore, under your sanction, to carry the triangulation over the whole of it and in order to make its benefits



felt as much as possible, it was arranged to permit the claimants of large blocks of land within it to have their boundaries surveyed at the same time, by a system of minor triangulation based on the major triangles, and carried round the boundary lines in single series. The extension of this detail work would give the whole geographical completeness, and the charge made to the land claimants for it of about  $\frac{1}{2}$ d. per acre, though far less than has been paid for very inferior work, would fully repay all the additional expense incurred in performing it.

From the want of instruments and other causes, this work was not commenced until late in the season, and the Taupo plains were not reached until it was too advanced for work in that elevated and cold country. It was resumed early in the present season, and so great a progress was made that by the end of February the surveys were ready for the adjudication of at least 500,000 acres, of claims which were set down for hearing in the Native Land Courts to be held in Taupo and at Tauranga early in March and April; but unfortunately the irruption of Te Kooti into the district spread such alarm and excitement, and created so much real danger in parts, as necessarily put a stop not only on the surveys but to the sitting of the Courts. By this untoward circumstance a large quantity of work in the Rangitaike Valley has been left unfinished, and at its resumption at a future period the greater part of it will have to be done over again. This interruption necessarily greatly enhances the expense of the work; nevertheless, I think I am entitled to claim it on the whole as a success.

The area included within the whole district covered by the triangulation is 2,000,000 acres, of which 945,000 acres within computed triangles may be considered completed; reconnoissance has been carried a good deal further, and most of the detail work of the boundary surveys of nearly 300,000 acres has also been completed. The positions of the major stations are determined within a limit of error which cannot exceed one foot in a mile, and trustworthy sketch-maps have been prepared of a district previously very imperfectly known, which will, it is believed, serve many useful purposes, and will greatly facilitate a more elaborately accurate survey, if it should ever hereafter be desirable to make one.

I do not now propose to enter upon any detailed description of the processes of survey adopted; these are minutely set out in the instructions, of which a copy was forwarded you, for the survey of the Chatham Islands and elsewhere. I need only say here that the principle is that of minor triangulation, that is the triangles are treated as parts of a plane surface. The angles have all been observed with a 12-inch and an 8-inch theodolite, and precautions have been taken to secure their observation with the utmost accuracy attainable with such instruments. The base was very carefully levelled and measured, under precautions which seem to exclude the possibility of error to the amount of three inches in a mile.

The direction of the prime meridian and the latitude of the starting point were determined with great nicety, and the calculations, from which result the distances on the meridian and perpendicular of each station from the starting point, have all been checked and recomputed in the head office at Auckland, and the computation all duly tabulated. The convergence of meridian and other corrections necessary to reduce the whole to a near approximation to the truth, have also been computed for outlying stations.

It is obvious that this system is theoretically inaccurate, but since it furnishes the elements to which approximate corrections for sphericity can be readily applied, it is believed that the result will afford as near an approach to the truth as is attainable with instruments of the size and class used; and in the first instance, in entire ignorance of the country and of its roads, it would have been wholly impracticable to have used larger ones, even if we had possessed them, since the only means of carriage of them is on men's backs. The result is certainly quite accurate enough for any practical object connected with the titles of land. Still since the survey will I hope be used as the centre upon which all the other surveys from Hawke's Bay, from Cook's Strait, from the Thames and Waikato, and ultimately from the West Coast (Aotea and Kawhia) will close, and the standard by which they will be checked, I still retain the hope, at some future period, to retake the angles of a few selected stations with instruments of a superior class, and to close a few large triangles embracing the whole work on a base of verification at Taupo, or at Hawke's Bay, and so to reduce the possible error to a very small quantity indeed. The south end of the survey enters to some distance into the Province of Wellington, and the north-west angle of the Hawke's Bay Province has been reached.

If any survey from which geodetic elements could have been deduced had existed in the Province of Hawke's Bay, I could with facility have closed my survey upon it, and so have checked the two reciprocally, and have incorporated them into one work. But only a small part of Hawke's Bay Province has been triangulated, and even that not in a manner to admit of comparison and closure with a general triangulation.

It is obvious that the mere taking triangles, even with some degree of accuracy, will not afford geographical information unless the quantities resulting from their computation can be converted into differences of latitude and longitude from a point the position of which is known, and this involves the accurate determination of the prime meridian and the latitude and longitude of the starting point. The Hawke's Bay triangulations have not this character.

In my observations on the surveys in the Province of Wellington, I have stated that the triangulation there may well be united with that at Taupo, and be made part of a Colonial work; but this must be done by first extending it over the greater part of Hawke's Bay Province, a work which will receive no aid from anything that has yet been done there, but which will not be either long or expensive.

A triangulation has been completed of the Chatham Islands by Mr. P. Smith, under general instructions prepared by me. Mr. Smith has furnished you with a detailed report of his operations, so that it is unnecessary for me to say more than that the work appears to have been most carefully performed, and that notwithstanding some difficulties met with, especially in finding a suitable base, there can be no doubt of its thorough accuracy and completeness.

Mr. Smith's Field Book is a perfect model of neatness and accuracy, and of lucid arrangement of the different observations and calculations. The only point in the work which I find open to criticism is the method used in the determination of the direction of the true meridian: this has been done by azimuth in altitude of the sun, and occasionally of a star, a few hours before or after their culmination. This method is not susceptible of much accuracy with a theodolite, unless in the case of a star very

near the prime vertical, and involves far more trouble than the better method by the greatest elongation of circumpolar stars. If Mr. Smith had adopted this method, and had then determined his azimuthal error by transit of high and low stars, it would have made the work perfect, and would have given to the longitudes derived from transits of the moon and moon culminating stars a value which they do not now possess.

However, the number of observations used for obtaining a mean for the meridian is so great, and they carry on the face of them such an impress of genuineness as well as of care, that there can be no doubt of the accuracy of the result to every degree requisite for the purposes of the survey within itself.

The sketch of the Islands published by the Admiralty is so rude that it might be worth while to furnish the Hydrographical Office with a copy of Mr. Smith's work, to serve in the production of an improved chart. Before doing this, however, I should be glad if a doubt could be cleared up as to its accurate longitude.

I have also attempted during the current year to get the triangulations of the Bay of Islands extended over a larger area, since I cannot insist on private surveyors basing their work on the triangulation, and using only its meridians, unless the stations are pretty generally diffused and accessibly situated. The work, however, is not very extensive, and does not call for any special remarks.

A return is annexed showing the expenses incurred in these triangulations, and the result is calculated to remove any alarm as to the costliness of extending such work over the whole Island. As regards Native lands, it appears to me that the Government is morally pledged to its performance. In offering the Natives Crown Grants for their lands, it became bound to see that all such precautions are taken as are necessary to give these Crown Grants safety and value. All lands passed through the Native Lands Court are subjected to fees for inspection of survey, and varying from 1d. to 6d. per acre. Taking the whole Island together, it is clear that it is sufficient to defray the cost of executing the whole work, and it is so greatly to the interest of the Government and of the public that it should be done properly, that even if the fees charged fall somewhat short of the cost, it would be but just as well as economical that the Government should supply the deficiency, and defray some portion of the expense of a work which in other countries has been done entirely out of general revenue.

I therefore most strenuously urge upon the Government, that the work which has been commenced at points only, and incidentally, should be fairly embraced as a whole. That instead of employing as my assistants surveyors engaged temporarily as opportunity offers, a small but permanent Geodetic Staff should be established, and the work be pursued incessantly on one system, whether from Wellington or Hawke's Bay, or from Taranaki, or from the Thames and Waikato, as opportunity offers and occasion requires, with the object of carrying the work as rapidly as possible over the whole North Island. To do this will require an expenditure not larger than that estimated for last year (exclusive of any contribution to be made to the Provincial Government), and not equal to the amount likely to be chargeable as fees under the Native Lands Act; but since the payment of these fees is in most cases spread over a long period, the amount will still be required to be advanced by the Government.

I have, &c.,  
THEOPH. HEALE,  
Inspector of Surveys.

Enclosure in No. 6.

RETURN showing the Number and gross Area of NATIVE LAND CLAIMS received at this Office from each Province in the North Island; also, those from the Middle Island.

Province of Auckland.

No. 1.—Northern portion; coloured green on map. No. of maps, 305; gross area, 200,740 ac.  
No. 2.—Middle portion; coloured red on map. No. of maps, 537; gross area, 318,341 ac.  
No. 3.—Southern portion; coloured yellow on map. No. of maps, 214; gross area, 921,993 ac.

Total in Province of Auckland.

							Acres.
No. 1.—305 maps	...	...	...	...	...	...	200,740
" 2.—537 "	...	...	...	...	...	...	318,341
" 3.—214 "	...	...	...	...	...	...	921,993
1,056 maps.							1,441,074

Province of Hawke's Bay.

No. of maps, 126; gross area, 358,272 ac.

Province of Wellington.

No. of maps, 195; gross area, 104,603 ac.

Middle Island.

No. of maps, 41; gross area, 19,600 ac.

Total in both Islands.

		No. of Maps.	Area.
Province of Auckland	...	1,056	1,441,074
Ditto Hawke's Bay	...	127	358,272
Ditto Wellington	...	195	104,603
Middle Island	...	41	19,600
Grand total	...	1,318	1,923,549

Auckland, 3rd June, 1869.

J. E. ALLEN, Inspector of Surveys' Office.

## Enclosure 2 in No. 6.

RETURN showing the AREA and COST of TRIANGULATION executed under Provisions of  
"The Native Lands Act, 1867."

*Bay of Islands District.*

Area within calculated triangles, 244,150 acres; cost, £560 6s. 8d.; being 0.55d. per acre.

*Taupo and Bay of Plenty District.*

	Acres.
Area within calculated triangles	945,100
Area included by reconnaissance survey	1,024,000
Area of incompleted survey	40,500
Total	2,009,600

Cost ... £2,100 7s. 11d.  
Being 0.53d. per acre.

*Chatham Islands.*

Area, 238,120 acres; cost at 25s. per 1,000 acres, £297 13s.

Inspector of Surveys' Office, Auckland, 3rd June, 1869.

## No. 7.

Copy of a Letter from Mr. T. HEALE to the Hon. the NATIVE MINISTER.

SIR,—

Wellington, 19th June, 1869.

Four maps of traverse surveys executed on the East Coast by surveyors working for Mr. S. Locke, under general directions from the late Major Biggs, reached my office some time since, and in several communications I have stated my doubts as to what portion of the work was properly chargeable to the Government and what to the Native owners of the several blocks of land the boundaries of which have been surveyed. On reaching Napier, however, last month, I received for the first time, from Mr. Locke, a statement of the terms on which he had the work done, and was furnished by him with copies of letters from Major Biggs, conveying a general approval of it.

These documents establish in my mind the conclusion that however little service these boundary surveys may now render to the Government, the payment of them ought to be completed, their execution having been approved by an authorized agent. The surveys will then be the absolute property of the Government, and if any blocks of land are adjudged to Native claimants by the Compensation Court through the instrumentality of them, the due proportion of their cost ought to be claimed on behalf of the Government, and be secured by lien on the Crown Grant, just as would be done in favour of a private surveyor; or at all events, the surveyors should not be allowed to claim payment from landowners or their lessees for surveys which have been executed for the Government.

On this view of the case, there is nothing left to do as regards Mr. Locke but to check the quantities charged for in the bills, just as in the case of any other contract surveyor, and to pay the balance due, if any. These bills amount in all, exclusive of some charges for interest, to £2,856 0s. 10d., of which £2,300 has been paid on account.

I only saw the bills, for the first time, yesterday. Of the four maps which comprise the work, the most important, that of Poverty Bay, has on it no bearings and distances of the traverses, and therefore the quantities cannot be checked on it with any accuracy, nor, indeed, could any payment have been properly claimed on this survey while the map is so incomplete. The second, that of the East Cape, is complete. That of Tolago Bay is not in my possession here, but I shall find it at Poverty Bay, in the custody of the Court. But the fourth, that of Upper Wairoa and Waiau to the Waikare Moana, is stated by Mr. Locke to have been taken away from Napier by the Hon. the Defence Minister, and cannot be found, and its loss is a very serious inconvenience.

I am thus not in a position to check this bill in detail here. There are however certain facts in connection with it which may well be considered at once, and which will seriously modify the state of the balance.

The terms on which Mr. Locke undertook these surveys were the contract rates which were used in Auckland some years ago, viz., £8 per mile for forest cuttings, £4 per mile for fern cutting, and £2 per mile for open traverse.

The bill for the Poverty Bay work includes:—

107 $\frac{3}{4}$ miles of forest cutting at £8	... ..	£859 14s.
67 $\frac{3}{4}$ " fern at £4	... ..	£270 16s.
32 $\frac{3}{4}$ " open traverse at £2	... ..	£64 11s.
1211 pegs	... ..	£60 11s.

Now on looking at the map I find delineated a very few detached clumps of forest, the lines through which only scale 3 $\frac{3}{4}$  miles, a difference which alone would make a reduction from the sum charged, amounting to £416. I am well aware that it will be said that in the Waikato Surveys, although the printed terms of contract stated forest cutting £8, the term "high cutting" came to be used in surveyors' bills, and that some contract surveyors were allowed to include under that head cutting through vegetation which could not possibly be called forest nor even bush, and were even paid £8 per mile for lines through raupo. I have however always considered that to be one of the corruptions which so strikingly characterized the Survey Department in Auckland, and as when executing contract surveys I never charged, so I have never knowingly permitted others to charge, as forest, for any cutting which was not through trees; there are indeed some kinds of cuttings, such

as thick flax, which are very tedious and costly, and on proper proof that such cutting had been done, an extra allowance might well be made for it, but then the fact ought to appear distinctly on the bill, and it ought certainly not to be called and charged for as forest.

The last item in the Poverty Bay bill is £200 for a sketch map in duplicate, and a map of Poverty Bay, an item which is wholly inconceivable without distinct explanation. There are other smaller matters, such as traverses carried along both sides of rivers, lines having no terminal connections (hanging lines), pegs, &c., which would certainly be disallowed in the ordinary cases of contract surveys.

The bill for the East Coast Survey in like manner includes 43 $\frac{1}{2}$  miles of forest cutting, while no such forest is shown on the map—at all events not clearly.

It then appears at first sight of the two maps now before me, that there are sums in the bills which are at least open to question, amounting to more than the whole balance claimed; besides one of the maps being so imperfect that, according to the ordinary rules for contract surveys, not even the first instalment ought to have been paid upon it; there can therefore be no hardship in postponing any consideration of that claim until after my return to Auckland, when, on the map being properly completed by Mr. Graham (who is in Auckland), I will have the bill checked in the usual way, by the officer who has long done that part of the business of my office.

In the mean time it may be proper to communicate this report to Mr. Locke, and to whoever may be concerned, in order that any explanation may be furnished, especially as to "forest cutting" and the claim of £200 for maps.

When at Poverty Bay, I will as far as possible inspect the work, and inform myself of the nature of the cutting. I will also take care to ascertain if any claims are made against other parties for any portion of these surveys, already so highly paid for by the Government.

The Hon. the Native Minister.

I have, &c.,  
THEOPH. HEALE.