

PAPERS

RELATIVE TO

DEFENCE OF THE HARBOURS

OF

NEW ZEALAND.

PRESENTED TO BOTH HOUSES OF THE GENERAL ASSEMBLY, BY COMMAND OF
HIS EXCELLENCY.

WELLINGTON.

—
1871.

PAPERS RELATIVE TO DEFENCE OF THE HARBOURS OF NEW ZEALAND.

No. 1.

MEMORANDUM by the Hon. the DEFENCE MINISTER for Captain HUTTON.

THE defence, in case of a general European war, of the harbours of the Colony against a class of small but fast and heavily armed ships is a consideration worthy of attention.

It is not intended to make any attempts at fortifications to repel the attacks of large iron-clads; these are not likely to be seen in our waters. The improvements however in modern artillery enable a one-gun vessel to inflict considerable damage, and vessels of the "Alabama" stamp must be guarded against.

The harbour defences of Auckland are obsolete: Captain Hutton, whose staff service qualifies him for the duty, is therefore required to submit a plan for putting the Port of Auckland in safety from any sudden attack from cruisers of small tonnage.

In making up the report, due regard must be had to the necessity for combining economy with efficiency.

In a general way, Captain Hutton's report should mention the position and armament of each battery he proposes, together with the ranges, and the estimated cost per gun, whatever be the principles of defence. Suggestions will also be expected as to the nature of the ordnance he may recommend for import from England, with regard to the use of torpedoes, &c.

The report will eventually be submitted to a Commission appointed for the purpose.

A month's time will no doubt be required by Captain Hutton to complete his report; and his remuneration for this service will be a sum of £30.

Auckland, 13th March, 1871.

DONALD McLEAN.

No. 2.

Captain HUTTON to the Hon. the DEFENCE MINISTER.

SIR,—

Auckland, 3rd April, 1871.

I have the honor herewith to forward my Report on the Defence of the Harbour of Auckland required of me in your Memorandum of the 13th ultimo.

I have, &c.,
F. W. HUTTON.

The Hon. the Defence Minister, Auckland.

Enclosure in No. 2.

REPORT on the Defence of the Harbour of Auckland.

IN compliance with my instructions I have not taken into consideration the defence of the harbour against a regular attack by ironclads or by a blockading squadron, but have limited my recommendations to the defences that I consider necessary to repel a sudden attack by one or two small cruisers or privateers, coming to the Colony for the purpose of plunder only, and not with any idea of taking possession of it.

I have in the first part considered the subject generally, and these remarks will therefore apply to all the ports of New Zealand. In the second part I have suggested the best way of applying the conclusions, arrived at in the first part, to the defence of Auckland. I regret that I have been unable to give, as required, detailed estimates of the various means of defence; but I apprehend that the cost of the most important items, such as the self-acting electric torpedo, is hardly yet known in England.

PART I.—General Considerations.

Defence by Torpedoes.—Of late years the system of defending ports by means of torpedoes has come into very general favour. It is certain that during the American war the Confederates employed them very successfully, and in the last war between France and Germany they have the credit of entirely paralyzing the action of the French fleet. On this point, however, we are in want of authentic information; and I am inclined to think that it will be found that the heavily-armed forts and the shallow bays in which they are situated, by preventing the French ships from taking up positions sufficiently near, have had more influence than torpedoes.

Different kinds of Torpedoes.—Torpedoes as at present manufactured are of four kinds:—1. The percussion torpedo; 2. The shore-fired electric torpedo; 3. The self-acting electric torpedo; and 4. The Harvey torpedo. Submarine guns and floating torpedoes propelled by mechanical contrivances might also be added to the list; but they have not yet been brought to such a state of practical usefulness as to warrant any further reference being made to them in this report.

Percussion Torpedo.—The percussion torpedo is a floating box of wood or iron moored below the surface of the water, and fitted with percussion fuses which explode on a ship's striking it. This kind has the advantage of cheapness, but they are only adapted for the defence of a harbour already blockaded, and whose trade is entirely interrupted, for they are just as dangerous to friends as to foes. We may therefore dismiss them as quite unsuited to the object that we have now in view.

Shore-fired Electric Torpedo.—In the shore-fired electric torpedo, the charge is ignited by an electric fuse connected by means of a submarine insulated wire with a galvanic battery placed on shore. This kind has the advantage of being quite safe for friendly vessels, as they explode only at the wish of the operator on shore, and they also present the chance of an enemy's vessel passing through without exploding any of them. They have, however, the great disadvantage of not securing the harbour against a sudden surprise by night; and the quantity of insulated wire necessary for each torpedo would be a serious item in the expense.

Self-acting Electric Torpedo.—In the self-acting electric torpedo, the wire from the shore is attached to one of the poles of the fuse, while the other is connected with an insulated metallic plate near the top of the torpedo. Through the top a pivot projects, to which are attached several arms; on these arms being struck by any passing body they swing round with the pivot, and bring the lower part of it into contact with the metallic plate, and thus complete the circuit. These have therefore all the advantage of security against surprise possessed by the percussion torpedoes, while they are quite as safe for friendly vessels as the shore-fired torpedoes, for until the operator on shore connects the insulated wire with the battery they are perfectly harmless. They will no doubt be more expensive than the shore-fired torpedo.

Harvey Torpedo.—The torpedo invented some years ago by Captain Harvey, R.N., is on quite a different principle. It consists of a strong timber case bound with iron, and is rectangular in section and rhomboidal in plan. It is brought into contact with an enemy's vessel by means of a tow-line paid out from a fast ship. The shape of the torpedo makes it, when towed, diverge at an angle of nearly 45° from the path of the ship towing it, and on striking it explodes by means of percussion fuses. In a series of trials made with an unloaded torpedo of this description against the turret ship "Royal Sovereign," it was found that she was struck by the torpedo every time, and that she only succeeded in firing from two to twelve shots at the attacking ship before she was struck. The advantages of these torpedoes are their cheapness, and that they can be used just when and where they are wanted.

Charge.—Gun-cotton.—With regard to the charge, it appears that Abel's compressed gun-cotton is considered in England to be superior to gunpowder. This substance, when damped with a weak solution of carbonate of soda, can be sent without risk to any part of the world, and may then be easily dried at a temperature of 180° F. (the temperature of explosion being 300° F). It must, however, be remarked that gun-cotton is very *hygroscopic*, and this defect would make its use uncertain in a moist climate like that of New Zealand. If, however, the torpedoes were charged with freshly dried cotton, and then kept under water, they would probably remain in good condition for some time; but if kept for long in the air their action could not, I think, be depended on. Even the india-rubber coating to Prentice and Co.'s gun-cotton cartridges is not able to keep out the moist air of this climate. The manufacture of gun-cotton requires so much care that, unless it can be obtained through the Home Government, I should much prefer using gunpowder.

Difficulties in Details.—There are also several difficulties in the details of torpedo defence, such as the rise and fall of the tide, the chance of a friendly ship touching the arms of a self-acting torpedo and leaving it in such a position that the pivot touched the insulated plate, in which case a premature explosion would take place immediately the wire was connected with the battery. These will no doubt be found fully discussed in the Reports of the Torpedo Commission in England, and of the subsequent Committee of which Colonel Nugent, C.E., was President.

Distance between Torpedoes.—The distance apart at which self-acting torpedoes should be placed will depend, not on their size, but on the chances of a ship passing through without striking any of them. At 25 yards distance, a ship of 40 feet beam would be certain to touch one; while at 55 yards apart, the chances of her striking or passing through safely would be equal. We may therefore conclude that seventy torpedoes would be required for a line one mile long. Torpedoes fired from the shore might, if they were large enough, be placed further apart.

Defence by Guns.—The great advantage which guns placed in shore batteries have over those on board ship has been proved over and over again; even in smooth-bore days, small one-gun batteries have performed almost incredible feats. Thus, at Antwerp, in 1814, a $5\frac{1}{2}$ -inch howitzer drove off a French 84-gun ship, with a loss to her of forty-one men; and at Cape Licosa, south of Naples, a one-gun battery *protected from assault*, and defended by twenty-five French soldiers, successfully resisted an attack by an 80-gun ship and two frigates under Sir Sidney Smith, and it was only compelled to surrender by landing in boats and surrounding it. The reason of this is, that although a ship can work her guns quicker than a shore battery, the unsteadiness of the deck prevents a good aim being taken. The accuracy of ship guns depends entirely on the distance, and at anything over 1,000 yards the shore gun has a very great advantage. It will therefore be seen that rifled guns and elongated projectiles, by increasing both the accuracy and range of guns, has given an enormous advantage to the shore battery, so much so, that I feel confident that two powerful rifled guns could with ease destroy a whole fleet of wooden ships, no matter how they were armed, if they could only keep them at a sufficient distance. In the present day, therefore, no guns can be admitted for the defence of forts against ships but those that are rifled, for with smooth bores the whole of the advantage of stability of platform would be thrown away. Probably the best gun that we could have for the defence of our harbours would be a 7-inch built-up gun weighing about $6\frac{1}{2}$ tons and throwing a solid shot weighing 114 lbs. or 120 lbs. This gun, with an elevation of $19\frac{1}{2}^{\circ}$ and a charge of 22 lbs. of powder, would range about $4\frac{1}{4}$ miles. As however it is very unlikely that the Home Government could spare any of these guns for some time, I should recommend that the gun to be used for the defence of the harbours of New Zealand be the old 68-pounder smooth bore, bored out and fitted with an internal rifled tube of steel or coiled iron, reducing the calibre to 7 inches. These guns are, I believe, equal in accuracy and range to the built-up

guns, but are not equal to them in endurance. Of the old Armstrong breech-loading guns, I should prefer the 40-pounder to any of larger calibre, for the larger guns are not to be depended upon, owing to the breech piece not being sufficiently strong.

Gun Carriage.—Moncrieff.—To insure the full benefit of these guns, they must be mounted on the Moncrieff carriages, or some other contrivance on the same principle. The advantages gained by this method are too obvious to require noticing; the principal one for our purpose being the great economy introduced in the construction of forts, owing to the very small risk the guns run of being dismounted by the enemy's fire.

Mounting Battery Guns.—Mr. Menere, of Melbourne, appears to have invented a method of mounting battery guns which he says is superior to the Moncrieff in the following particulars:—

1. It does away with cog-wheel action.
2. The gun rises 6 feet, which is more than the Moncrieff.
3. The carriage can be manufactured in the Colony, and can be more readily repaired when disabled.
4. It is cheaper, more effective, and more easily managed.
5. The recoil is not so destructive to the platform.
6. It is capable of being rapidly removed from one pit to another.

From the meagre account given in the *Melbourne Herald* it is impossible to form an opinion as to the merits of this invention, but I will make a few remarks on some of the points on which superiority is claimed:—

1. The only cog-wheel actions in the Moncrieff carriage are, I believe, that used for the pawl to drop into when the gun descends, and those used for training; and, according to the published accounts, they are not in the least liable to get out of order, having been subjected to the severest trials that the artillery officers could devise.

2. I am not, of course, personally acquainted with the Moncrieff carriage, but according to published accounts the gun rises from 12 to 15 feet above the ground, or from 8 to 10 feet above the loading position; and I think that the statement of the *Herald* that it only rises its own diameter is quite incorrect.

3. I do not understand why the Moncrieff carriage cannot be made in the Colony.

5. That the recoil of the gun destroys the platform I do not believe. Experiments with small guns have been made upon ice, without any perceptible slipping of the carriage; and I think that any one who is acquainted with the great caution with which any new invention is introduced into the British Service will not be inclined to credit a statement so wildly put forward.

6. I can hardly believe that a carriage sufficiently strong to stand the recoil of a heavy gun can be rapidly removed out of a pit 10 feet deep.

I therefore do not feel at all confident that Mr Menere's invention is superior to that of Captain Moncrieff; nevertheless it might be worth while to obtain more precise information about it.

Comparative advantages of Torpedoes and Guns.—The greatest advantage that can be claimed for torpedoes is, that they are capable of destroying, at one blow, the strongest ship yet built. That torpedoes are the cheapest and safest defence against a fleet of ironclads no one can doubt, and they also have the advantage of being much more easily extemporised than guns; but their great fault is that the expense is the same, whether the harbour is to be defended against one or a dozen ships. This does not apply to the Harvey torpedo, which is only used where required.

Guns once in position entail no further expense; but torpedoes would have to be placed long before they were wanted, and during this time sailing ships and steamers would be constantly passing over them, and would probably often damage them.

My opinion therefore is, that against an attack by wooden ships, rifled guns would prove superior in defence to torpedoes; but that when a port is closely blockaded, the addition of torpedoes would prove of great service, but not otherwise.

We must also remember that moored torpedoes of whatever kind, but more especially self-acting ones, would be of little use unless moored within range of guns, for if they were unprotected there would not be much difficulty in fishing for them with boats, cutting the wires, and raising them, so that in all cases guns would have to be used; and I think that, for the object we have at present in view, a few rifled guns, combined with the Harvey torpedo, would protect the New Zealand harbours far more economically than any attempt to defend them by means of stationary torpedoes.

The Harvey torpedo can, I believe, be obtained from Mr. W. Nunn, St. George's Street, London Docks, who is a part proprietor in the concern.

Danger from Boat Attacks.—The greatest source of danger to land guns is from a land attack. Where guns are at some distance, and unprotected by a garrison, a sudden landing by boats could be easily effected and the guns captured before any resistance could be offered. This is particularly the case in this Colony, for we have no permanent force to garrison them, and volunteers could not be expected to be always on guard. I would therefore recommend that a small force of artillery be applied for from the Home Government; and as the defence of the Colony is now left entirely to the British fleet, I would suggest that this force should consist of Marine Artillery, under the command of the senior naval officer on the station.

PART II.—Defence of Auckland Harbour.

The harbour of Auckland is approached by two channels, one between Rangitoto and the North Head, the other between Rangitoto and Brown Island. Close to the point where both these channels and the harbour meet, lie some low rocks, covered at high water, called the Bean Rocks. There can be no doubt but that these rocks form the most important position in the defence of the harbour. Not only would all ships approaching the harbour be exposed to a raking fire, from a battery placed on them, from the time they first came within range of its guns, but they would have to pass within 800 yards of it before they could enter the harbour; and even if they succeeded in passing it without being sunk, there is no part of the harbour in which they could be sheltered from its fire. Its guns would also flank

the east coast of the North Shore, and render a landing at the White Beach impossible, and would secure the safe retreat of any troops sent to the North Shore for the defence of the town. Its low position, however, renders it unsuitable for a Moncrieff battery, and it would be therefore necessary to build an iron-plated fort mounting at least three guns, and the expense of this puts it out of the question.

Dismissing, therefore, this project as unattainable at present, the first consideration is to prevent a ship which has run through the outside defences, or has passed in under cover of the night, from lying in perfect safety in the harbour, and summoning the town; and that this is quite possible, more especially at the commencement of a war, will hardly be disputed.

North Head.—On the North Shore the only position worth attention is the North Head (216 feet above the sea), as all other points west of that offer no advantages over places on the south side, while they all have the disadvantage of not commanding the entrance of the harbour. The North Head is second only in position to the Bean Rocks for defending the approaches to the harbour. It is equal to the Bean Rocks for defending the eastern channel, but inferior to it for the defence of the north or main channel, which is the most important. A ship could also lie close under the head at the mouth of the harbour, quite out of sight of the guns on its summit, and shell the town in security. But the most important objection to a battery placed here is that it would be exposed to a boat attack, and would have to be always garrisoned. Altogether, the North Head is well adapted for the defence of the approaches to the harbour, but it defends the interior in a very imperfect manner, and it would be unsafe to trust the whole defence of the harbour to a position so liable to be surprised, for it is evident that if this was the only defence, an enemy could land on the North Shore, and after capturing the battery, could turn the guns on the town, and compel it to surrender without even entering the harbour; so that torpedoes even covering the entrance might be rendered quite useless.

South Side of Harbour.—On the south side of the harbour we have the points between Bastion Rock and Hobson's Bay; the two points in Parnell on either side of Judge's Bay and Fort Britomart. The points of land between Bastion Rock and Hobson's Bay, although commanding the whole of the interior of the harbour and well adapted for defending the entrance, have the fatal defect of being too far from Auckland to be rapidly supported against a landing effected at Kohimarama; consequently, with the small garrison that the Colony could afford, they would always be in danger of capture by the enemy. Their distance also from Stoke's Point, the farthest distance, perhaps, to which a ship might go, to take up a position against the town, is three and a half to four miles, a range which is too great for any guns that we are likely to obtain from the Home Government.

Fort Britomart.—Fort Britomart is well placed for defending the harbour, but is rather too far from the entrance, being about 3,900 yards from the North Head, and 2,800 from Stoke's Point. Its position in the town of Auckland is so far a disadvantage, that any shot missing the fort would probably tell in some part or other of the town; but, on the other hand, this defect is considerably neutralized by the security it gives against a boat attack, so that a single policeman would be a sufficient garrison.

Parnell.—The two points in Parnell on either side of Judge's Bay appear to me to offer superior advantages to any of the others. They are centrally situated, close enough to Auckland to be effectually protected from a land attack, and sufficiently distant so as not to draw the fire on the town. The point between Judge's Bay and St. George's Bay is 3,200 yards from the North Head, and 3,900 yards from Stoke's Point, while the point between Judge's Bay and Hobson's Bay is 2,800 yards from the North Head, and 4,400 from Stoke's Point. A rifled gun on each of these points would, I think, effectually prevent any wooden ship from entering the harbour.

Distance at which Ships should be kept.—The next consideration is, at what distance is it necessary to keep the hostile vessels, in order to prevent the town being shelled? No ship can approach nearer to Auckland than three miles, without entering the harbour. This distance is no doubt much less than the range of the present heavy rifled guns; but I think that the small class of privateers, from whom we are expected to defend the harbour, will seldom carry guns of such calibre as to inflict much damage at such a distance. It is not only the difficulty of procuring these heavy guns, but the ships would have to be built expressly strengthened to enable them to resist the recoil from such large charges of powder. In the last war the French seem to have thought a distance of 4,000 metres (two and a half miles) too great for an effective attack on the fort at the entrance to the Gulf of Dantzic; and at Alsen they thought that an attack at 3,000 metres (3,280 yards) would be useless, on account of the destructive fire of the forts. The shelling of an unarmed town from a secure position is however a very different thing from attacking a fort, and I am of opinion that it would be very desirable to keep off vessels to a greater distance. This might, I think, be intrusted to the Harvey torpedo. Fast vessels like the "Luna" and "Golden Crown" might, if armed with two or three of these torpedoes, easily prevent any ship from shelling the town, and that without much damage to themselves. An arrangement might be made with the owners of fast steamers by which the Government could, in case of necessity, take up these vessels and send them out with the torpedoes. If, however, the expense was not too great, a heavy gun mounted on the North Head, would very materially assist their operations, but by itself this gun could not prevent a ship from taking up a position off the White Beach and shelling the town from there, for a sunken gun on a Moncrieff carriage could not deliver its fire at a very low angle; another gun, however, mounted on the hill east of Mount Victoria, would overcome this difficulty.

Recommendations.—I would therefore recommend—

1. That the two 40-pounder Armstrong guns be at once withdrawn from the North Head, where they are almost useless and highly dangerous, and that for the present they be mounted *en barbette* behind earthwork parapets, one on each of the points on either side of Judge's Bay.
2. That Moncrieff carriages be applied for, for these guns; and that if they cannot be obtained, working drawings be got from England, and the carriages be made out here.
3. That six Harvey torpedoes, with a proportionate number of spare fuses (for experiment and practice), be procured from England.

4. If further funds allow, and if a proper garrison can be obtained, that a 7-inch gun and Moncrieff carriage be applied for, to be placed in a sunken redoubt, with brick revetments on the top of the North Head.

I consider that a very efficient defence would be provided against ships like the "Alabama," without No. 4, at an expense of about £300.

If however the gun on the North Head was considered necessary, the expense would probably be about £1,800.

F. W. HUTTON.

No. 3.

The Hon. the DEFENCE MINISTER to Captain HUTTON.

SIR,—

General Government Offices, Auckland, 13th April, 1871.

I have the honor to acknowledge the receipt of your report on the defence of Auckland Harbour, dated 3rd April, 1871.

I have perused it with attention, and have to thank you for the valuable and suggestive information which it contains.

Captain Hutton, Auckland.

I have, &c.,
DONALD McLEAN.

No. 4.

Captain HUTTON to the Hon. the DEFENCE MINISTER, Wellington.

SIR,—

Wellington, 30th May, 1871.

In compliance with your instructions, I have the honor to enclose herewith reports on the defence of the harbours of Nelson and Wellington against the attack of small cruisers.

The Hon. the Defence Minister, Wellington.

I have, &c.,
F. W. HUTTON.

Enclosure 1 in No. 4.

REPORT on the DEFENCE of the HARBOUR of NELSON against CRUISERS.

THE town of Nelson lies at the head of a broad bay, and the harbour is formed by a boulder bank which stretches from one side of the bay almost to the other, leaving only a narrow channel between the end of the bank and the mainland.

To protect the town therefore from bombardment, at least two powerful rifled guns, of a range at least equal to those likely to be brought against the town by an enemy, would be required; mounted in Moncrieff batteries, and placed, one on the hills at the entrance of the harbour, and the other on the other side of the town.

To prevent the ships of the enemy from entering the harbour and getting under cover from the guns, I would recommend that a strong chain cable be securely fastened at the end of the bank, and the other end be brought over to the main land and made capable of being hauled up tight by means of a windlass across the entrance. I think that this chain would be cheaper, more efficacious, less liable to get out of order and more quickly got into place, than any system of torpedoes.

Hand power and not steam should be used for tightening the chain, for it must always be remembered that an attack would be made by surprise.

The entrance to the harbour is so narrow, and the hills close to it offer such favourable positions for riflemen, that any attempt to land or force the passage by boats ought not to succeed.

The windlass, &c., should be placed in a sunken pit, to screen it from the fire of the enemy.

F. W. HUTTON.

Enclosure 2 in No. 4.

REPORT on the DEFENCE of the HARBOUR of WELLINGTON.

THE town of Wellington, although at the head of a large harbour, with a narrow entrance, is only three miles from the sea, from which it is divided by low land.

An attack upon it could be made in three ways—

1. By entering the harbour and taking up a position opposite to the town.
2. By effecting a landing in Lyall's Bay, and placing field guns on the hills between it and Wellington, so as to command the town.
3. By bombarding the town from the open sea.

In the absence of means of protection, the first is the one that would most certainly be selected, and it is therefore against this that precautions must be first taken.

A battery on Palmer's Head might certainly prevent ships from entering the harbour; but without a permanent garrison it might easily fall into the hands of the enemy, for I would again reiterate that any attack of the nature now contemplated will be made by surprise. Even Jerningham Point I consider to be too far off to be supported with sufficient rapidity from the town; and I should therefore recommend that two rifled guns, mounted in Moncrieff batteries, be placed, one on the point between Oriental Bay and the Baths, and the other between Mr. Rhodes' house and the town, at an elevation of about 100 feet above the sea.

To guard against the second mode of attack, I think that a Company of Volunteer Artillery with two 12-lb. Armstrong field guns, and the Rifle Volunteers, ought to be amply sufficient to give a good account of any force likely to be landed from cruisers or privateers.

The third mode cannot well be provided against without permanent garrisons for batteries on the sea coast. It is however, in my opinion, very unlikely that any such attack would be made, and if made, it ought to have very little effect; for shelling at such long ranges and at no visible object is not likely to do much damage, and, unless a landing can be effected, I do not see what object is to be gained by it.

If, however, it is thought that a battery should be made for practice as well as for defence, I should recommend that the guns should be smooth-bores, whose range would not be sufficient to throw shells into the town.

F. W. HUTTON.

No. 5.

The UNDER SECRETARY, Defence Department, to Captain HUTTON.

(No. 400.)

SIR,—

Colonial Defence Office, Wellington, 8th June, 1871.

I am instructed by Mr. Gisborne to acknowledge the receipt of your letter of the 30th ultimo, covering reports on the means of defending the harbours of Wellington and Nelson against the attacks of small cruisers, and to thank you for the same.

The Government would feel obliged if you would take an early opportunity of visiting and reporting in a similar manner upon the harbours of Lyttelton and Port Chalmers, before the approaching Session of Parliament, in order that they may be in a position to place a complete series of suggestions as to the defence of all the principal harbours in the Colony in the hands of Members.

I have, &c.,

Captain Hutton, Wellington.

G. S. COOPER.

No. 6.

Captain HUTTON to the UNDER SECRETARY for DEFENCE.

SIR,—

Colonial Museum, 24th July, 1871.

In accordance with your instructions I have the honor herewith to enclose reports on the defence of the harbours of Lyttelton and Port Chalmers against the attack of small cruisers or privateers.

I have, &c.,

The Under Secretary for Defence, Wellington.

F. W. HUTTON.

Enclosure 1 in No. 6.

PORT OF LYTTELTON.

THE town of Lyttelton lies in a hollow, surrounded by hills so high that they would effectually protect it from the fire of ships unless they took up a position just opposite to it, and it is therefore more easily protected than any other harbour in New Zealand. One gun placed on the western point forming the bay in which the town is situated, and another on the eastern side, on the point next beyond the new breakwater below the road, would effectually command both sides of Quail Island and all parts of the port where ships could lie to bombard the town. They would also mutually support one another, and would both bring a raking fire to bear on any ship entering or leaving the port, while both would be easily accessible from the town.

Christchurch is situated so far from the sea, and the coast is so shallow there, that it is quite protected by its distance.

F. W. HUTTON.

Enclosure 2 in No. 6.

DUNEDIN and PORT CHALMERS.

DUNEDIN is the most important town in New Zealand, and at the same time it is the most expensive to defend from the attack of an enemy, for it could be attacked either by way of Port Chalmers, or it could be shelled from the open sea, as it presents a large mark on the sides of the hills, at a distance of only three or four miles.

The passage up the harbour could best be obstructed by guns on the half-way islands; but these islands are too far up to protect Port Chalmers, as the projecting eastern head of the small bay entirely shuts off the view of a large part of the anchorage; and as Port Chalmers possesses a dock and the terminus of the railway, it is quite as necessary to protect as Dunedin itself.

I should therefore place one gun on the north-west point of Koputia Bay, and the other on the north-west point of Portobello Bay. In these positions the guns can see one another, and both will command the channel as far as their range extends.

I prefer the north-west point of Portobello Bay to Observation Spot as the position for the second gun, as I consider that Observation Spot is too high for a gun placed there to effectually support another placed so close to it as the one on the north-west point of Koputia Bay would be; and also because it would be quite possible, without a gun on the north-west point of Portobello Bay, for an enemy's ship to run past Port Chalmers, and effect a landing behind the town.

It may be thought that Portobello Bay is too far from Port Chalmers to be quickly supported; but it must be remembered that the channel a ship would have to take is a circuitous one, and passes close to the other gun; and also that Portobello itself is a populous district, and could easily support sufficient Volunteer artillerymen to man the gun.

I do not think that a landing on the open beach near Dunedin is likely to be attempted; but as the town could be bombarded from the sea, some precautionary measures should perhaps be taken in this direction. I therefore recommend that two heavy rifled guns be placed on the high land between Anderson's Bay and Lawers Head, near the Hon. Mr. Holmes's house. These guns should be placed in separate batteries, at not less than 100 yards distance from one another, so as to disperse the enemy's fire, and render it less likely that either would be dismounted.

Of course I must be understood to recommend that these, and all the other guns, be mounted on Moncrieff carriages, and placed in sunken batteries.

F. W. HUTTON.

Enclosure 3 in No. 6.

ADDENDUM.

In my report on the defence of Auckland I suggested that the two 40-pounder Armstrong breech-loading guns should be placed at the points on either side of Judge's Bay. I did so as an attack was then considered possible at any time, and I thought that would be the best way of providing against the emergency; but that emergency having now passed away, I strongly recommend that two 7-inch rifled muzzle-loading guns be substituted for the breech-loaders. My reason for this is that it has been found that the lead-coated projectiles of the Armstrong guns are not to be depended upon after lying for some time in store, as they are liable to strip, and render the gun useless.

It will thus be seen that I recommend the Government to try to obtain twelve 7-inch muzzle-loading rifled guns, four to be mounted at Dunedin, and two at each of the ports of Auckland, Nelson, Wellington, and Lyttelton. The exact spots for these guns had better not be settled until the guns are procured and their range ascertained. These would amply defend the ports, not only from wooden cruisers, but also from ships armoured with plates not more than $5\frac{1}{2}$ inches thick.

F. W. HUTTON.

No. 7.

The UNDER SECRETARY for DEFENCE to Captain HUTTON.

(No. 467—2 G.)

SIR,—

Colonial Defence Office, Wellington, 24th July, 1871.

I am directed by Mr. McLean to acknowledge, with thanks, the receipt of your letter of this day's date, enclosing your interesting reports on the defence of the harbours of Lyttelton and Port Chalmers.

I have, &c.,

G. S. COOPER,

Under Secretary.

Captain Hutton, Colonial Museum, Wellington.

No. 8.

The Hon. the PREMIER to Lieut.-Colonel CARGILL.

MY DEAR CARGILL,—

Wellington, 25th May, 1871.

Referring to a conversation I had with you a few days ago on the subject of harbour defences for the Australian Colonies, I now forward you a copy of a report on the defences of Auckland Harbour by Captain Hutton, for your perusal, and to state that you would very much oblige my colleagues and myself if you would favour us with your ideas on the general question of the defence of the Colony against filibustering or other expeditions from seaward. The attention which you have given this subject, and the opportunity you have recently had of collecting information in England, will, I think, make your suggestions well worthy of consideration, and they shall be treated either as an official or a private communication, at your pleasure.

Yours very faithfully,

WILLIAM FOX.

Lieut.-Colonel Cargill, Dunedin.

No. 9.

Lieut.-Colonel CARGILL to the Hon. the PREMIER.

SIR,—

Militia and Volunteer Office, Dunedin, 6th July, 1871.

I have the honor to return the report of Captain Hutton on the defence of Auckland Harbour, which I have read with great interest. The subject of the defence of the principal ports of the Colony is one that I have endeavoured to call attention to for some time past. It is here presented in an intelligent form by one who is evidently well informed on the matter.

There can be no doubt that a great risk is incurred in ignoring the possibility of attack. Should a single vessel of the "Alabama" class enter any of our harbours, there is at present nothing to prevent her naming her own terms of ransom, and, if not acceded to, destroying the town and shipping at her leisure. It would be a great disgrace for a town containing thousands of able-bodied men in it, or in close proximity to it, to be conquered by a vessel with a crew of one or two hundred men, and that solely because the ship has a few heavy guns, whilst the town has none; and more mortifying when we think that had the town the same guns as the vessel, the position would be reversed, as from the steadier platform and better cover guns are more powerful on shore than afloat. Wooden

ships cannot stand against the shells fired from rifled guns ; whilst ironclads are penetrated at distances according to the weight of the guns.

The 35-ton gun has a 12-inch bore, and with a charge of 130 lbs. of pebble powder will penetrate 12-inch iron plates at a distance of 2,000 yards.

The next most powerful gun is the 25-ton, with a 12-inch bore, and a projectile 18 inches long, weighing 600 lbs., the performance of which is much short of the above.

The 18-ton gun has a 10-inch bore, firing projectiles of 400 lbs., with a battering charge of 60 lbs. of powder. The effective range of this gun is from 1,500 to 1,700 yards. This piece is said to give the best comparative result for its weight of any now made. The "Cerberus" at Melbourne is armed with four of these guns.

The 12-ton gun has a bore of 9 inches, and the 6½ ton of 7 inches.

The above are known as the Woolwich pattern guns, constructed on Fraser's principle of breech-coil, and cost about £70 a ton. The demand for heavy guns, both for shore and sea service, to meet the requirements of the Imperial Government, is so great, that I question whether any of the above mentioned could be got for some years to come.

The most useful gun for the Colony, and one likely to be obtained, and at a very much smaller cost than any of the foregoing, is that mentioned by Captain Hutton—the 68-pounder smooth-bore gun, converted on Palliser's principle into a 7-inch rifled gun. It has given results equal to the 6½-ton built gun of the same calibre. One of these Pallisers was tested with charges of 30 lbs. of powder, and a bolt increased by 10 lbs. each discharge, until with a 680 lbs. bolt the inner tube cracked. The battering charge of this gun is 22 lbs.

The Moncrieff carriage is coming largely into use at home, and has lately been improved. There is no part of it that could not be made in the Colony. The cost of mounting guns on this principle is much less than iron embrasures and mantlets, appliances now considered essential against rifled guns.

Breech-loaders are not in favour ; they are not such hard hitters, are more complex and liable to get out of order, and not so strong, as muzzle-loaders. They have also the disqualification of filling the casement or pit with smoke when the breech is opened after firing.

Torpedoes are a most powerful aid in the defence of harbours, and, owing to the improvement made in the manufacture of gun-cotton, are now easily managed. Late events in Europe show how safe harbours may be made by torpedoes covered by guns from the shore.

There is an instrument called "Davidson's Collimator" which enables guns to be laid at night so as to cover accurately the object aimed at in daylight, and when the gun is not in action. By this means torpedoes can be protected in the darkest night.

Two 7-inch Palliser's guns in this harbour would give a good account of any force likely to escape the attention of the Imperial authorities ; the cost would be small, and well balanced by the sense of security against the risk of insult and loss of property which at present exists. A sufficient force to fight the guns could be got from the Artillery and Naval Volunteers, and also to cover them against surprise until aid can be sent from Dunedin. Torpedoes might be placed in charge of the Pilot Establishment at the heads.

The question of covering these guns by rifle-pits or redoubts is one of detail ; the main question, the position of the battery, is one that can best be dealt with by a military engineer. I believe Colonel Mould, R.E., has reported on this subject.

The covering force must be armed with breech-loaders. Men armed with muzzle-loading rifles in the present day are simply nowhere for the purposes of war. I believe that practically the Snider is the best weapon extant.

There is no doubt but that an ironclad gun-boat is the most efficient defence for a harbour. In smooth water the platform would be as steady as a shore battery, and an enemy could not run past her and get out of range. The annual cost, however, is very great. The "Cerberus" is a mistake—that is to say, the same number of guns might be carried on a better principle and at less cost, by placing them in a vessel or vessels of a different construction, as the "Staunch," for instance.

Captain Hutton's suggestion as to a small detachment of Marine Artillery from the Naval Force on the station being put in charge of the harbour defence batteries, is worthy of consideration. It is possible that the Imperial Government may be made to see that a disaster of the kind contemplated, would cause a heavy loss to English underwriters at a port like this, where a large value of home shipping is generally lying.

If, however, no help in this direction is to be depended upon, the constitution of the Defence Force for this purpose must be looked to. The standard of efficiency of the Volunteers must be raised, and a stricter discipline maintained. This would cause a falling off in the number now on the rolls, which should be made up by a call on the Militia. Mr. Cardwell's Bill, recently before Parliament, provided for the country being divided into districts, which are each rated at so many men on a percentage of the population ; the number of efficient Volunteers is deducted from the rate, and the balance short, if any, made up by calling out that number of Militia.

This will act as a stimulant to the Volunteers, and also to the public to encourage the Volunteer movement. Employers of labour, for instance, would give the time to their employés necessary for day drills and occasional encampments, which at present are not possible.

The fact of a call of the Militia to make up the quota would give the public a direct interest in the efficiency of the Volunteers.

Limiting the number of Volunteers to the quota determined upon would also be greatly beneficial in maintaining a higher standard of efficiency.

I have, &c.,

J. CARGILL, Lieut.-Colonel,
Otago Volunteers.

The Hon. Wm. Fox, Wellington.'

Enclosure in No. 9.

EXTRACT from the *Globe*.

LAST year Sir W. Armstrong wrote a remarkable letter to the *Times* on our Harbour Defences. He there urged in the strongest manner that some means should be taken for affording protection to our open seaports. He pointed out that, in the case of Liverpool, a single hostile ironclad might do incalculable mischief, destroy masses of merchantmen closely packed in docks, and burn large stacks of warehouses containing merchandise worth millions. The remedy proposed by Sir William Armstrong was a system of floating gun-carriages, each mounting a heavy rifled gun. He referred to the little "Staunch" as an example, pointing out that this vessel, although a mere barge, carried a 250-pounder rifled gun of twelve tons weight, was quick and handy under steam, drew very little water, and was at a distance such a dot on the water that she would be very difficult to hit; whereas her shot would plump every time into the side of any large sea-going ironclad. We remarked in our comments at the time, that it was evident the safety of many of our seaports depended merely on the forbearance of an enemy, and that it was absolutely necessary to make our harbours secure against a sudden dash of the nature contemplated by Sir William Armstrong. We further pointed out that there did not appear to be any difficulty in constructing a hornet fleet, each vessel of which should carry a 10-inch muzzle-loading rifled gun, capable of sending a 400 lb. Palliser shell slap through the side of any foreign ironclad at 1,000 yards. We have reason to believe that a certain number of these useful little vessels carrying these guns will shortly be afloat; but we know that considerable difficulty has been experienced in stowing away so large a gun as the 10-inch of 18 tons. It is satisfactory, therefore, to find that Captain Moncrieff has devised a plan of raising and lowering such a heavy gun, so simple in its operation that it has received the approval of Sir William Armstrong and Mr. Rendall, the designer of vessels of the "Staunch" class. Captain Moncrieff has called his arrangement a hydro-pneumatic carriage, in which the recoil of the gun is absorbed by pneumatic agency. The principle upon which it depends is that the elasticity of air provides the most perfect spring that can be conceived. When out of action, the Moncrieff gun is safely stowed away below the deck. To all appearance the wasp becomes an ordinary fly; its sting is hidden. Suddenly, however, the huge monster rises from his lair, shows his black muzzle for a moment over the bulwark, vomits forth a stream of fire, and slowly descends out of sight. The gun is mounted on a simple but wonderfully ingenious carriage. The recoil, as the gun descends, drives a plunger into a cylinder filled with water, and communicating by a pipe with a reservoir, the lower half of which is filled with water and the upper half with air. The latter is thus compressed, and becomes a spring sufficiently powerful, when released, to return the plunger, and consequently the gun, to its original position. The air-spring is eased by a simple stop-cock, which permits some of the water to escape past the plunger. It is easy to see that this system possesses many of the advantages of the turret system, while it is free from many of its defects. The gun in the firing position is exactly in the same relative position to the deck of a vessel as it would be in a turret. In the latter, however, it is always obliged to remain at the same level, and thus requires a heavy circle of wrought iron above the deck to protect its carriage and gun detachment. In the loading position the Moncrieff gun is safe below the deck, and thoroughly protected by the sides of the vessel. It is worked with greater ease and freedom on the lower deck than it could be in any turret, and it can be fired from under cover and at any elevation required. The extra weight of a turret is about 170 tons top-hamper, but a Moncrieff 25-ton gun would only require 16 tons additional weight, and none of this would be top-hamper. When the gun is fired it descends into the loading position by the recoil, under cover—if necessary under the water-line. The force of recoil is not lost but stored; and the simple operation of turning a cock raises the gun at once, and under perfect control, into firing position. The carriage appears of the simplest construction, and all the hydraulic appliances are stowed away in safety at the bottom of the vessel. Finally, Captain Moncrieff is encouraged and backed up by such men as Major-General Sir Lintorn Simmons, R.E., Sir W. Armstrong, Mr. Rendall, and many other distinguished engineers. We trust, therefore, that no time will be lost in giving this system a fair trial, particularly in vessels of the "Staunch" class. The invention is of such a simple and practical form that there is every probability of its success; and the Admiralty may rest assured that one of the first questions next Session will be, "Has Moncrieff's pneumatic carriage been tried yet?" If the answer is in the negative, it will only be a fresh proof that something must be done to thoroughly arouse the masterly inactivity of Whitehall.

No. 10.

The UNDER SECRETARY for DEFENCE to Lieut.-Colonel CARGILL.

SIR,—

Colonial Defence Office, Wellington, 14th July, 1871.

I have the honor, by direction of Mr. Fox, to acknowledge the receipt of your letter of the 6th instant, conveying your remarks upon Captain Hutton's report on the harbour defences of Auckland, and making suggestions for the defence of the harbour of Port Chalmers, and to thank you for the same.

In reply, I am to state that Captain Hutton has been requested to report in a similar manner upon the harbours of Lyttelton and Port Chalmers; and his reports, together with your letter under reply, will be printed and laid before the General Assembly for its consideration.

I have, &c.,

Lieut.-Colonel Cargill, Commanding Militia District,
Dunedin.

G. S. COOPER.

