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Friday, May 11th, 1860.

General Sir J. F. BURGOYNE, Bart. R.E. G.C.B. in the Chair.

THE DEFENCES OF PORTSMOUTH.*

By COLONEL SHAFTO ADAIR, F.R.S.

A.D.C. to the Queen.

THERE are special difficulties incident to the treatment of strategic questions as applicable to England, arising from the character of her people, and from the character of her wars. The English mind has great difficulty in admitting the assumption that battles might be fought in the course of events on English ground, although forts and works of defence indicate such a possibility. Secondly, in the interval between the Peninsular War and the first Scinde Campaign, though England was rarely at peace, no war of strategy was undertaken. Probably the largest school of experience is to be found in the operations consequent on the Indian Mutiny. The system of concentration of columns on the positions of the mutineers, in order to crush the rebel forces after the capture of Lucknow, is a magnificent object of study.

Rationale of Defence.

There are five principal points to be considered—

First. Whether any and what portion of the national defence shall be assigned to fortresses or permanent works of the first class.

Secondly. Whether these works shall be treated as substantive and isolated points of resistance, or as points of appui in strategic plans and for tactical movements.

Thirdly. Whether the regular Army is competent in numerical strength to the service required.

Fourthly. Whether the Militia, that is, the Army of Reserve, the Yeomanry, and Pensioners, can be made available. And

Fifthly. Whether the defensive system can be so composed as to include the service of a volunteer auxiliary force—Infantry, Cavalry, Artillery with Engineers, and Boat squadrons.

Let it, then, be assumed that England must have a special military system for home defence. And in this should be utilized the sedentary

*The district map referred to in the Lecture has not been published, to avoid great increase to the size of the publication, but it is hoped that the details given in the Appendix will enable the reader to follow the plan.

portion of the national forces. And, to suit the defensive character of her strategy, as well as to compensate for paucity of numbers and lack of practical experience, the system must be largely based on the advantages to be derived from fortified positions, whether permanent or field. Hence it may be assumed that the defence of fortresses of the first class must be entrusted to the regular forces, and that of the field works to those of the second class—to the Army of Reserve and the local forces.

Now as regards the nature of English works of the last 150 years—from the time when the feudal castle or military blockhouse of Henry VIII.'s construction became obsolete—the most noteworthy quality is the low power of defence, combined with large capacity for garrison and stores. As at Landguard Fort, every work had the pretensions of a fort; and every fortified town, of a fortress, as on the lines of Portsmouth. The model afforded by the bastioned villages of the Flemish frontiers was faithfully copied by the Engineers who had been present at the sieges of the wars of William and of Marlborough. But the English defensive work, redoubts, forts, or fortress, should represent the keep of a camp of manœuvre.

I proceed, with the sanction of H.R.H. the General Commanding-in-Chief, and the permission of the Council, to consider the conditions under which the defence of Portsmouth may be conducted, either as the site of an arsenal and dockyard, as a maritime fortress, or as a land fortress of the first class, with its dependent positions and entrenched camp; and also as furnishing a base of operations in the event of invasion. I propose, however, to omit all means of defence depending on the Naval departments in activity.

First. With regard to Portsmouth as the site of an arsenal and dockyard.

On referring to the map it will be seen that if a line be drawn from Fort Monckton, at the western angle of the outer harbour, or roadstead, to Southsea Castle on the eastern, as a base, and thence, on either shore, to the Block House Fort, the point where the gorge narrows and the harbour is entered, as the apex, an isosceles triangle will be described, of which the sea-base = 3,500 yards, and the sides = 2,300. Outside, and almost parallel with the base of this triangle, the fair way lies from the westward, till arriving at a point nearly opposite Southsea Castle it joins the passage by the Nab Light, from the eastward, which forms an obtuse angle with the direct passage into the inner harbour, passing under the sea-face of the lines of Portsmouth proper. This triangle lies in-shore of one of the chief anchorages of the empire; wherefore great care has been taken, at all periods, from the time of Edward VI., to secure the anchorage from occupation, and the sea-face of the works from close attack. Now, although it would appear on the first inspection easy to make the inner harbour at any time of tide, yet the channel is tortuous and exceedingly difficult of entrance and exit at times, and always inaccessible to heavy vessels with their lower deck guns in. With regard to the protection which is given by landworks, two forts at the gorge, namely, the Block House Fort and the Point Battery, project their fire athwart the channel. Fort Monckton with its guns sweeps the anchorage at Spithead, and Southsea Castle brings to bear a diverging

fire on the eastern and western passage, which unite at 1,200 yards from its batteries.

It is needless to detail the nature of the armament of these works. Southsea Castle is a work of an old trace, like the forts within the limit of the Cinque Ports. These have been enlarged and strengthened so as best to meet the requirements of warfare, and may be described as being constructed on the same principle as the original works which were enlarged and re-modelled by Vauban and his immediate successors, and not on the pure bastioned trace, or on the polygonal, which obtains so prominently at the present day. The fire of these works sweeps the channel very effectually. Southsea Castle gives an oblique fire on vessels approaching and passing into the inner harbour, but it has been found necessary to supplement its fire by reconstruction of a work on the foundations of the old Lumps Fort, 1,600 yards to the eastward. This work is on the new construction, and will mount 17 heavy guns, sweeping by direct and oblique fire the obtuse angle down which vessels coming from the eastward pass into the inshore channel parallel to the coast line. A similar work is projected between Lumps Fort and Fort Cumberland. The fire from the old works on a bastion trace at Portsmouth is simply perpendicular to the line of passage, and not apparently very effective against steamers; while to judge from the construction, the nature, and command of these works in reference to the immense offensive powers of vessels of war with the present armament, it appears probable that any heavy vessel, well within range of the King's bastion, and the curtain connecting it with the Point Battery, would act with most destructive effect against that portion of the sea line of defence. But a vessel approaching for that purpose, being broadside to the main works of Portsmouth, would, having endured the oblique fire of Southsea Castle and Lumps Fort, be raked by the guns of the Block House Fort, and therein consists the safety of the Channel. It appears then that, so far as direct fire will prevent the ingress of vessels of war, the key of Portsmouth Harbour lies in the Block House Fort.

The question of the shape of embrasure, and of the protection enjoyed by plated vessels, will be considered hereafter.

Now, restricted as every heavy vessel of war must be in the choice of the channel, and exposed during the greater part of her course to a heavy and fatal fire from Block House Fort, it is not very probable that it would be attempted to force the passage of the inner harbour by the unassisted broadsides of line-of-battle ships or heavy frigates. I leave the question of the accuracy with which guns can be trained from the decks of vessels under steam, so perfectly manageable as they must be, to professional discussion. But one point should be noticed which has not yet been brought prominently forward in respect to the defences of Portsmouth Harbour. The approach of vessels of war, of the heaviest class, is restricted by the circumstances of the tortuous channel delaying their course, while their huge bulk is exposed to the fire of the forts. But there is another element of attack which might be developed in aid, and would exercise a very material effect on the fortunes of the day: I speak of those formidable and minute batteries of movement, gun-boats. I class among gun-boats every steamer that is

restricted to the use of one or two guns. With the experience of the last war to guide us, it is probable that in any attack on Portsmouth, not made solely for purposes of destruction by vertical fire from long ranges, gun-boats would be brought up, and materially assist, in accordance with the system of nautical tactics, which in many cases prefers the fire of accumulated gun-boats to the heavy battery of a man-of-war. Now, a gun-boat engages a battery ordinarily at great advantage. If the Block House Fort or Point Battery be attacked, on the prolongation of the capital, that is, perpendicular to the face of the work, the loss caused by enfilade is reduced to the lowest expression, especially if the rear of the guns be secured by paradors, or by ramps perpendicular to the rampart, as on the Gomer-Elson lines. But if a gun-boat be placed permanently upon, or occupy at intervals, a point in enfilade of a heavy shore battery, the conditions of the contest become most unequal. The gun-boat, with its power of movement, small bulk, and heavy armament, selects a position whence it can by projection of shells to the rear of the work distract the attention and annoy the gunners of any battery not entirely casemated. For in the case where the gun-boats' line of fire traces a very obtuse angle to the face of the work, the Haxo casemate would in itself be but slight protection against the scourging and searching fire from shell guns plunging in reverse. A floating shore-battery might take up the defence doubtless, but would in turn be shelled by another gun-boat, and a series of duels would result of giant against dwarf, where the chances were in favour of the party whose defeat or annihilation would probably be no equivalent for the loss previously sustained by the battery. Let it be supposed that a line of gun-boats is echeloned in shoal water in a line parallel to the faces of Fort Monckton, the Gillkicker Battery, and Blockhouse Fort. A more formidable line of battle in aid of an attempt to force the in-shore channel can scarcely be devised. And let the same conditions be applied in diversion on the eastern passage, from Fort Cumberland to the entrance of the in-shore channel. It may be assumed that this fire of support would be sufficiently destructive. It must be dealt with and dissipated on tactical principles, identical with those which define its adoption. The ascendancy acquired to the maritime attack by dissemination of fire over land defence must be reversed, and the superiority restored to batteries over the formidable gun-boat. But provision has not yet been made in the sea defences of Portsmouth to meet this contingency. It has been laid down by high authority, that under circumstances similar to those under which the attack of Portsmouth Harbour would be conducted, a supplemental fire on heavy vessels should be disseminated, because, in proportion to the dissemination of fire, loss is occasioned to the antagonist, whose fire is massed.

A very remarkable action might be quoted, which was fought in the Scheldt in 1814, with one 5½-inch howitzer and a field gun against the battery of a French frigate. The howitzer and field gun were placed in position on the banks, and the French frigate, lying in the channel, was ultimately obliged to weigh. This illustrates the advantage of a disseminated fire. It becomes a question, then, how far the direct fire of the heavy forts shall be supplemented by scattered batteries specially designed to act against gun-boats.

It may be well imagined that in the triangle, including the Spitsand, and in shoal water of $1\frac{1}{2}$ fathoms, it would be perfectly easy for a detachment of gun-boats so to take up their position that they would harass, and possibly even keep down, the fire of heavy guns mounted in works of rectilinear trace, while those very guns could not be brought to bear on the gun-boats. Now what is true of disseminated fire against batteries from the sea, is true of disseminated fire against gun-boats from the land. It is proposed then to construct a system of batteries as against gun-boat attack especially, but also to serve against heavy vessels. The conditions of construction of such lines are easily determined by the positions which lines of gun-boats would of necessity occupy for the purpose of co-operating in a maritime attack. Let a line be drawn from Southsea Castle at an obtuse angle to the salient of the King's Bastion, a distance line of 1,430 yards to the westward; and to the eastward draw a line passing through Lumps Fort at 1,600 yards, to Fort Cumberland, a further distance of 2,800 yards. Now it will not be sufficient to have a disposable force the specific duty of which shall be to engage a gunboat squadron, but it must also be so disposed as to overpower the gun-boat fire without accumulating such a mass of gunners and artillery within works under fire from the gun-boats, which would be murderous in its effects proportionately to the number of men and guns. Southsea Castle is supported on either point by two auxiliary batteries, having a flanking fire eastward and westward of two 68-pounder guns.

On these lines it is proposed to construct, at such a distance from the crest of the beach as should give sufficient command of the in-shore channel, and commencing on Southsea Common, a line of 3-gun batteries *en echelon*; these guns would be scarcely seen over the beach, while they would exercise a perturbing influence over the movements of the gun-boats. Three guns are assigned because the concentrated fire of three guns on a single gun-boat would probably occasion her to alter her position if stationary, or disorganise, if in motion, the system of delivering fire on recurring curves of approach and retreat. The fire of Southsea Castle might be advantageously delivered gun by gun. On the prolongation of the line towards Lumps Fort, and thence to Fort Cumberland, at suitable intervals, and at such an elevation as should give due command, batteries should be half sunken, constructed on the same principle, so that even if a line-of-battle ship worked into the channel, the probability is that but very slight harm would be done to the disseminated batteries.

It is with very considerable diffidence that I venture to make these suggestions, yet it has struck me forcibly, in the course of practice from the batteries of Southsea Castle, due regard being had to the peculiar nature of the entrance to the inner harbour, that it will be necessary to prepare some special system of defence against the class of attack by gun-boats, which would be very irritating, and might, possibly, become dangerous; and is, moreover, a system the materials of which lie within the capacity of non-maritime states, or maritime states of the second order, to organise at no great cost of money, men, or sea-going experience. A partial idea of the tactics applicable to an attack of this class may be easily obtained. The chart printed on the occasion of the Great Naval Review of 1856 represents the primary or original position of the men-

of-war, gun-boats, mortar-boats, and floating batteries, which were reviewed by Her Majesty at the termination of the Russian war. Those present will remember how triumphantly those magnificent 24 sail of the line swept the sea at Spithead without a sail being let fall. And they will also recollect the general effect of energy and concentration produced even by the blank firing in bombardment of Fort Monckton, from the mosquito fleet of gun-boats which anchored in shore. The positions pointed out in the chart give a very instructive lesson on the probable course of attack by heavy vessels, whether alone or assisted by mortar and gun-boats and floating batteries.

In considering the attack by direct fire, as on the Block House Fort, the question of construction of the embrasures of all works, especially of the casemated, becomes of importance. The engineers of the United Service have given much attention to this subject, with reference to their coast defences, and from the experiments recorded in the Report of Brev. Brig. Gen. Totten, on the effect of firing against embrasures, 1852, 1853, and 1855, it appears that by the employment of embrasures with offsetted cheeks, as compared with embrasures with flaring cheeks, the conditions of entry of canister iron balls 1·05 are reversed. Thus—

Of canister iron balls	1·05 diameter, per cent. fired
Against Embrasures with flaring cheeks	95 reflected, 5 stopped.
" " Offsetted cheeks	6 reflected, 94 stopped.

The materials for construction in order of excellence are stated to be—wrought iron, lead, concrete, brickwork, sandstone, granite. But the tabulated results, p. 160 of the Report, are more remarkable as between ships and forts :—

TABULATED RESULTS.

Iron and leaden canister balls discharged in half an hour through embrasures of a casemated battery of twenty-four guns, and through port holes of a ship of fifty guns in each broadside, total surface fort and ship each = 6,000 square feet. In 32-pounders and 8-inch guns. Number entering each embrasure and port hole.

	No. entering each Embrasure.		No. entering all the Embrasures.		No. entering each Port.		No. entering all Ports.	
	Musket	Iron 1·05	Musket	Iron 1·05	M.	I.	M.	I.
From 32-pounders :—								
Large embrasures, 54ft.	1,404	351	33,696	8,424				
Target embra. flaring cheeks	231	53	5,544	1,392				
" offsetted cheeks	101	25	2,424	600				
" shutters	10	3	240	72				
SHIP'S PORTHOLES	—	—	—	—	126	31	6,300	1,550
From 8-inch guns :—								
Large embrasure, 54ft.	2,754	643	60,096	15,552				
Target embra. flaring cheeks	453	106	10,872	2,544				
" offsetted cheeks	193	46	4,752	1,104				
" Shutters	20	5	480	120				
SHIP'S PORTHOLES	—	—	—	—	252	52	12,600	2,600

The paper is to be found in Prof. Papers, R.E., which should be consulted on construction of offsetted cheeks and of embrasure shutters.

With regard to the armament of the sea-faces of these batteries and of the works, the general employment of shell-guns should be insisted on; mortar fire is inefficient against shipping. The result of experiment from a 13-inch mortar at a range of 600 yards, against an anchored steamer whose beam shall be 40 feet, gives a per-centage of 16 hits. But there is another weapon, namely, the shell-gun, from which can be projected into the advancing vessel, a missile of sufficiently disruptive force, with much greater certainty of aim. And as to the result of the explosion of a shell on board a man-of-war, that remarkable instance of the explosion of a shell in the *Medea*, printed in Sir Howard Douglas's "Naval Gunnery," shows that the explosion of several shells must produce a most terrific effect on the strongest vessel. But it must be understood that the shell guns are to project shells, or red-hot shot, and not cold hollow shot, which is a projectile of the least satisfactory results of its class, fired from batteries against shipping.

Many interesting points of detail, as for instance the merits of the Armstrong and Whitworth guns, and of the resistance which plated vessels may be able to oppose to batteries, must necessarily be postponed. But it may be observed here, that the advantage derivable from the projectile will be multiplied and increased by successive trials, and it is probable that whatever resistance the strengthening of vessels may have given under the old system, will be still further increased by the powers of resistance given to plated vessels.

Still it is said that the Whitworth $8\frac{1}{2}$ -pounder gun has pierced a wrought-iron plate of 4·5 inches at 200 yards. But the experiment was probably made against a stationary object (the floating battery), and on a line of fire perpendicular to the vertical plane of the target.

Is it to be assumed that the penetration would have been equal against an object in motion, whereof the point of percussion should lie in a plane inclined to the line of fire at an angle of not more than 15°? If not, then every gun commanding the channel of approach to a harbour must be capable of traversing at low horizontal angles, and in fact become a gun of *enfilade*, and, if not *en barbette*, the cheeks of the embrasure should be splayed proportionally.

But one disturbing element of calculation in the trace of sea works has already shown itself. The increased range of the Enfield rifle has extended the line of defence from 180 to 500 yards, as in the sea rampart and works at Alverstoke, that is as 3 to 1.

Passing from the attack to force the passage of the inner harbour, the consideration of Portsmouth as a maritime fortress is now to be approached. And here it becomes incumbent to refer to an omission which, no doubt, has already been noticed, namely, of notice of the defences of the Isle of Wight. Considering Portsmouth as a maritime fortress, the Isle of Wight must be taken as a work projected across the main ditch, or as an outpost to be most vigilantly guarded. I prefer assigning the tier-towers which have been suggested, and will be probably carried out on the Horse Sand and on No-Man's Land, to the defence of the passage of the eastward of the Isle of Wight, rather than to take them

into consideration of the defence of the harbour proper. The works then that are now available for the defence of the passage to the westward are, Victoria Fort, the Cliff-End Fort, and the batteries at Hurst Castle to the westward. On the south coast lie the batteries of Freshwater and the old work of Sandown, which though now valueless from decay, is well placed for sweeping the coast. I would here refer to the ingenious system of an anonymous writer who proposes for the defence of the coast line of England works which are thus described.

Vessels carrying batteries of heavy guns capable of injuring forts can nowhere approach within a considerable distance of the shore—this distance being generally greater where the nature of the coast affords, in other respects, fewer advantages for defence, and more facilities for invasion.

If the space near the shore within which ships and floating batteries cannot be brought, and which an invading army must cross in open boats, and if the beach and banks upon which it must land and form, be effectually under the fire of a sufficient number of guns, it will be impossible for a force, however numerous, to land its artillery and ammunition, except it can first silence the fire of these guns.

But because ships cannot approach close to the land, it is possible to plant guns protected from their fire that will accomplish the purpose.

Where the line of the coast has bold curves or projections, and the banks are elevated, such positions will, for the most part, be readily obtained, and require little aid from art to render them efficient for protection; but where such natural advantages are not to be found, earth mounds of adequate dimensions will do all that is required.

If small forts, protected either by the form of the coast, or by artificial earthworks, from fire from the sea (except that which is from too great a distance to injure them), made bomb proof and secure from escalade, be placed along the shore at proper intervals and positions, the fire from them will command every point on the shore, and the approach to it in such a manner as to render a hostile landing impracticable.

A bank of earth 150 yards long, placed along the beach close to high-water mark, sloping upon its sea face, and supported by a nearly vertical wall upon the land side, made of sufficient height and thickness, will protect guns placed near the centre of its length, pointed along the shore, from being fired upon from vessels, except from a very great distance. For instance, a gun placed 15 yards behind the embankment, is only exposed to a vessel that approaches within 400 yards of the shore at 2,100 yards distance; one placed 9 yards away from the mound does not become visible till a vessel as near the shore is 3,500 yards off; while one only 3 yards from the wall cannot be seen from a nearer point than 7,000 yards, and that only by a vessel within 250 yards of the land.

By making the bank sufficiently high, several tiers of guns may be placed in such a position, so that an adequate fire can be maintained in both directions along the beach. The shot from the guns three, nine, fifteen, yards respectively from the mound will strike the water's edge about 300, 500, and 1,100 yards from the guns.

It must be evident to every one at all aware of the effect of artillery, that such a raking fire *along the beach* as these guns could maintain would make it altogether an impossibility to land guns and ammunition either by day or night, in thick weather or in clear, by the most sudden surprise or the most extensive preparation; and that, to prevent artillery being brought on shore is all that is necessary to deprive invasion of any terror.

The cost of a bank of earth to protect a fort of three tiers mounting eighteen guns, need not exceed £2,000.

The cost of the fort itself, bomb-proof, surrounded by a ditch, protected by a gallery with loopholes for musketry in the wall of the earthwork, need not exceed £3,000.

The available range of rifled cannon, when used as these would be, may be assumed as extending at least to 9,000 yards (above five miles), so that a system of such forts placed at intervals along the beach, varying according to the nature of the coast line, of from two to seven miles, and flanked by similar forts, similarly protected, placed in the intervals between them, upon or near to the line of the cliff or bank, will effectually secure every point of the coast.

The cliff forts will protect the faces of the embankments in front of the beach forts and the parts of the shore not reached by their guns: also they will command the line of the cliff and the country inland to a considerable extent.

This system is not likely to require upon an average more than one fort for every two miles of coast, so that the cost need not exceed £2,500 per mile.

There is no form of coast line or kind of shore to which this species of defence is not adapted, the principle remaining the same, though the details would vary—it would be impossible to find any point upon the coast where a gun can be put on shore that may not be placed under the fire of a battery screened completely from being injured by fire from the sea.

This system appears to be specially applicable to works constructed in the bights of a bay, or on a projecting headland. A work to command Brading Harbour, and the anchorage of St. Helen's completes the land defence of the island to the eastward. And the sea-line will be closed by the two-tier towers hereafter to be placed on the firm ground of No-Man's Land and the Horse Sand. The question of forcing the passage of the Solent from the seaward has been often discussed, but chiefly with reference to the nature of the work at Cliff End, and its capabilities for a satisfactory defence. It was asserted that the heavy guns of this casemated fort could not be worked on account of the retention of smoke from the casemate construction, or that, if the guns could be continuously worked, the heavy firing would bring down the walls. When the Commission of National Defence inspected this fort, all the heavy guns were fired with 20 rounds each, and, while no wall of construction in the whole of that fort was shaken by that heavy firing, the guns were worked with the most perfect freedom from suffocation; and this is very remarkable, for the air was very still and the smoke almost motionless; the only difficulty was that the smoke, being, from the peculiar formation of the adjacent coast, completely shut in from the influence of wind from every quarter but to the direct front, hung before the works; a certain disadvantage, unless there was some current to sweep it away, but one equally affecting an open work. But even this disadvantage might be minimized by firing guns alternately, or at intervals, so that the smoke would lift by the concussion, and thus a constant fire be kept up upon passing vessels.

The batteries of Hurst Castle and its dependencies have been strengthened and enlarged, and under their slopes an experiment was tried very satisfactory to the position of troops lining a beach against disembarkation. It was doubted whether round shot in striking the beach would not produce, by displacement of pebbles, an effect analogous to that of shrapnel. Several round shot were fired from a gun-boat, against a target formed from sail. The shot struck at some 30 yards from the sail, and after a very careful examination not half a dozen pebbles were projected forwards to strike the sail. A portion of the crest of the beach had been swept bare by the round shot, but the shot deflected the pebbles upwards, and, consequently, riflemen might have been lying below the crest of the beach without any risk of being dislodged or wounded by pebble showers driven in upon them.

With regard to the defence of the Isle of Wight by troops, the opinion of a distinguished officer, Colonel Hall, of the Durham Artillery, is here by permission made public. "It appears to me that, supposing our fleet eluded or scattered after naval engagement, an enemy might land in Alum Bay with little difficulty; prepare a gun road to the high ground; seize Cliff-End earthwork, and taking in reverse Cliff-End and Victoria

Forts, command for a time the western approach to our great naval dépôt at Portsmouth. From thence, proceeding north-east by Cowes, take Osborne, which would be occupied as a Quartier-Général. From Ryde, Spithead would be commanded, and even the dockyard at Portsmouth might be set on fire by rifled artillery. To meet such a force, *selon les règles*, 10,000 men would be required, of whom 600 should be trained field artillery men, with 490 militia or garrison artillery in the works of Fort Victoria, Cliff-End, Yarmouth Castle, Freshwater, and Sandown Redoubt. Two heavy batteries of movement, one nine-pounder battery, and a half troop of horse artillery, would give three field pieces per 1,000 bayonets nearly. Three hundred of the engineer corps would at least be required, considering the skilled labour necessary for the repair of the masonry, and iron racers of the armament. Deducting 200 for cavalry, leaves 8,400 infantry. The force to be encamped and entrenched would then amount to about 7,840." He then proceeds to suggest that a camp for 2,500 men should be formed between the village of Freshwater and Cliff End, leaving 5,250 to occupy the central and important position on the hill, which should be entrenched, to the eastward of Carisbrook Castle. "If, however, a battery of four 32-pounders (or heavier if completed) of the new rifled ordnance can be supplied and placed in position on a point a little to the north-west of the old lighthouse above Scratchell's Bay, the force above calculated might be reduced to at least one-third of the number. The soil here is good, unlike the unmanageable clay at Cliff End, and in this elevated position an earth battery, with embrasures protected from ships' musketry by mantelets, would suffice without multiplying the permanent works on the island. If such battery were well manned and officered, no vessel or boat even could pass, by day or night, through the narrow channel between the Needle rocks and shoal." These opinions show, first, what positive advantage and efficiency may be anticipated from rifled ordnance; and, secondly, how materially the great difficulty of getting a sufficient number of men for defensive operations would be obviated. This question, now so largely discussed and with such energy, is by no means new in the records of our country. A reference will be found in the "*Sussex Archaeologist*," to councils held by Queen Elizabeth in the year 1589. To these councils were summoned her generals and statesmen, and their words and their warnings are applicable now. For instance, there is a general consent amongst those consulted that some fortification should be erected at Hurst; and over against Hurst, in the Ordnance map, will be seen marked "Cary's Sconce," "sconce" being then a term for "redoubt;" and this, doubtless, was the *scandito* of the Italian engineers, and a work then projected under the auspices of that great soldier.

Lord Essex, advises, "that a great fort should be raised over against Hurst Castle." Lord Burghley suggests "that Portsmouth should have a sufficient garrison; and also that the Isle of Wight, with 900 men, could stay the possession of an enemy, as was proved in the last year of Henry VIII. when all the French navy was at St. Helen's, and their forces were repulsed by land by the forces of the Isle, with the aid of the two bands of Sir Francis Knollys and Sir Richard Bland. It is not probable," he says, "that Southampton would be attacked unless Portsmouth and the Isle of Wight should be attacked, but there he would suggest also

that some sconces or ravelins of earth should be made." Now this is the first time that ravelins are mentioned as a single or independent work. Much stress is laid on arms and training, and, with a true perception of the principles of defensive warfare, on breaking up of the country, and defence of positions. Sir Francis Knollys says:—"There must be men, and store of pioneers, but, if time permit, Plymouth, some place in the Isle of Wight, Southampton, Dover, Rye, and some places in the Thames, should be fortified." And thus speaks Carew, the Lieutenant of the Ordnance:—"The Isle of Wight is most needful to be respected. Portland, an island strong by nature, which by a help of a little would be made impregnable, if once gotten by the enemy, would give command and annoy us." Thus spoke the wisdom of our ancestors.

Passing to the consideration of the land defences of Portsmouth, I must ask those who have honoured us with their presence, to accompany me, as it were, to the crest of that long hill, so much spoken of lately, called Portsdown. Standing, then, on Portsdown, and looking southward, they will see close beneath the island of Portsea, containing the old town of Portsmouth, a parallelogram of about four miles by two and three-quarters or three miles. Looking to the westward, they will observe the long line of Southampton Water, and immediately on their right front the new line of works covering the suburb of Gosport. Southward will be seen on the sea margin the works which stud the entrance of the harbour, until at last the view is closed to the south-east by Fort Cumberland, protecting the entrance of Langston Harbour. Immediately below them they will see the Hilsea works, with six batteries and two redoubts, resting on the military canal, designed to prevent an advance on Portsmouth by an enemy disembarking on either flank. Fortunate it is, indeed, that attention has been directed so timeously to the essential works of defence.

Since these new works on the former line were commenced, the Hilsea lines have been projected, commenced, but are not yet completed, nor will they be during the course of this year. Within a very brief period projectile science has been so largely developed that, notwithstanding the outlay which has been made on those lines, it will be necessary to support them by additional works. There is no doubt that, to complete the defensive works, Portsdown Hill must be occupied. On the map is traced a zone of fire, taking the Dockyard as the centre, which is maintainable by the new system of projectiles; and, indeed, since that trace was first drawn, with abundant scope, as it then appeared, 1,300 yards additional have been obtained. Taking the Dockyard as the centre of the zone of incendiary fire, 8,000 yards overpasses the whole of the works now erected for the protection of Portsmouth. A bolt was recently projected 9,300 yards. Now the point at which Ryde Pier springs from the shore is distant from the centre of the Dockyard 8,800 yards. It is, therefore, evident that means must be adopted to remove, or impede, or interfere with, the power of the enemy to approach to such distance as may enable him to harass and annoy the garrison at long range, or, as in the case of the Dockyard, to destroy it by incendiary fire.

The works on the Gosport side, forming the Gomer-Elson lines, are well worthy attention. Their trace is very remarkable. Four have been

added to the original Fort Gomer to the northward; Forts Grange, Rowner, Brockhurst, and Elson. The position of these forts is marked on the map; and the three central forts have added to them a rear keep, in order to the maintenance of a substantive defence. They are worked out on that trace, that, in the event of one work being taken, it will not give an enfilade to the lines of the others. They are thus each capable of substantive defence, and if any one work were captured it would not lend facility for the capture of its neighbour, right or left. And it is evident that the ground in their rear may be swept by the fire of *rasé* hulks placed in battery in the upper part of the Harbour. Peewit Island might be occupied as a battery. But the independent character of these works is not their sole merit. A very large extent of adjacent land, amounting to 1,600 acres, is in the possession of Government, and will be eventually converted into one large parade ground. Thus will be attached to one of the greatest British arsenals, the finest parade ground in Europe in peace, and if the enemy should land and attempt to take Portsmouth from this direction, a magnificent plain studded with armed *points d'appui* and offering intervals of manœuvre to the troops.

I cannot here fail to remark a particularly beautiful application of engineering science. On the Gomer-Elson lines the ground is diluvial and of a very crumbling nature. The works are all excavated from the level, whence the *terreplein* of the work remains as an isolated block supported solely by the scarp. At Fort Elson the work appeared to be complete, when in one night the scarp was projected in mass ten feet into the ditch. It was therefore clear that the fault was not in the construction, but in the inability of mere brickwork laid at such a slope as to forbid escalade to resist the outward pressure of the shifting earth in the rear of the scarp. How was it then possible to resist the continual and unabated pressure, since the ground having once began to slip continued its outward motion? In rear of the reconstructed scarp, arches were turned like the dry arches of a railway viaduct, so that the whole of the scarp rested against their ends, the parapet above being sustained by the arch itself. As the earth from the interior gradually subsided into these arches it could be carried away, and thus an operation which might have been a source of continual expense, was limited to the labour necessary to relieve these works by hand. A very scientific application of the construction appropriately called the *escarpe en décharge*.

The inland lines of Gosport, Portsea, and Portsmouth, now lie far within the new defensive works. They are of a slight trace, and they would very materially depend on a water defence on the Portsmouth and Portsea lines. It is frequently supposed that an open suburb is on all occasions an inconvenience, or always leads to the disadvantage of the garrison. But the practice adopted by the Austrians may be remembered for instruction. Whenever it was desirable to strengthen a position in villages or small towns, the roofs and walls were removed to a certain height, then laying timbers horizontally on the walls, they were covered with earth, so as to make the buildings perfectly shell and fire proof. A suburb may be turned to advantage, and very materially delay the capture of a fortress. It is true that here the solid, powerfully con-

structed buildings necessary to make such a defence as that of Saragossa do not exist, especially in the suburbs of Portsmouth; but the defence might very materially be aided and protracted by turning to account the mass of buildings that mask the glacis of Portsdown and Portsmouth.

And now it will be perceived how materially the command from the crest of Portsdown Hill, 450 feet, taken as a base of *emplacement* for artillery fire at long range, has changed the conditions of the internal defence of Portsmouth, as developed on the northern side of the island. It is not pushing a principle to extremity, to assume that the necessities of position urgently require the formation of a camp, or entrenched position, whereof Portsdown should form the centre or curtain, and Emsworth and Fareham determine the salients of the eastern and western bastions. The concentric lines of defence will then be clustered around Portsmouth proper, thus: Inner line—Portsmouth and Portsea lines; with the dependencies of Southsea Castle, two batteries, and Lumps Fort; on the westward, Gosport lines and Block House Fort. The outer line of defence to the eastward rests on Fort Cumberland by the sea; on the Hilsea lines to the northward; and is taken up on the westward by the Gomer-Elson lines, continued along the Alverstoke lines from the Browndown Batteries, through Gillkicker Battery, to Fort Monckton. The northern front is covered by the entrenched camp. From the crest of Portsdown there is an ample space for a powerful mass of fire. From the lines of Hilsea can be also concentrated a most powerful fire from six batteries inclosed in a solid rampart, and from two redoubts of the Ravelin trace, against an enemy, advancing from either direction, in order to turn the hill. The fire of these works is projected on parallel lines of fire, set at a large angle to each other, and thus securing a practical convergence of the first order; the prolongations of the respective portions of each work are directed on the least available portions of the country; and it becomes almost impracticable to enfilade by round shot, or seriously to annoy by shell the defences on the convexity or concavity of the *polygone renversé*, on which these works are traced. But, since military expeditions are now prepared for the accomplishment of an object by the combination of a multitude of small co-operating causes, as well as by the employment of a proportion of large means, it would probably enter into the scheme of an enemy, and would certainly be within his power, to place himself in the actual condition of works existing or projected solidly on Hayling Island, and use that position as a base of operations whence to annoy Portsmouth, or as a focus of artillery fire for its destruction. Is it not, therefore, desirable to construct works embracing within their combined curves of fire a very considerable portion of this island? It is proposed to construct two forts, not of the Maximilian trace, because it has been proved how thoroughly their armaments have been dismounted by field fire; but such works as, while enjoying a sufficient command of the country, should not expose a full front to fire in accomplishing the great object in war, the removal of the breaching power of artillery to the maximum distance.

It is probable that there are few spaces of ground of the same capacity and accidents as Portsdown Hill, in which there is so much dead ground. That will be the great difficulty to overcome in occupying Portsdown,

which being unoccupied, the gates of Portsmouth are left open, and its works uncovered to the first expeditionary corps disembarked on the coast. With regard to the construction of any proposed work, the advantages of material are great. The chalk is of great tenacity, and will stand with but little revetting.

The long ridge of Portsdown Hill measures, from the Nelson Pillar, west, to Belmont Castle, east, about 5 miles 2 furlongs.

The breadth of crest varies from 60 to 200 yards.

The crest line undulates with seven principal points of emergence.

The southern slope is steep, and indented into five principal hollows; the northern ascent is gentle.

The crest of the hill is about 7,040 yards from the centre of the dock-yard, in an air line, which is therefore within the zone of incendiary fire from batteries on the western summits.

Works constructed on either extremity of the long axis of the hill would dominate the contained space of a circle inclosing Havant, part of Hayling Island and Bridge, Portsea, Fort Elson, and Fareham.

The possession of this height must then give a great preponderance, as affecting objective points of combustion, and it should be so occupied as to be capable of a substantive defence; and this effectual occupation may be effected by the minimum of labour, as the line of attack can always be exactly foreseen, and reduced to an alternative certainty.

But a peculiar geological formation of this hill enforces such a distribution of the works, that no dead ground should be permitted either on the crest or slopes. It is therefore proposed to excavate seven forts, of which the superior slope of the parapet shall be below the natural crest line at the seven dominant points; and to determine five batteries on the southern slope to search the hollows of that face with fire from their flanks, as well as to disturb any expeditionary movements of an enemy on the plain below, and to assist in defence of the slope from direct assault from the railway level. The northern slope receives its subsidiary defence from the covert way, running, as will be shown, below the crest on that face.

Now, it is essential that the inner crest works should have a double command, to north and south; and the outer crest works an additional command, as has been said, on the prolongation of the longer axis of the hill.

The fire must not be too plunging, and the batteries should be so placed as to have little to dread either from enfilade or vertical fire.

The ground lends itself singularly to these postulates, wherefore it is proposed to excavate works on an oblong trace, to consist, in one portion, of battery and magazine, in the other, of barracks.

The battery to be mounted on the outward faces, and to be entered only through the barracks.

The whole to be excavated from the solid chalk, with brick linings where occasionally required, as at the angles of galleries.

The work to consist of ditch and rampart; and within the excavation will remain the solid block to be hollowed into magazine and barracks.

Mortar platforms might be placed on the roof of the magazine and barracks.

The communications would be maintained by a sunken road, or covert way, with tramway for transport of heavy stores carried below the northern side of the crest of the hill.

Approximate length of works, 440 yards.

„ breadth of work, 220 „

The advanced batteries to be cut back into the hill, and protected from rolling shot or shell by roofs sloping from the upper ground, as in the road and galleries of the Alps. Their communications with the upper works to be maintained by winding roads, sunken, as may be seen in the existing cart tracks, on the face of the hill.

The upper edge of the natural glacis on the southern slope coincides with the limit of cultivation. It is proposed to draw a sunken road along this line, having a parapet to be maintained by the musketry fire of volunteers, and with heavy carronades projected in small caponieres from point to point, to check with their fire the advance of troops up the slope.

The excavated chalk will assist in forming firm ground for docks and quays, as shown in the plan.

The two Montalembert towers shown on the flat of Portsea are designed to complete the flanking defences of the island, and to serve against an enemy established, *en dépôt*, on Hayling Island. Farlington is stockaded, and inclosed within musketry lines.

Fareham furnishes an excellent polygon of defence; and a work capable of a substantive defence, at the junction of the Fareham and Titchfield and the Stubbington roads, would make Titchfield, with its inundations, a valuable bridge-head.

As regularity of fire from heavy ordnance is of more importance than rapidity for the defence of Portsdown Hill, the armament has been restricted to a small proportion of the heavier description, but the ramparts and parapets have been so arranged as to permit the transfer of ordnance to the side attacked.

And it is to be remembered that, as these works will be occupied only on special occasions, it would be necessary to detail no more than the actual number of officers, non-commissioned officers, and rank and file, required for the defence of the works, at the rate of two-thirds of the gun-detachments for the artillery service, and a proper proportion of infantry, without including in the establishment of the Portsdown system the mass of non-combatants required for the maintenance of works permanently garrisoned.

The general details of numbers for garrisoning the suggested works will appear in table; for it is essential that in the consideration of the defence of the district, an approximate estimate of numbers should be formed, the garrisons of the works completed or in progress being already decided on by superior authority.

But now comes the question of permanent fortifications. It is said that if a large outlay be made on defensive works, these works must be kept in serviceable condition by means of a large and expensive establishment, at a needless cost, when their service is not required; and that when occupied on a war footing, the garrisons are withdrawn from active service in

the field. With regard to the first remark, the problem is to proportion the minimum of defensive preparation to the normal numbers of troops on a peace establishment. With respect to the second, that objection was, I apprehend, very valid and reasonable in the old system of continental warfare. For if the projected works be considered as mere depôts of troops, as the fortresses of the Elbe, the Oder, and the Vistula in the campaigns of 1813 and 1814, by Napoleon during his reverses; if a garrison be allowed to remain passive spectators of manœuvres in the field, dynamic results are incommensurate with outlay. But if the due advantage be derived from their use as points of appui for a field force, which is the appropriate use of works like these on the Gomer-Elson lines, if they are so constructed as with a small garrison to make a substantive defence, while under their cover troops of manœuvre impede the march of an advancing enemy, then due tactical results will follow their adoption, and the national resources not have been diverted to a fruitless expenditure.

An important movement has recently arisen in this country, and one having especial significance in relation to defensive works. I refer to the organisation of Volunteers, who will doubtless verify the hopes of their country; and from this force may be drawn the materials for the special service of a strategy based on field movements appuied on fortified points, posts, and positions. In considering the functions of the national forces, it is not intended that the Militia, or Army of Reserve, should, except in the spirit of soldier-like emulation, become rivals of the regular Army, or that the auxiliary masses of the Volunteer Corps should be called on to perform other than appropriate duties. But, the Volunteers having shown an aptitude for the particular duties of defence, have satisfied many that, whereas it might have been formerly an injudicious policy to add to the extent of existing defence, that now the Volunteer movement justifies the construction of defensive works necessary to a complete system. And not only as regards the special employment of Volunteers for field movements of an irregular character, and the defence of posts by musketry fire, but also in serving the ordnance of field and other works by Volunteer gunners. In Great Britain there are now probably 150,000 Volunteers, of which 15,000, or 10 per cent. are Artillerymen. Time and training are needed to give that impassibility under fire which is the essential requisite of the Artillery soldier; but on the consideration of manning works, these 15,000 Artillerymen, exclusive of officers, will do their duty if they are properly trained to the specific service, and represent an aggregate of 1,500 guns. For in calculating the available strength of Militia and Volunteer Corps of Artillery, one-tenth of the entire body represents the number of gun detachments, there being no deductions for artificers or miscellaneous ordnance duties, as in the Royal Artillery, nor for sick or employed men; and, from the nature of the service, reliefs would not be required in the rigid proportions of a regular siege defence. For the service of the dockyards, it will be advisable to revive the dockyard battalions on emergency. It is doubtless true that the shipwright and anchorsmith should be shipwright and anchorsmith, and nothing else, in ordinary times. But great needs master economic axioms, and it is not improbable that the shipwright's task would be suspended per force when the guns of a breaching battery were opening on Fort Cumberland,

or gunboats sending their fiery hail athwart the harbour. Is then the proficiency required obtainable without sacrificing the hours of valuable labour? The recorded facts are these.

In 1847 the Dock Yard Volunteer Battalions were formed at the Seven Home Yards and the three Victualling Yards.

Commissions, signed by the Queen, were issued in 1849, to the several Officers, who were selected from the principal officers of the yards, the junior professional officers, and the clerical departments—the non-commissioned officers being selected from the inspectors and leading men of trades. Thus a body of useful intelligent men, who must have obtained their positions through their acknowledged ability in their several vocations, were placed over the artisans and labourers of whom the Battalions were composed.

The commissioned officers devoted their best energies to carry into effect the loyal intention which dictated the embodiment of these corps, and gave their attendance after the working hours of the yards gratuitously; they underwent the necessary drill under well selected paid sergeants of the Line and Marine Corps, and adjutants who were appointed from the Royal Marines and Marine Artillery. The zeal they evinced as well as the discretion they showed in handling bodies of men who, as skilled artisans, were likely to have objection to a position new to them, was most creditable.

The men surprised every person who witnessed their practice with field guns at targets moored afloat, as well as that made by the Boat Brigades, and with small arms, and they became qualified to prove a most useful auxiliary corps to the Professional Gunners for the defence of our Naval Ports and Arsenals. If it be urged that they might fail when under fire, the answer must be that there are no men more frequently subjected to serious cuts and blows, and that being Englishmen they would do their duty under any circumstances, and more particularly if called to defend their homes and country.

The drills took place within the Dock-yard Gates, and continued twice a week for two hours during the summer months, after the working hours of the yards. The effective strength of the whole of the Battalions, which were subsequently ordered to be drilled to the guns as Artillery Corps, may be taken as between 7,000 and 8,000 men and officers, and the amount of cost was about £9,000 per annum, which sum was taken in the Naval Estimates under Vote No. 8, "Wages," for the years 1850 to 1855, besides the cost of clothing.

In December, 1857, the several Battalions were reduced, the staff discharged, and the guns, arms, and stores returned. The officers were allowed to retain their equipments, and are anxiously expecting to be again embodied to join in the Loyal Volunteer Movement, which has been so strongly developed in all parts of the country.

This statement proceeds from an active F. O. of the Dockyard Battalions, and Lord John Russell stated in the House of Commons, Feb. 18, 1848, that the Dockyard Battalions, which numbered 9,800 gunners, had in charge 1,080 guns; being an excess over the previous calculation resulting from the smaller class of ordnance then in use.

Now these Dockyard Battalions of Portsmouth would release a force sufficient to man the works of Portsdown, or the detail given in the appendix, and a very large proportion of the new works.

In the year 1806 the garrison district furnished Artillery as follows:—

Portsmouth . . .	225	Hayling . . .	83
Portsea . . .	225	Gosport . . .	86 = 613

I now come to the consideration of Portsmouth as a base of operations against an invading force. I have had it strongly impressed on my mind for some years, that for political and social reasons, on which I will not at present dwell, whenever from political reasons it may be considered expedient to make an attack upon England, that attack will be made on a gigantic and unprecedented scale, in result of a formidable alliance, and by simultaneous movements on several points of Great Britain. If I am

not misinformed, the original plan of campaign in the Crimea was that of convergent attacks directed simultaneously on several points. It is believed that this plan was not approved of at the English headquarters, but was a scheme suggested as a French plan of campaign. Consequently it will be observed, in considering the fixed condition of the position of defence against invasion, first, that it is a felicity of our insular position that the various points of attack can as clearly be anticipated by the English Government, as predetermined by the invading powers. For, although the earliest point of attack cannot be precisely assumed, yet, knowing that it must be one of several, it becomes easy to provide against the contingency, by holding the means of defence in hand until the enemy has developed his plan of operations. In fact, the landing-places of England are *points obligés* either for attack or defence, and, in favour of the latter, a privilege vouchsafed to few nations. On the sketch map are laid down the general features of the shores of the country districts of the South Coast within which would probably lie the points of disembarkation by an invasion in force, either by expeditions in chief or by subsidiary corps.

An attack on Plymouth would probably envelope all the country below this range of hills lying between the Exe and the Tamar. And thus the provident sagacity of General Roy would be confirmed in marking out an entrenched camp to the west of the Tamar to cover Plymouth on that side, nearly 100 years since. If the enemy restricted his first onset to Portsmouth, the attack would probably be conducted by two simultaneous operations on either flank of the fortress, assuming the objective point to be to the westward of London and in the valley of the Thames. For an invader will naturally trust to overpowering or baffling the efforts of the British forces by his proficiency in strategy and manœuvres, and will therefore betake himself to the country which allows him ample room, and an opportunity of striking a blow effectively on the communications of London. That ground will be found in the valley of the Thames, probably near Reading. Then with regard to the northward, I have assumed that an expedition might be projected on the Cheshire Coast where troops might be disembarked in the estuary of the Dee; on the Lancashire coast, probably in Morecambe Bay, for the purpose of confusing and harassing our manufacturing population; on the north of the Tyne, to intercept any march of re-inforcements from Scotland; and also on south of the Humber. One of the most dangerous points of England for facilitating invasion appears to be the south of the Humber along the crest line of the Lincolnshire wold, whence it is practicable for an army to penetrate deep into the Midland Counties without much risk of being harassed on the march. Flank attacks by expeditionary corps up the Bristol Channel and on the East Anglian coast would envelop the country in one great net of threatened invasion.

Reverting then to the tactical and strategic considerations which determine the military importance of the district immediately dependent on Portsmouth, it will be seen that the country lying between the Avon, west, and the Adur, east, has special characteristics of high value. It offers, in fact, a mass of direct resistance to an enemy manœuvring on any line between Portland and Eastbourne, and the defensive front is generally as

one to three of the depth of the base line. It will now be surveyed in detail, observing its natural and artificial means of defence.

A point to the west of London being assumed as the objective point of an enemy (and it was on this supposition that the camp at Aldershot was formed), the Portsmouth district would contribute largely to the defences. For, though Portsmouth fortress might, perhaps, be masked, the district itself could not safely be neglected, and left on flank, or in rear, by a manœuvring force, since the troops occupying the district would operate on interior lines against an enemy advancing from either flank to their north-east or north-west on the capital, or on the objective point before suggested. If the advance of the enemy bore to the north-west from the neighbourhood of Brighton, in order to avoid the rough ground and gorges of the weald and the North Downs, then from the Portsmouth district a corps might be detached to hang on the flank of the advance until the troops were in junction with the Aldershot divisions. If the advance were from the New Forest to the north and north-east, the same manœuvre would be effective in reverse; if from both flanks at once, then the duty would be effectually performed by intercepting the enemy's communications between his divided columns. And in any case the country lying within the Portsmouth district might be left with a diminished force, yet so as to effect the means of rallying troops, retiring not in panic, but on strategic justification.

The Portsmouth district comprises the ground between the rivers Adur and Avon, on the east and west; the northern boundary stretches from Steyning along the downs, through Winchester to King's Sombourne and Bossington. The coast line from Red Bridge to New Shoreham defines the southern limit.

The country lying between the Adur and the Avon is distributed into five districts, marked by natural divisions, and closed on either flank, with one exception, by rivers, easily convertible into wide and deep inundations. The extreme flanks of this district are prolonged into the interior by canals; and one canal, traversing the Chichester district, forms therein a southern sub-district of defence.

To the north-east a long range of down country dominates the plain, with a rapid northern slope: to the northwest the high table lands on either hand of Winchester complete the border, within which lies a well-wooded and well-watered region.

The military organization of this district is detailed in the Appendix.

The defence of the district *A*, or New Shoreham, is not very important, though easy of arrangement.

Here, as in the other river districts, batteries of enfilade may be constructed to prevent the enemy from crossing the inundations. Guns might be obtained to any extent for this purpose; from the Arsenal, or even from the lines of Portsmouth.

The importance of the district *B*, or Chichester, is considerable, and is of a two-fold character; the light infantry defence of the down line to the north-east, and the standing defence of the line of river, and of the canal.

The Portsmouth district, *C*, is considered independently of the *enceinte* of the garrison, or of the resources furnished from the Royal Navy. It

enjoys the advantage of a triple railway service, but it is must not be forgotten that while railways assist in the concentration of troops which prepares success, the same concentration, becoming congestion, aggravates defeat, as was seen in the Italian campaign of the past year.

The Winchester district, *D*, on its north-eastern edge must be defended by the manœuvres of trained troops, and therefore steadily watched by the reserves of the central district, *C*.

The Southampton or *E* district has for its stragetic increment that effective resistance which can be offered by entrenched towns and posts covered and flanked by inundations.

Generally, the expedients for defence are endless. The inundations form barriers to an advance on Portsmouth from east or west. They are easily formed, and if barriers be constructed *en étagé*, from level to level, not easily drawn off.

The Down line of stockaded village outposts might be strengthened by scarped roads, and other contrivances.

It would probably not be difficult to mount guns on naval slides for service on the railway lines.

The estuaries might be guarded by old hulks serving as gun-platforms and embedded in the mud beyond the reach of escalade or military boarding.

In the interior, where wood abounds, there are abundant means of forming a stockaded camp of refuge to receive non-combatants and stores.

Now with regard to Portsmouth, I have laid off the district thus :— The general defence would be divided into two portions, the defence of Portsmouth as a maritime fortress, and the defence of the district to which this fortress should be as the keep of an entrenched camp, and for an army of manœuvre a base of operations. For general purposes there should be established what may be called the Southern Army of the Coast, assuming Dover, Portsmouth, and Plymouth to be the three main objective points; and a force should be formed for their defence, distributed into three Army Corps, fifteen battalions of infantry for each Army Corps, two batteries of Royal Artillery, and a moveable battery of position composed of heavy guns, with a proportion of heavy cavalry; with the Volunteer Corps of the district, which should be attached specifically to each district until the determination of the enemy was made known. These corps should be massed on the great coast line of railway, with tents, camp equipage, stores, and baggage of every sort, so that the mass might be determined on any point. The railway accommodation and the railway power which would be required for such a force is easy of calculation. Thirty locomotives and proportionate numbers of trucks, waggons, and carriages would be required to move such a Army Corps, and to keep it available on the line of manœuvre, and thirty locomotives are the number allotted for the service of thirty miles of railway. The elements of calculation being given, power and distance, the result may easily be obtained. Sufficient importance is not attached to the strategic facilities afforded by our railway communication on lines of manœuvres or perpendiculars to lines of operation. Yet much remains to be done to perfect the means of military communication. The Great Northern Railway alone can carry chargers

on cattle trucks. Troops could be moved, concentrated, withdrawn, and dispersed with great ease on the railway lines. A system of railways in rear of Wilna would probably have saved a million of human lives, the conflagration of Moscow, and all the misery resulting from the inability of Russia to concentrate her retreating armies. The force required for the defence of the Portsmouth district is not, by means of rapid co-operation, necessarily very large. The entire periphery of the district to be defended, as shewn in the Appendix, is 150 miles. Therein are projected 13 fortified posts, 72 places of minor importance on the line of the Downs, and 18 small batteries to defend the passage of the rivers and inundations. Fifteen battalions of infantry forming the staple of resistance, of which five should be regulars, and ten drawn from the local militia of the neighbouring counties, would be sufficient to check, or at all events to harass, any force which might be landed, and the service could be performed without drawing on the permanent garrison of Portsmouth.

The Royal Artillery and the Militia Artillery will be disposable, as well as regular cavalry and yeomanry. Other local defences of posts might be in great measure entrusted to the Volunteers, when once properly trained to the duties of their special service.

It has been very justly remarked that the numbers required for the occupation and defence of works and districts are seldom detailed. Nor, indeed, is it possible to do so with perfect accuracy, although a reasonable approximation may be attainable; but the first necessity is to determine the nature of the defence to be made. In the Appendix will be found a topographical table of the Portsmouth district, (*A* and *B*); the number of volunteers in 1806, (*C*); the population of the same district 1851, (*D*); and the armament of the proposed works on Portsdown (*E*).

In considering the space to be traversed by the divisions of the Army of the Coast, it may not be inopportune to gauge the value of the system by the opinion of the most experienced tactician, General Dufour. Speaking of the establishment of fortresses of the 1st and 2nd class, he says, "Intervals of from 50 to 75 miles, in conformity to circumstances of ground, should be left between fortresses. Such is the distance which appears to consist with the great masses of modern armies, and with the present system of warfare. In rear of the first line of fortresses capable of sheltering a beaten army, should be traced a second at 75 or 100 miles. Then one last fortress in the heart of the country, the dépôt of the archives and arsenals, would offer a final asylum and anchor of security to its defenders. Excellent roads made in rear of the lines of defence would connect all these fortresses; they would give the troops power of movement with extreme ease from one to the other, without fear of a false manœuvre in face of an enemy, who, not enjoying the same advantages, is obliged to move on eccentric lines, to surmount a thousand obstacles in order to seize an easy communication to conduct him to his point of attack."—(Dufour, *Fortifications Permanent*, p. xiii.)

Now since space and time are for manœuvring synonymous, it will be seen that the railway system gives a great advantage in time, while the space required for free movement and choice of position remains unchanged.

TIME DISTANCE BY RAIL.

	Hours.	Min.
From Portsmouth to Plymouth . . .	13	25
„ Portsmouth to Dover . . .	5	7
„ Plymouth to Dover . . .	18	32

But as railways prepare for victory by rapid accumulation of troops, so defeat is aggravated by the constraint to retire on a single line, or by casual routes previously unexplored.

In the preceding suggestions it is not intended to sketch out a plan of campaign, but to point out the primary formation in which an attack might be awaited; and, considering that the advance of an invading force must be made from one of three bases, previously calculable, it would seem to be no very difficult matter to prepare alternative systems of defence, in any eventuality.

In providing the battalion mass of fifteen regiments, a suggestion may here be made—assuming that the three principal objective points of attack on the south coast, *not of disembarkation*, to be Dover, Portsmouth, and Plymouth, it would appear advisable to detail fifteen regiments (battalions) of the line, for coast service alone—to be echeloned on the coast railway, and to be designed to form a flying division for the special service of assisting in the defence by manœuvre of these named districts, with their proportion of guns and cavalry. Allowing five regiments of the Line and ten of Militia to each district, the distribution for Portsmouth would be as follows:—

	Combatants.
Five battalions of the Line at 800 effectives . . .	4,000
Ten battalions of Militia Infantry at 800 ditto . . .	8,000
	<hr/> 12,000 <hr/>

MILITIA BATTALIONS.

1 Hampshire, in district C.	
1 Sussex „ B.	
1 Dorsetshire „ E.	
1 Berkshire „ D.	
1 Wiltshire „ E.	
2 Surrey „ D.D.	
3 Middlesex „ A.B.D.	

	Battalions.	R.	M.
Or, District A. . .	1	1	
„ B. . .	1	2	
„ C. . .	0	1	
„ D. . .	2	4	
„ E. . .	1	2	
	<hr/> 5	<hr/> 10 <hr/>	

Excluding then the garrison of Portsmouth, the final estimate might be taken to reach—

Fifteen battalions of Infantry	12,000	
Volunteers, Infantry	5,000	
	<hr/>	. 17,000
Royal Artillery (two field batteries) .	484	
" " (one of position)	242	
Militia Artillery	800	
Volunteer Artillery	500	
	<hr/>	. 2,026
Cavalry 500
		<hr/>
Portsmouth District of all arms, ex- cluding Royal Engineers 19,526
Dover and Plymouth Districts 39,052
		<hr/>
Army Corps of the Coast 58,578

Let me in conclusion read to you the appropriate language of our forefathers of three hundred years ago. For I could not willingly let perish from the memories of Englishmen a speech made by Lord North at the Great Council:—"If the enemy is firmly planted, let him be blocked up with sconces, or fronted with a great army, giving him little rest." There spake the spirit of an Englishman under circumstances of heaviest discouragement. It mattered little to that gallant man that he saw arrayed against him men whose warfare had been tried by the stubborn Dutchmen, and by terrible struggles in the Crusading warfare of Southern Spain. It was sufficient for him that the enemy was there; he would have "blocked him up with sconces, or fronted him with a great army; giving him but little rest." (Appendix F.)

There is another point with which I shall conclude what I have had the honour of submitting to the meeting. Great attention was paid in those days to the arming of Sussex, and there was one officer, Sir James Colbrond, then deputy lieutenant of the county, who seems to have paid special attention to this. He says, on the last day of January, 1599, "The duty I owe to my Sovereign, and love to my country, hath caused me to write, as moveth thereto, the rather by reason of my observation of the country's unreadiness to march forward in August last, when as for defence of Her Highness' person royal they were hastily called for." He proposes "that the forces of the country should stand in continual readiness by previous organization, so that their duty of mustering should be with ease well or better performed in one day, if need be, more than in seven or eight days as it was aforesaid upon the last great call for soldiers for Her Majesty's service of special importance." And he adds this: "All our hopes rest now upon our musquets and calivers, and good weapons they be if kept in readiness." (Applause.) And he concludes thus: "Now to conclude,

I am thence of opinion that the service will best get forward, and the charge and expense of time be least regarded among all them that serve and find arms, when the trained have justices of the peace and gentlemen of the better sort to be their leaders." Mark that; not one officer who bears the British commission, I am assured, thinks that either courage or good conduct, or the devotion that leads men to death, are the special inheritance of any class. We have had a striking instance and noble recognition of the fact that bravery and energy, truth and good conduct, are native in all ranks in the institution of the Victoria Cross. But it is in the constitution of ordered society that they, to whom Providence has assigned in this world less of its goods and more of its troubles than to their more fortunate brethren, should look of right to those on whom the heavy responsibilities of wealth have been laid, for that self-devotion, and above all things for that sober, loyal, honest guidance which the English people through all their ranks always recognise and appreciate with a proud obedience, unsupported by which they will not be content to serve.

POSTSCRIPT.—The Report of the Royal Commission on National Defence having been published since the foregoing Lecture was delivered, the writer may be permitted to remark on the confirmation which the Report has given to his general suggestion that the defences of Portsmouth must be much extended. The proposed work on Horsea Island, named in the Appendix, would add largely to the strength of that flank of the defence. It may be doubtful whether the guns from the batteries on the Hilsa line can thoroughly search the dead ground on the southern slope of Portsdown, which contains hollows most favourable for lodgement and ascending sap, and the writer would therefore resort to the construction of batteries dependent on the upper works, as stated in the preceding pages. And, while so much thought has been taken to strengthen existing works by new constructions, the weak point lying between the Portsmouth and Portsea lines has not been overlooked.

There would appear to be much arrangement requisite that the tier-towers projected on the shallows of the Spithead anchorage may not mutually blind their fire against vessels of small draught and heavy armament.

The long-range projectile will be probably employed in these batteries, and it might be a matter of renewed inquiry whether gun-cotton might not be advantageously employed in the armament of works of this class, where clear sight of the mark is essential to the development of the powers of the rifled ordnance, especially since fire *en ricochet* cannot be depended upon as in smooth-bore cannon.

The writer cannot refrain from congratulating the country on the production of a Report of a character alike bold, comprehensive, and scientific.

APPENDIX.

A—TABLE OF DISTRICTS.

	A.	B.	C.	D.	E.	
RIVER - - -	Adur.	Arun.	Titchfield.	Itchen.	Avon.	TOTAL.
CHIEF TOWN - -	N. Shoreham.	Chichester.	Portsmouth.	Winchester.	Southampton.	
River line, length -	4.4	8.4	14.4	12	12	51.4
Principal Stations -	2 N. Shoreham, Bramber.	3 L. Hampton, Bury, Arundel.	2 Titchfield, Wickham.	3 Twyford, Bishopstoke, Bp. Waltham.	3 Bossington, Romsey, Tolken.	13
Outposts - - -	5	7	3	2	12	29
Line of Downs, length -	10.4	12.4	12	—	—	35
Principal Stations -	3 Steyning, Stonington, Amberley.	3 Bignor, Cocking, W. Lavington.	5 S. Harting, Buriton, S. Meon, W. Meon, Warnford.	—	—	11
Outposts - - -	3	8	4	—	—	15
Coast line, length -	10.2½	10	—	8.4	3	31.6½
Principal Stations -	1 Worthing.	1 Slindon,	GARRISON.	1 Hamble.	1 Redbridge.	4
Outposts - - -	5	5	—	1	—	11
Inland line, length -	—	—	11	12	8	31
Principal Stations -	—	—	2 Hambledon, Horndean.	5 Hinton, Ampna, Cheriton, Titchbourne, Kington.	1 King's Sombourn.	8
Outposts - - -	—	—	4	6	1	11
Batteries on Rivers -	2	5	—	5	6	18
Regiments of Infantry -	2	3	1	6	3	15
Sub-district P. Posts -	—	1	—	—	—	1
Interior Posts - -	—	6	—	—	—	6

BOUNDARIES OF DISTRICTS.

A district extends from N. Shoreham to Bramber; by downs to Amberley, thence to L. Hampton, and by coast to mouth of Adur.

B district extends from mouth of Arun to Arundel, thence to Bury by downs to Twyford, and by Beacon Hill to Ensworth, and by the coast to Arun river.

C district extends from Ensworth to Beacon Hill by Row Hill, thence to W. Meon and mouth of Titchfield river, and by the coast to Ensworth.

D district extends from mouth of Titchfield river to Warnford, thence to Winchester, and by Itchen river to coast and to mouth of Titchfield river.

E district extends from mouth of Itchen to Winchester, thence by King's Sombourn to Bossington, down the course of the Avon to Redbridge, and by the coast to Southampton.

B—SUMMARY.

Entire length	-	-	-	-	-	149.2½
Principal Stations	-	-	-	-	-	37
Outposts	-	-	-	-	-	72
Batteries, Rivers	-	-	-	-	-	18
Regiments of Infantry	-	-	-	-	-	15

MEM.—The defence of the Rivers, on both banks, is assigned to the District lying inwards; Portsmouth therefore has two inner lines.

C—In 1806 the Portsmouth District furnished Volunteers as in List annexed :—

HANTS . . Cavalry, 465	Artillery, 923	Infantry, 4,040
SUSSEX . . " 172	"	" 1,637
	<u>637</u>	<u>5,677</u>

D—POPULATION OF PORTSMOUTH DISTRICTS—CENSUS 1851—MALES.

Havant	3,432
Portsea	35,920
Alverstoke	8,564
Fareham	6,874
Southampton	15,875
South Stoneham	7,605
Romsey	5,377
Winchester	13,146
Petersfield (half)	1,956
Droxford	5,493
Steyning	8,296
Worthing	8,862
Chichester	7,083
	<u>128,484</u>
Deduct Army and Navy	15,000
	<u>113,484</u>
One-fifth of the Population =	22,697

E—ARMAMENT OF PORTSDOWN WORKS.

WORKS.	ORDNANCE.			TOTAL No. OF GUNS.
	68-Pr.	8-in.	32-Pr.	
EACH.				
FORTS—A. M.	4	4	12	40
" B. F. H. K.	2	2	10	56
" E.	4	4	10	18
BATTERIES—C. D.	—	2	5	14
" 9	2	2	6	10
" 1, 4	—	2	5	14
	<u>22</u>	<u>30</u>	<u>100 =</u>	<u>152</u>

	Men.				
1. For the defence of Her Majesty's Person, drawn from the Mid-England Counties .	28,900				
	Infantry.	Lances.	Light Horse.	Pioneers.	
2. Field force drawn from the Southern Counties	27,000	407	1,901	4,892	
3. To attend on the Lord Steward	22,000	203	669		
	Reserves.	Depot.			
1. For the defence of Her Majesty's Person	17,600	11,009			
2. To attend on the Lord Steward	6,000	11,536			
	Of all Arms.				
3. South Wales	24,664				
4. North Wales	21,344				