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Friday, July 13th, 1860.

Gen. SIR JOHN F. BURGOYNE, Bart., R.E., G.C.B., in the Chair.

THE DEFENCE OF LONDON,

By Colonel SHAFTO ADAIR, F.R.S., A.D.C. to the Queen.

THE occasion on which I am permitted to address this meeting is so peculiar that, before proceeding to the technical questions which will arise, I think it will not be inopportune to remark on the reasons that have called us together. The Report of the Royal Commission on the National Defences is already familiar to every one present, as it will be to the entire population of the empire; and to all who, in every land, take an abiding interest in the maintenance of the British dignity, security, and renown. But when the Report of the Commissioners was published, there was an omission on one point of highest interest, but not the less capable of a most satisfactory and clear explanation; namely, the absence of any allusion to the defence of London. And, in truth, if the question of the defence of London had been connected simply with a military arrangement proposed by the Commission, I should not, on this occasion, have intruded my opinions, or have impugned the deductions of soldiers, than whom none are more competent to propose measures the most desirable for the military security of this country. But, inasmuch as the defence of London trenches on a larger question than that raised in the discussion of warlike preparation, and is too extensive a subject to be covered by the instructions of that Commission, I have thought, and the Council of this Institution have been pleased to sanction the idea that I entertained, that it would not be altogether inappropriate for one, albeit not a professional soldier, to enter on a subject which, although mainly embracing military considerations, yet in large proportion was to be weighed and judged in dependence upon the exertions, the sacrifices, and the labours of the population at large. Therefore it is that, having examined with much care and with exceeding admiration the opinions of the distinguished soldiers who have elaborated the plans set forth in the Report of the Commission of Defence, I desire to be excused of rashness in taking up the question where they have left it, in accordance with the terms and spirit of their instructions, and in bringing forward for public discussion such ideas as have occurred to me with reference to the defences of the metropolis. And since I shall not have time on this occasion to detail at length the reasons which lead me to particular conclusions with respect to any threatened attack upon London, I must request you to admit certain assumptions which I have advocated, and I hope justified here, and at other times, but which I have not now the opportunity to set forth at length. Let it then be assumed that the command of the seas has, for a season, passed from us; let it be assumed that an enemy has landed in

force, prepared to take the alternative routes by which the metropolis may be reached. For, indeed, it seems to be generally believed that a march on the metropolis would be the special object of an invading force. But I may detain you for one moment by referring to the plan before me, in which I have traced in shaded divisions, in supplement of that oral explanation which I am compelled to postpone, the strategic justification of my belief that specific and well-ascertained routes must be adopted by an enemy marching on the capital. I find on the south coast of England three objective points of attack—Dover, Portsmouth, and Plymouth. I have given my reasons in my lecture on the defence of Portsmouth, for asserting that it is perfectly possible to surround these objective points of attack with districts of defence, such as may compel an invader to choose the routes interposed between the borders of these well-defined districts; and I have also pointed out the districts in other parts of England which would be liable to incursions of diversion, as they may be called, in order to draw off and distract the movements of the corps assigned for their defence from acting in repulse of the main attack which would be precipitated on the metropolis. Assuming, therefore, that London is the point at which the attack is directed—that the Portsmouth, the Plymouth, and the Dover districts furnish each its contingent of defence, which render it difficult, if not dangerous, for an invading force to engage in direct battle operations within their limits, there are evident points of disembarkation eastward and westward of the central fortress, which are precisely such as would be selected by an enemy who was determined on fighting battles of manœuvre. Landing to the eastward and westward of Portsmouth, they would soon find themselves in a district adapted to the tactics of practical warfare to a degree scarcely to be found in any other part of England. Manœuvring to the northward, the valley of the Thames is within a few marches. It is especially suited to the purposes of an invading force, first, because the rich district would support the invader's troops, and the Thames would give an easy mode of bringing up those indispensable stores which encumber and delay the advance of an army so much. And there is another reason which I will add, that, inasmuch as an enemy advancing on the capital from the south-east would be observed by the forces garrisoned at Dover, would be watched on the flank by the reserves within the lines at Chatham, and would also have to hew a desperate way through the eight difficult passes of the North Downs, the longer route would be adopted as the best suited on the whole to an aggressive strategy based on rapidity of advance, exaggeration of strength, and superiority of tactics.

In the progress, then, of this hypothetical invasion, it may be assumed that a great battle has been fought with or without decisive success, as the case may be, on the one part or on the other, but that the invader after this battle is still in sufficient force and sufficient heart to present himself before London. Presenting himself before London, I see no reason for doubting the issue; whatever the result of the previous conflict may have been; and it is my duty this day to give my reasons for that opinion.

Several plans have been suggested for the defence of London, but there is one fatal deficiency common to them all—the want of confidence in the inhabitants of the capital to achieve their own safety. Strategic points

are selected without much certain reference to their individual value, as if the question was of studding a Flemish frontier with fortresses, where the soldier should be everything, and the citizen nothing. In this system I cannot but see the rejection of a mighty element of strength and safety; for in invasion, the place for the trained soldier is in the army of manœuvre, and of the citizen in the army of reserve. One plan has the authority of great names, of soldiers of large experience and military knowledge, well and honourably known to the ranks of the British Army, which consists in placing strong remote forts at intervals around the metropolis. This system has found much favour; but I confess my inability to assent to the proposition upon which it is based. I think there is, first of all, this great danger, that, when defence is based on remote points, if the interval between those points, which it would be exceedingly difficult to guard in proportion to the importance of the points themselves, is once penetrated, all would be considered to be lost. Now, I repeat again, that, whatever the result of any battle, London, if properly organised, has no reason to be discouraged; for, in my deliberate judgment, looking over the neighbouring and adjacent country carefully, considering the temper of her people and her power of organisation, I dare affirm that London is naturally the strongest capital in Europe. My ground for this opinion shall be briefly detailed. If the topographical circumstances of London be reviewed, it will be remembered that the capital is formed on a parallel-gram, the northern side whereof is drawn along the ridges of the Highgate and Hampstead Hills, sinking into the great western plain at Harrow; and that the southern line passes over Shooter's Hill (speaking simply of the London district) to the bend of the Thames, which is guarded by Kingston, Richmond, and Brentford. The east approaches are covered on the north side of the Thames by the marshes of the Lea, on the south by the marshes lying to the eastward of Woolwich, considered apart from the mass of Shooter's Hill. To the west, in the valley of the Thames, lies the most difficult portion of the London district to guard, and the one against which, on my hypothesis, the whole strength of an invading force would be hurled. That point, therefore, is one, and that line is one, that it especially behoves us to regard and to defend. And, when I said that London was the strongest capital in Europe in its natural advantages, I referred especially to the impunity which may be secured to London from that agent which produces so terrible an effect on the population of beleaguered cities; I speak of the harassing and dispiriting effects of the continual stroke of vertical fire; I speak of the misery that arises to populations driven from a quarter exposed to the enemy's fire into another already overcrowded; I speak of the growing accumulation of wounded and of sick, who are crowded in the time of such calamities in vast numbers in hospitals; and I conclude that, from the conformation of London, it is above all other capitals most easily defended from such a scourge. For, to neutralize the unbearable evils of a fire so terrible, the one and the secure means is to render bombardment impracticable, by keeping at a safe distance the batteries that vomit forth their host of plagues.

I may say once for all, that my principal design in encircling London with forts which are not of a capacity too great, or of too intricate detail for the occupation of troops of reserve, at as close a distance as safety from

vertical fire will allow—the reasons for my preference of this distribution of force to the employment of large forts at a distance—are these: I do not wish London to remain in a silent anxiety endeavouring to ascertain how the battle goes from the rise or fall of the distant cannonade; I do not desire that London should hang in suspense on the chances of a remote struggle. The defence of London should be bound up intimately with the spirit and the heart of her people; I desire that each cannon shot and each volley should raise her spirit to a higher pitch, and brace the nerve of her defenders to efforts each greater than its preceding one, until the supreme and conquering charge crown the conflict. Let her know the extent of the defence of which she is capable, that she may not know, if that defence be not prolonged, the extent of the evil to be endured.

With regard to the trace, that is a matter, of course, open to future suggestion; but, generally, and, considering the quality both for attack and defence of the troops we should have to deal with, and the nature of the assault *de vive force*, and of the resistance by musketry or carronade, I should say that, where the works are of the more important character, they should be as much as possible on a polygonal trace, with a redoubt *en caponnière*. Where the works are of a less decisive trace, there I should propose to take modifications of the old bastion system.

The armaments should be of mixed calibres; one-third of 8-inch guns, one-third of 32-pounders, and one-third of 32-pounder carronades, in order to obtain by the union of the 8-inch and the 32-pounders an identity of charge, and by the union of the two qualities of 32's an identity of projectile, and consequently greater simplicity. I am also enabled thereby to diminish the strength of the gun detachments. If the whole of the guns were of the same calibre, the detachments would require to be so strong that they must draw enormously and disproportionately on our resources; neither would they be suitable for all the cases that might arise, because, inasmuch as these forts are rather works of occasion, so to speak, than works designed to maintain a long siege, an attack would probably be of a nature that would occasionally require a proportion of ordnance handier and more quickly managed than the 8-inch on a traversing platform, or than even a 32-pounder on a garrison-carriage; and therefore the carronade is introduced to resist these attacks.

Commencing from the eastward, I propose, after the example of Alfred, to inundate the valley of the Lea from Tottenham to the Thames. Beyond this inundation I project a star fort on the high ground at Barking, nearly resting on the inundation, which would cross its fires with a fort protecting the access from the Eastern Counties Railway, and, at the same time, keep down any attempt to molest Woolwich from the low-lying ground between Barking and the river. Fort Barking should be armed with thirty guns. The garrison details will be given in the Appendix (A).

Now, since London is shielded on the south side by the hills of Kent and Surrey, and on the north side by the hills of Middlesex, it will be seen that, if we can detain an advancing enemy on the southern and northern slopes respectively, a very large power of mischief is withdrawn. I have, therefore, on the plan, drawn the line of works with which I propose to protect the northern, eastern, and southern side, and also a line of works

and batteries with which I would close the entrance to London from the westward, by the approaches in the Valley of the Thames.

Passing from this fort of which I have spoken, I proceed to a similar one, Fort Stratford, of 30 guns, resting on the Eastern Counties Railway. I shall hereafter point out the advantages that I propose to derive from the inner line of railway which traverses London from East Woolwich to North Woolwich; and I would here remark, that many of these works have been placed, especially on the south side, so that their rear will be covered and their flanks commanded by the artillery fire that may be projected by aid of this circular railway. Passing to the north-west, we come to Low Leyton, where the Leyton Redoubt of 30 guns rests on the River Lea, and on the inundation. The ditches are supplied from the waters of that river, and it crosses its fire with Fort Stratford and with Fort Stamford of 20 guns on Clapton Common. Fort Stamford is placed on the low ground whence the Stamford plateau rises from the marshes, in order that the defence of the Eastern Lines may thus be completed, and also a powerful fire lent in aid of Fort Hornsey, of 20 guns, which I have placed in such a position as to cover the reservoirs through which London draws from the springs of the New River a large proportion of its water supply.

I now come to the difficult point of the occupation of the ground about Highgate. Passing along the plain to the north-westward, it will be observed that on the left the spurs of the Highgate range project themselves into the country north-east, terminated by a hill overhanging the railway, and called Mount Pleasant, in the south-east direction, and by Muswell Hill on the east. With all an artilleryman's distrust of a very high elevation and excessive command, I doubted whether it were safe to draw defensive constructions close to the crest of the hill; but, bearing always in mind how necessary it is to protect London from the scourge of vertical fire, the better course appeared to advance, along the axes of these hills, two semi-elliptical works, Forts Muswell and Mount Pleasant, of 25 and 20 guns respectively, of a trace determined by the ground, to cross their fire, be connected by earthworks, and thus detain the enemy at a safe distance. Passing from Highgate, the ground forms a natural *glacis* to the northward, sloping upwards to Hampstead Heath. Hampstead Heath is a very favourable position for defence, and must be carefully secured by double lines of earthworks.

In considering the treatment of Hampstead, I am indebted to the skill of Lieut.-Colonel Alcock, R.E. Middlesex Militia, for suggestions on fortifying that hill. He observes very truly, that on the upper summit is a space for a work of 15 guns, giving extensive command over the valleys radiating from that point, and that the fire of that position may be combined with that on a lower hill called Child's Hill Redoubt, and armed with 30 guns, marked as a semi-circular work on the plan. Those combined works are of importance from their position, and capable of prolonged defence, and are designated the Hampstead and Child's Hill Redoubts. A country is now entered upon especially suited for two purposes: for manœuvre by skirmishing in force, and with heavy reserves; and secondly, for fighting a battle with field artillery. It strikingly resembles the famous field of Bautzen, which was the scene of a protracted artillery battle, and contested with such skill on the part of the Allies that they were enabled to

withdraw every gun at the conclusion, to the astonishment of the Emperor Napoleon. As the slope of Hampstead is descended towards the Edgware Road, in front lie the Brent Reservoirs. In conformity with the obligation which I have imposed upon myself of protecting reservoirs wherever possible, I propose to construct at the north-east angle above the Brent Reservoirs the Brent Redoubt, an irregular work of 30 guns, which should protect that basin.

The most difficult district, so far as regards a battle of manœuvre, is now approached. Between the flat-topped hill rising immediately above the Brent Reservoirs and the Harrow Road an eminence will be observed, culminating in Wembley Park. On that point I would construct Fort Wembley of 30 guns, a work which shall give a reverse fire, if the enemy should penetrate athwart or pass round either point of the Brent Reservoirs, and also sweep the country to the north-east, and in front of the separate chain of field works intended to cover Harrow. It should also be kept in communication with the next and most remarkable point in the western neighbourhood of London, where the undulating range terminates in a bluff crowned by Horsington Wood. It is a very strong position, about two miles from Harrow, and closes the whole of the level ground on the north side of the river Brent, and, in fact, observes the country to the bridge-head at Brentford. The southern face is of a steep and almost scarped character. It has capacity on the summit for the construction of a large fort, and I think should be used as a *dépôt*, and considered the right point of *appui*, facing outwards to the lines of the western defence. The country at the foot is marshy, and is susceptible of inundation, being traversed by the waters of the Brent, and is partially covered by the Grand Junction and Paddington Canals. Now, it may always be observed that in defensive warfare very great use can be made of inundations, and that they are invariably turned to the profit of those who know the country, and who can direct them at pleasure. I should, therefore, taking Horsington Hill as a *dépôt*, and as a main point, the key in fact to the position, arm that position more heavily than any other, and 80 guns should be assigned to Fort Horsington. Fort Greenford, placed within the loop of the Brent, would require 60 guns. Fort Ealing, projected on the flat in front of that town, should mount 60 guns, while the line of fire would be continued by four pairs of batteries armed respectively with 10 guns to the bridge-head at Brentford. Passing through the flat country, where the works, nearly as far as Ealing, are defended by water, and thence by the ordinary appliances of engineering skill, the lines reach Brentford. Brentford is protected by a bridge-head mounting 20 guns, as is Richmond Bridge by 20 guns. Kingston, lying on an exposed salient, is covered by a bridge-head with a strong bastion trace, and mounts 40 guns. For if the assumption be correct that the weight of invading war would be brought on the west of London, it is important to guard this point with as heavy a mass of fire as possible. In the rear, on the slope of the hill above Ham Common, Fort Richmond, a strong work of 20 guns, planted at the apex of the angle formed by the western and southern sides of Richmond Park, would connect the western and southern lines of defence.

DEFENCE OF HARROW.

And at this portion of the London lines I turn to the special defence of Harrow. The position is too valuable in the military point of view, and the ground too highly placed, in the national estimation, to be left in peril of foreign occupation, by being excluded from the metropolitan system of defence, however difficult the defence may be. The long slope of Harrow, projected nearly at right angles from the north-western angle of the London lines, rises in a continuous ascent for a mile and a quarter to the highest point crowned by the parish church. The flanks of the hill gradually increase in steepness, until the rapid slope of the north-western face projects boldly, overlooking the plain of the Thames to the distant hills of Surrey and of Berkshire, and overtopping the nearer heights of Stanmore to the north-east.

The most appropriate system for the defence of Harrow, on the special ground of the military value and of the national character of the spot, will be by batteries, and not by works of construction on a regular trace. For works casemated or otherwise of a permanent character could not be constructed without obliterating the special distinction of the hill, as consecrated to national education. But this strong post of vantage may not be the less efficiently secured.

The formula of defence is this : heavy earthen batteries, loopholed and stockaded posts, and an extensive system of rifle trenches. The earthen batteries should have no great command, but have an uniform mutual relation of defence. The position of the batteries should be determined by a contouring line, to be drawn at such an elevation on the slope as would give an angle of depression of 4° on a point distant 700 yards from the foot of the rising ground on which the battery is to be placed. The general line of the zone of artillery fire would commence on the Greenford Road, one mile from Harrow, and passing below the south-western shoulder of the hill, would sweep to the north of Roxeth, and thence to the junction of the Kenton Road, round the northern face of the hill. The line would follow the hollows of the hill until it reached the cross road connecting the two approaches from London, and passing to the westward complete the circuit. The right and left rear would be connected by field-works with Fort Wembley and Fort Horsington.

For this line of defence nine pairs of heavy batteries, of the construction of those on the Ilisea lines at Portsmouth, would suffice; they should be armed with twenty guns, each pair, and be determined in position by the re-entering angles or loops of the contouring line—for the southern and western faces six batteries; for the eastern face six batteries, and the northern front should be formidable with six batteries, of which two should be advanced on either flank, to give a decisive check by flanking fire to attacks on the lateral fronts.

The rear of these batteries should be closed by strong musketry redoubts, which should in turn be open to the rear to fire from loopholed houses and stockaded posts. And from battery to battery, and along every advantageous slope of ground, should be traced rifle trenches formed by

excavation, with the earth thrown to the front, as *glacis*, and not as *parapet*.*

Every position would thus be threatened in turn if it were necessary to withdraw the defenders from the lower levels. Finally, the Volunteer Corps of Harrow should have this defence specially assigned as its duty.

I now proceed to treat of the southern lines of defence, whereon I place the works, not symmetrically indeed, nor at equal intervals, but, as I have throughout, according to the circumstances of the ground, determining the projection of their face as they may be required to sweep any particular point of approach with their fire. Now, those who recently attended the practice of the Volunteer Rifles on Wimbledon Common will remember how rapidly the ground falls in front of that position. Since it is necessary to occupy that plateau, it appears desirable that a work to be called Fort Wimbledon should be constructed in the immediate neighbourhood of the present rifle ground, which would answer all the conditions proposed, namely, sweeping and searching the ground in front and flank with 40 guns, and keeping an enemy at a sufficient distance from the inner district, liable to insult from vertical fire. From Wimbledon, following the southern slope of the hill, the very remarkable ridge which divides the waters of the Wandle from the Sydenham Plateau is reached. On the level ground immediately above Tooting Common, on the ascent from the village below, I should propose to place Tooting Redoubt, another substantive work of 30 guns, to be kept in connexion with Fort Wimbledon by earthworks distributed through the plain, across the course of the Wandle. The ground at many of those points is remarkably strong. And there, again, a water defence may be adopted very successfully.

From Tooting, following the indications given by the slopes of the ground, we arrive at the Beulah Redoubt, an irregular work of 30 guns, which will be seen to the north-west of Beulah Spa. This work is adapted to the character of the eminence which it crowns, and is designed to maintain a communication with an advanced work, the Anerley Redoubt, of 20 guns, in front of the Crystal Palace, of an irregular shape, resting partly on the Railway, and partly on the Anerley Ponds.

We have now lying in front of us the great plain of Kent. From these heights the general line of ground is most clearly and distinctly to be traced, and the approaches of an enemy calculated. I should therefore across the valley on the other side of the Ravensbourne river, on a gentle slope which rises at a distance of one mile and a half in an air line from the Crystal Palace, place Fort Ravensbourne, a substantive work of 50 guns; and the line of defence would be closed by Fort Woolwich, a work of 80 guns, with its rear resting on the Dover Road, in the loop of the road near Woolwich Common. With regard to fortifying Shooter's Hill, that point I have not taken into consideration. The occupation of Shooter's Hill is a matter of high engineering moment and skill, and would require a very considerable outlay. It must, in fact, be a fortress of itself, and therefore does not enter within the scope of these suggestions.

* An illustration of the rifle trenches may be found in the trace of the ascending sap at the siege of Burgos.

I would request the meeting to bear this in mind, that the works I have pointed out are not the only works I desire to construct. These are the permanent works which it is essential to construct, and the fire of which it is necessary to determine. But the intervals must be consolidated by such field works as can be thrown up with comparatively little labour, and would by their cover enable the troops detailed to maintain the musketry fire which is necessary for a complete defence. Therefore I differ from the advocates of the *enceinte continue* at Paris and elsewhere. I propose to leave only the forts *en permanence*, but in time of necessity to connect them by means of field works.

It is a very just objection, that the requisite guns and troops are seldom mentioned in detail of plans; and, at the risk of having the calculations disproved, and in the design of submitting them to critical analysis, I commence by the calculation that 870 guns will be a sufficient armament for these works, exclusive of the defence of Harrow, which must be special, as has been already shown. From the combination of qualities of ordnance which I propose, the strength of the artillery detachments may very materially be kept down, as may be reasonably borne in mind in calculating the strength of artillery required for the service of the London lines; and, inasmuch as the general defence of the lines of London would not be a matter of siege, and of protracted firing and attack, the service can be carried on with fewer reliefs than in a garrison which had to resist on a front of attack assaulted according to the rules of art. Therefore, it appears to me, that seven men per gun would furnish a standing garrison sufficient to justify us in undertaking the defence of the works most likely to be attacked *de vive force*. Perhaps the higher proportion should be preserved for such works as from their importance might be more formally attacked. The infantry defence may be calculated on a low scale at 10 men per gun, being intended simply to occupy the works while operations are going on, and their number must be inconsiderable, and should be inconsiderable on this principle—that we are occupying works which are to be only temporary obstacles, and which should be so constructed as to allow every disposable man to be placed in line of battle, and available under the hand of the supreme military authority.

Now, having surrounded London with works, the question arises, what are the resources for defence? The assumption which I have always insisted upon is, that the primary defence of England should be a defence by local forces specially trained for the protection of a particular district, wheresoever the attack may fall, in order that our limited manœuvring force may be available in every direction in which it is required. Thinking thus, I hold with regard to the metropolis, that the metropolis should be prepared to stand or fall by its own substantive defence, and not in consequence of any operations elsewhere. We know what a gallant, and ready, and available spirit has arisen throughout the country in development of the volunteer movement. We see in these levies the earnest of a true soldier-like, manly, British determination to do their duty. They show in their organisation and by their bearing, the consciousness that they have undertaken a duty which the country required should be performed, but which could not be discharged by existing means. We know what sacrifices many in their

ranks have made, and those especially to whom the time given to their occupations is valuable, and whose leisure hours have also been placed, without fee or reward, at the service of the State. It has been a matter of some little difficulty to arrange the proportions of these volunteer forces that we may expect to draw from the general population. I have found the greatest assistance from the accurate statistical tables prepared by Lieutenant-Colonel Kennedy, in his valuable memoir on "National Defensive Measures, their Necessity, Description, Organisation, and Cost." To him I am indebted for suggestions showing how the volunteer forces may best be disposed in proportion to the military demands on the population. I have, therefore, adopting his principle, placed the masses of volunteers in such positions as they might advantageously occupy in the event of a call for their services. I have not attempted to distribute the general body by regiments, which would complicate the plan, but, observing the calculated density of the population, I have assigned to them alarm-posts in their respective localities, which would be points whereon the regiments, brigades, or divisions would form upon the first alarm. The corps would then be available in the direction for any special purpose, and would thus be prepared for any movement. The tabular arrangement is shown in the Appendix B.

It is evident, as has been shown, that this question is removed beyond the province of purely military speculation. It should be maturely considered, whether the volunteer regiments, armed, drilled, and disciplined, may not have an enlarged scope given to their organisation and some additional duties assigned to them, in the interest of their special service, which are not ordinarily devolved on regular troops, or on troops in the field. For instance, as I have shown, one great evil to be dreaded is the vertical fire that the enemy would endeavour to pour on the metropolis, with which he would hope to alarm the population, and, hence through their fears, to extort a capitulation of London. Now, in the firm confidence that I have in the power of organisation enjoyed by the English people, and in their present readiness to adopt any sound suggestion, and their firmness in carrying it out, I maintain that even this evil, so awful to contemplate, may be modified, minimised, nay, reckoned as an ordinary incident of battle.

It is always satisfactory to draw some instruction from the occurrences of former times under similar circumstances, and with a population of identical character. For it would almost seem as if the precedents of the reign of the great Queen, in anticipation of the Spanish invasion, were, with other glorious incidents, to be repeated in these later days. Now, it is very remarkable that in the accounts of the armament of Elizabeth to resist the invasion, a proportion of artificers is always combined with every armed body. There are pioneers and artificers of all trades, wheelwrights, carpenters, blacksmiths, all specified in particular and accurate proportions, detailed to accompany every body of armed men. Let, then, every volunteer force embodied under a regimental colonel or field officer have a volunteer engineer corps attached. Thus an opportunity would arise of drawing on the valuable class of men to be found among the steady resolute artizans of the metropolis. And I believe that such an organisation would be acceptable to the body of Civil

Engineers. That is one preparation. I would suggest, also, that to guard against the ill effect produced by working on the fears of the population through the threat of laying districts and suburbs in ashes, one fire brigade, with engine and horses, be attached to every district, and planted at every alarm post. Supposing, then, that any portion of the metropolis was on fire, it should be the special duty of the Engineer volunteer officer commanding at that point to hasten with a proportion of volunteer Sappers to the conflagration, extinguish the fire, and take such measures as might be necessary. By thus distributing the volunteer regiments or corps each to its defined district, and by assigning to each a special object and duty, confidence would be given to the people, and the dangers and terrors of a bombardment would be neutralised and dispelled by a simple and timely arrangement. If the people do not clearly perceive the manner in which they are to be defended, and by what arrangement their security is to be ensured, panic will arise, confusion will double every difficulty, and the military authorities will have to deal over and over again with the only military difficulty worth speaking of in England, that is, the process of clearing the front of non-combatants, to meet which special provision must be made. If the front be cleared of non-combatants the English soldiers will fight as they always have fought. But we must be prepared against the danger not only of reverses in the field, but against that greater danger which arises from the panics of unarmed and helpless multitudes in towns. And to combat this peril I make a special provision. I spoke of the difficulty of clearing the front of non-combatants. I believe that the terror which an enemy would hope to generate in the confused masses, by the approach of an invading army, would be held to be one of the most powerful weapons of invasion. This expectation it is our duty to dispel. I may be supposed to theorise, to estimate too lightly, or even to overlook difficulties which must inevitably arise in dealing with large masses of people; but, considering the perfection at which our railway communications have arrived, the speedy means which are enjoyed of connecting one part of the country with another, it is doubtless feasible, when one front of London is invested (for it is scarcely possible to suppose that London can ever be entirely invested), by due organisation to pass the whole of the non-combatants from the front attacked, through London, to the rear, into districts, towns, and places prepared for their reception, on which they shall be directed by the aid of the wide-spreading system of railways, which, radiating from London, traverses England in every direction. And so soon as those whom we desire to withdraw from the horrors and miseries of war should be conveyed far from the scene of conflict, there would be clear space for those who would alone remain in the front to defend their hearths and homes. I make this suggestion confidently, and believe it to be perfectly practicable. I think, Sir, you who saw to what extent the pervasive organisation of England was carried, in contending in the depth of a severe winter with the Irish famine, will have that confidence in the national power of combination to admit that such a plan is neither rash in conception nor impracticable in detail.

And for this service the admirable bodies of Metropolitan and City police might be trained. Their familiarity with the condition and daily life of all classes would give them the means of effectually putting in motion the inert mass, which would not be manageable under other agencies. To them also would belong the duty of maintaining the peace and security of the metropolis, certain to be troubled by the ill-disposed classes, who always expect plunder and license in periods of national peril.

Let us now consider the defence of London with an enemy at its gates. It is fortunate for those who entertain my opinion, that London deserves an unhesitating and protracted defence; that we already possess, as matter of history, the account of the successful defence, or rather of the relief, of an almost open town under more difficult circumstances than could probably be found twice in the annals of war. I allude to that great feat of arms performed by the Emperor Napoleon when he relieved Dresden, overmatched as he was in numbers, overmatched as he was in guns, and overmatched as he must have been but for his genius, his resolution, and the energy of his soldiers—in the moral power that the enemy brought to bear against him in the campaign of liberation. If the enemy, having pierced the line of works I have detailed, were in possession of the heights of London, and thence looked down, with the intention of fighting their way into its streets, I say the defenders of London would not be in so bad a plight as St. Cyr was, when, with his 20,000 men, he threw himself into Dresden, knowing that the Emperor would come to his aid; and how gloriously the Emperor did assist him, the historian has recorded as an example of what may be done in the defence of towns in all times. Dresden was almost an open town, merely surrounded by shattered walls, so imperfect in its fortifications that it was requisite to strengthen it by five large redoubts. In this Dresden 136,000 men held at bay and repulsed 166,000 men with 500 guns. The front of that battle extended for six miles and a half; but, again, the French Emperor was equal to the occasion, his soldiers seconded him, and the result was the disastrous retreat and rout of the Allies. Therefore it is that I say, whatever might be the condition of London, hemmed in as she might be by the masses of an invading army, there can exist no reason for despair, no reasonable excuse for abandoning the capital, no apology for deeming that it would be wise to purchase with our gold that which we could not defend with our swords.

I do not wish to speak with the exaggerated feeling that may arise when we consider with how great a calamity this nation might be threatened; I desire simply to deal with the plain mechanism of military resistance; I mean to prove what resistance, by works of construction, may be prepared; and I indicate the powerful means of resistance which may be anticipated from the support of your people. And I have endeavoured to show (by clearing thoroughly and decisively the field for the exertions of fighting soldiers), that if the disastrous event of the leaguer of London should ever occur, it may safely be left to history to say that the Russians were obliged to abandon and to burn Moscow in their distress, but the English remained and fought on their own ground.

Now, with regard to those details of interior defence, to which I have partially alluded, I speak of the zone of railways, which, beginning at North Woolwich, penetrates and surrounds the central portion of the metropolis on either bank, even to West Woolwich. I divide this zone into artillery districts. It is a point which I have discussed upon former occasions, and the distribution will be thus: I would make one artillery district from North Woolwich to the Stratford Station; a second artillery district should extend from the Stratford Station to the West London Junction; from the West London Junction to the banks of the Thames should give a third; a fourth should be drawn from thence to Clapham Station; from Clapham Station to Norwood Hill would form a fifth; and from Norwood Hill to Woolwich would complete the zone of artillery defence encircling central London with a second rampart. Now it is not that a railway is in its construction powerful for defence, for, in fact it may rather be called a line of movement than a line of defence, but that I would place on this curved trace of railway, guns moveable from point to point as occasion might arise. The stations projecting from the railway might be called points of emergence, on which to direct such field guns, stores, or troops, as might be required on a sudden change of front, or increase of attack. Such an adaptation is feasible, and adds, moreover, materially to the strength of those works near which the zone passes.

There is another point on which I would dwell in respect of the volunteer system. Admitting the axiom, that the standing defence of England is that by local forces acquainted with the particular districts, it is essential that volunteer corps should be acquainted with not only their own district and alarm-posts, but also with the nature of the country which might lie in their front when once they had quitted the suburbs of the metropolis. I can imagine cases (but it is scarcely worth while to particularise) in which the defence of London would be conducted with much greater success by soldiers accustomed to a particular district than by those who are strangers to the locality, and who had merely the ordinary rules of military service for their guidance. The local features of London, and especially of Western London, are very peculiar. There are large and well-defined districts broken up into manageable divisions of defence by the great thoroughfares that penetrate the capital. For instance, one side of our great thoroughfares might be occupied in force, and a defence developed against an enemy attempting to penetrate into the interior. It would, therefore, be advisable that to every great division, or independent corps of volunteers, field-guns should be attached, for the purpose of ultimate defence; because I hold that under no circumstances are we justified in capitulating for London. I repeat my belief, that we can rapidly and easily, with our organisation, remove the non-combatants from the danger in which they would be placed, and in which they would naturally look for sympathy and protection; and then, wherever the weight of attack may fall, I say we shall have no reason to despond for the fate of London.

And perhaps I dwell more on this subject because I am aware how little the English determination has been understood elsewhere. Because we do not proclaim without ceasing, a resolution to do that which falls to our lot in the shape of duty, it is often supposed that we have either lost

the power, or at least the spirit, which cares for the performance of great things. It is well that it should be known, that Englishmen carefully and deliberately adopt the resolution, that London is not to be taken; that we will neither hear in London of the removal of our Government, our Courts, or our Parliament; nor of the ransom of the City.

I would briefly remark here, that the zone of defence passing through these forts is about fifty miles. It is no very great extent to fill in, or make complete in the intervals between the forts, by field-works. The zone of radiation of fire covers 75 miles. And on this projection there are but three points, not included within a circle traced on a radius of one mile from a work, or, which is equivalent, from a point on a railway, at which guns might be placed in battery. These breaks measure respectively 700 and 1,000 yards. Consequently field-works would be covered during construction by the fire of forts and redoubts, direct or vertical. The zeal of the population, when appropriately directed, and when organised for the execution of well-considered plans, would cover the intervals of these works with such means of resistance as would enable us to justify the great promise that none need hesitate to make on behalf of the people of London. I am firmly and unalterably convinced of this fact, that so strong is London in its natural circumstances, rightly understood, for the special purpose of a judicious defence, that the greatest military reputation might be safely perilled on the successful defence of this capital, if only one point be conceded; namely, that we organise, be prepared, and be wise in time.

And in reviewing the history of great national crises there is an epoch which has been forcibly described by the great historian his country has so recently lost. He speaks of people resembling us nearly in their national character, like us, men of the sea, and like us, men who did not shrink from warfare on land. When the Dutch, the men of the Seven United Provinces, in their great national agony and distress, were almost overpowered by the great military monarchy of France, what was the resolution they adopted? Not to ransom their capital, in order that they might linger for a time on the marts of traffic, where whilst free they had been placed among the merchant princes of Europe; not to abandon the capital, and to betake themselves to some quiet region until the storm be overpast; but they said, "Either the country is to be held wholly and unconditionally by a free people, or it is no fit dwelling-place for them." They said, "Rather give our fields back to the salt sea, and the cities that we have wrested from the Spaniards to the monsters of the deep, than remain dishonoured in our own land." They were prepared, as the historian tells, in another clime to found new cities, and to seek new kingdoms under other constellations. But he also adds, "the men who have the courage to form these resolutions are seldom called upon to execute them." So it is with us. If we be determined, in our calm way, to declare that none shall make us afraid, and that we will hold our own, seeking to offend none, so soon as the determination is evident, and the force for defence is prepared, as has been shown full often in the history of the world, the attack is suspended, and the threatening war-cloud passes away.

POSTSCRIPT.

SINCE this Address has been made public, objections have been taken, both in the House of Commons and elsewhere, to the proposal for a defence of London, which it may be permitted me to examine and to test.

First. The first objection is, that if the arsenals are fortified London can be more effectually protected by armies in the field than by forts.

Secondly. The second objection results from the assumption that entrenched camps are a more certain defensive resource than fortified posts or suburban works, because an entrenched camp cannot be safely neglected by an advancing enemy.

Thirdly. That forts demand a large, clear space around them, and that works round London would be encroached upon by buildings to a dangerous extent.

Fourthly. That not only would the purchase of land for the works be very expensive, but that the connecting belt of ground required to be kept clear of buildings for future field-works would add very materially to the cost.

Fifthly. That such extensive works cannot be adequately manned, especially in artillery; and that no account has been taken of the regular army, the garrison of London.

To these objections I reply briefly—

First. That by securing the arsenals from attack, the advance of an enemy is determined through the unoccupied country interposed between the principal coast-districts of defence previously referred to. To guard against this movement the interjacent space must be occupied by an army of manœuvre. But the operations of an army of manœuvre, which has no firm base whereon to retire, will not be conducted with the requisite vigour, as was the case in 1815 with the army of the Loire.

Again, while an army of manœuvre is engaged at the front, an army corps in diversion, probably from the north-east, might threaten London, and with impunity. And an advance on the northern bank of the East Thames should not be excluded from calculation; for it must not be forgotten that, in proportion to the success that may have been obtained in the fortification of the arsenals, will be the tendency to penetrate between or turn their districts and invest the capital.

Secondly. An entrenched camp is of excellent use for concentration of troops, but if it be not placed directly in the line of approach of an invading force it does not fill the function of a fortress; and if it lies directly in that line, and thus arrests his march, the probability is, in the particular case now under consideration, that more is gained to the enemy by delay which will permit the arrival of reinforcements than even by a successful assault.

The imagination is misled and confused by an imperfect analogy between the Roman Camps and those of modern warfare.

The Roman camp exhibited the tactical disposition of a Roman manœuvring force in campaign against an enemy who possessed few mathematical or precise principles of manœuvre, excepting always the captains of the Punic wars, and of the campaigns of Magna Græcia. A modern

camp, on the contrary, represents the accidental and occasional disposition of armies of equal skill in the science of war, whereas the Roman camps were fortresses against superior weight of force; as for instance that in which Marius paused before he annihilated the Cimbri. The modern entrenched camp is but an unscientific congregation of troops, whose entrenchments are a cumbrous barrier to manœuvre, rather than a shelter against superior force.

The defeat of Braun by Frederick the Great, during his blockade of the Saxon entrenched camp at Pirna in 1756, illustrates the disadvantages of an entrenched camp of observation, and such is the design of a camp entrenched to cover London.

Thirdly. From the topographical character of London it is perfectly practicable to select positions of sufficient command to secure the works from the risk of being masked by neighbouring buildings.

In the contemplated necessity of clearing the military zone the amount of property to be sacrificed would be but trifling, and under some conditions of attack, buildings projected in advance might be converted into very effective outworks.

When, also, it is remembered that the sites proposed for these works would probably be those selected by an enemy as positions for batteries, whence to harass London by vertical fire, the occupation of the ground by defensive works may appear not altogether injudicious nor too costly.

Fourthly. The purchase of land would necessarily be of considerable amount, but as respects the connecting belt of land, or zone of military communication required for the construction of intermediate field-works and batteries, the quantity purchased might be relet under suitable agreements.

For it would seem that many railway companies have displayed a largeness of design in construction, a liberality in finance, and a sagacity in selection of ground adapted to the present and future requirements of their undertaking, on a larger scale than would be needed, in order to draw a permanent rampart around London, and thus to furnish a practical object and inducement to the continuous exertions of her volunteer soldiers.

Take for instance the cost and engineering difficulties of a well-known system of railways, the central line resting at either terminal point on Liverpool and Goole. The cost of that railway was £12,000,000, and the engineering difficulties were enormous. And yet the construction of that system is not reckoned among our special triumphs of engineering science, nor the capital sunk as of much account.

Lastly, it may be difficult to maintain the zeal of the Volunteer Corps, unless some specific aim of their labours be pointed out. But if it be once made clear that they are designed for a specific duty, which no other troops can perform so well, and that on them a great responsibility will be cast, the immediate result will be not only to stimulate their efforts, but to add to their numbers. The consciousness of definite purpose will lend a most effectual impetus to the general spirit of enrolment.

I have not taken into specific account the regular forces quartered in the capital and its neighbourhood, for two reasons.

The precise strength of the Regular Army must always be a fluctuating

element of calculation, whereas the Militia and the Volunteer forces should be numbered and posted to a man.

I desire also that the Army of Reserve should be habituated to consider it to be their duty to fight in positions where local knowledge and firmness are the first requisites, and to teach them that these positions must be maintained by themselves alone.

The eleven Metropolitan Regiments of Militia and the Hon. London Artillery Corps would form an available reserve. And so much of these suggestions as is well founded is applicable to every city, town, and village of the United Kingdom.

APPENDIX.

APPENDIX A.

DETAIL OF WORKS.

Works.	Guns.	Gunners.	Infantry.	Works.	Guns.	Gunners.	Infantry.
A	20	140	200	K	20	200	300
B	20	140	200	L	20	200	300
C	25	175	250	L'	40	400	600
C'	20	140	200	M	20	140	200
D	15	105	150	N	40	280	400
D'	30	210	300	O	30	210	300
E	30	210	300	P	30	210	300
F	30	210	300	Q	20	140	200
G	80	560	700	R	50	350	500
G'	20	140	200	S	80	560	700
H	60	420	500	T	30	210	300
H'	10	70	100	U	30	210	300
I	60	420	500	W	30	210	300
I'	10	70	100	X	180	1,260	1,800

Total:—Works 28, Guns 1,050, Gunners 7,350, Infantry 10,500.

Cost at £1,000 per Gun, without Land, £1,050,000.

APPENDIX B.

ESTIMATE OF PROPORTION OF VOLUNTEERS available within the LONDON LINES.

Extracted from Lieut.-Colonel Kennedy's Memoir.

No. I. DIVISION—LONDON LINES.

Volunteer Force should be 4-20ths of Males capable of bearing Arms.

ALARM-POSTS.	COUNTIES AND DISTRICTS.	Total Males capable of bearing Arms.	Effective Volunteers required.
	MIDDLESEX.		
	WEST DISTRICTS.		
Holland Park . . .	1 Kensington	30,000	6,000
Belgrave Square . . .	2 Chelsea	14,131	2,826
Grosvenor Square . . .	3 St. George's Hanover Square .	18,307	3,661
Westminster Playground	4 Westminster	16,402	3,280
Trafalgar Square . . .	5 St. Martin in the Fields . .	6,160	1,232
St. James's Square . .	6 St. James, Westminster . .	9,101	1,820
		94,105	18,819
	NORTH DISTRICTS.		
Portman Square . . .	7 Marylebone	39,424	7,884
Haverstock Hill . . .	8 Hampstead	2,996	599
Euston Square . . .	9 Pancras	41,739	8,347
Cattle Market . . .	10 Islington	23,832	4,766
Hackney Common . . .	11 Hackney	14,607	2,921
		122,593	24,517
	CENTRAL DISTRICTS.		
Russell Square . . .	12 St. Giles	13,533	2,710
Lincoln's Inn Fields . .	13 Strand	11,115	2,223
Lincoln's Inn Fields . .	14 Holborn	11,655	2,331
Gray's Inn Square . . .	15 Clerkenwell	16,194	3,238
Clerkenwell Green . . .	16 St. Luke	13,514	2,702
Finsbury Square . . .	17 East London	11,101	2,220
Middleton Square . . .	18 West London	7,197	1,439
Smithfield	19 London City	13,983	2,798
		98,312	19,661
	EAST DISTRICTS.		
Standard Tavern . . .	20 Shoreditch	27,314	5,463
Bethnal Green . . .	21 Bethnal Green	22,548	4,509
London Hospital . . .	22 Whitechapel	19,940	3,988
Victoria Park	23 St. George-in-the-East . .	12,094	2,418
Stepney Green	24 Stepney	27,694	5,538
Bow Common	25 Poplar	11,790	2,358
		121,380	24,274

No. I. Division—*continued*.

ALARM-POSTS.	COUNTIES AND DISTRICTS.	Total Males capable of bearing Arms.	Effective Volunteers required.
SURREY.			
SOUTH DISTRICTS.			
Orchard Gardens	26 St. Saviour, Southwark	8,933	1,786
"	27 St. Olave, Southwark	4,814	968
Leather Market	28 Bermondsey	12,032	2,406
Lock's Fields	29 St. George, Southwark	12,956	2,591
Surrey Zoological	30 Newington	16,204	3,240
Kennington Oval	31 Lambeth	34,831	6,966
St. Anne's Hill	32 Wandsworth	12,691	2,538
Brunswick Square	33 Camberwell	13,667	2,733
Emigration Depot	34 Rotherhithe	4,451	891
		120,600	24,119
KENT.			
Greenwich Park	35 Greenwich	24,841	4,968
Lewisham	36 Lewisham	8,709	1,741
		33,550	6,709
	Total of No. I. Division	590,554	118,099

No. II. Division.—SOUTH-WESTERN LONDON LINES.

Volunteer Force should be 4-20ths of Males capable of bearing Arms.

ALARM-POSTS.	COUNTIES AND DISTRICTS.	Total Males capable of bearing Arms.	Effective Volunteers required.
1. SURREY—exclusive of London Districts.			
Kingston	47 Kingston	6,606	1,330
Richmond	48 Richmond	3,976	795
	Total of No. II. Division	10,672	2,134

No. III. DIVISION.—NORTHERN LONDON LINES.

Volunteer Force should be 3-20ths of Males capable of bearing Arms.

ALARM-POSTS.	COUNTIES AND DISTRICTS.	Total Males capable of bearing Arms.	Effective Volunteers required.
	6. MIDDLESEX—Exclusive of London Districts.		
Brentford . . .	134 Brentford . . .	10,331	1,548
Hendon . . .	135 Hendon . . .	3,979	594
Barnet . . .	136 Barnet . . .	3,655	546
Edmonton . . .	137 Edmonton . . .	11,324	1,698
		29,289	4,386
	7. HERTFORDSHIRE.		
Hatfield . . .	143 Hatfield . . .	2,125	318
Watford . . .	145 Watford . . .	4,700	705
	Total of No. III. Division	6,825	5,400

GRAND TOTAL.

No. I. DIVISION . . .	118,099
No. II. DIVISION . . .	2,134
No. III. DIVISION . . .	5,400
IN ALL . . .	<u>125,642</u>