

**Report of Mr Donaldson, agricultural surveyor, on the state of Regent's Park : January, 1849.**

**Contributors**

London (England). Metropolitan Commission of Sewers.  
Donaldson, George (Surveyor)

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Wellcome Collection  
183 Euston Road  
London NW1 2BE UK  
T +44 (0)20 7611 8722  
E [library@wellcomecollection.org](mailto:library@wellcomecollection.org)  
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## Metropolitan Sewers.

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SEWERS' OFFICE, No. 1 GREEK STREET, SOHO,

29th December, 1848.

MY LORDS AND GENTLEMEN,

Pursuant to the Order of the Court of the 16th November last, with reference to the Memorial of the President and Council of the Zoological Society, in which are set forth the injurious effects resulting from the excess of moisture in, and consequent lowness of temperature of, the soil and atmosphere of the Regent's Park, as affecting the salubrity of the neighbourhood, and the conditions of flowers, plants, animals, and trees in that part of the Park in the occupation of the Society, and laid out as a Vivarium :

I beg to report that upon repeated inspection, judging from surface appearances, the soil of the Park appears to be a nearly uniform clay of a tenacious, retentive quality ; requiring, as the basis of all improvement, a regular and thorough drainage throughout its whole extent, without which, any attempt at improvement will be ineffective.

The driest portion of the Park is the high ground intersected by the broad walk, where the declivity of surface is favorable for the removal of surface water ; yet even there, during winter, or wet weather, it is so wet and soft as to be entirely unfit for walking upon. I speak from a knowledge acquired during eight years I have lived in the immediate vicinity.

The lower part of the grounds lying between the Zoological Gardens and the ornamental water is very wet, and is intersected by several large old surface drains, which disfigure the ground, without answering any good purpose. The general conformation of this part of the Park being somewhat irregular, is unfavourable to the escape of surface water, so that at times some portions of the ground become completely covered with water, for which there is no escape except by evaporation.

Little more can be said of the Park in its present condition, than that it is a piece of wet clay-land, capable of great improvement by proper drainage. Appended is an estimate of the probable cost of such drainage as seems requisite.

A great part of the Park will drain into the ornamental water ; there are, however, some portions of it for which a lower outfall is necessary. That part of



the Park south-west of the ornamental water, being little above the level of the water, is very damp, and contains enormous quantities of worms, which render it at times unfit for walking on, by the quantity of soft earth pushed up from their holes. It is said by some that the operations of the worms tend to improve the soil, which possibly may be the case, where it is dry enough for them to remain under the surface; but here the ground during winter and spring being saturated with water, the worms are driven to the surface, where in great quantities they die and rot among the decaying leaves of the herbage; and although a worm and a blade of grass together in a state of decomposition on the surface of the earth seems but a small matter, yet, with an extent of many acres closely covered with them, and the humid exhalations from such a wide-spread putrefactive mixture continually loading the atmosphere, the importance of such minute causes of atmospheric impurity becomes apparent. Such is the condition of all wet fertile soils and marsh lands. I do not mean to say that the Park is in the condition of a marsh; but that the evils resulting from excessive moisture in the Park are the same in kind, differing only in degree, from those of marsh miasmata.

I am informed that the ornamental water receives occasional supplies from the works of the West Middlesex Water Company; and, during the summer, the supply of water requisite to keep it sweet and clear must be rather considerable.

I found from a series of experiments I made during last summer, that from one square foot of water surface, eight ounces of water, on an average, were removed by atmospheric evaporation during the day; and from wet grass turf, the quantity was still more. Now as the ornamental water contains somewhat more than twenty acres, and assuming that only four ounces (half the quantity as above) be evaporated from each square foot per day during summer, it amounts to 21,700 gallons per day, and to about two million gallons during the three hottest summer months ( $4\frac{1}{2}$  inches depth).

The average fall of rain about London for five years past, is  $24\frac{1}{2}$  inches a year. The Regent's Park comprises upwards of four hundred acres; the average quantity of water (rain) falling annually thereon, is 34,848,000 cubic feet, or 217,800,000 gallons, two-thirds of which, 145,000,000 gallons, must of necessity be removed by atmospheric evaporation, there being no other outlet for it. I assume that were the Park effectively drained, half the quantity nearly of rain water that falls on the surface would pass into the drains, and might be made available for some useful purpose. The quantity of water thus collected from the Park would amount to 108,900,000 gallons a year; and the abstraction of heat necessary to convert so much water into steam, lowers the temperature of the soil and atmosphere.

The benefit derivable from the drainage in a sanitary point of view, I do not attempt to estimate; but looking at the Park in an agricultural point of view, it may be safely assumed that the drainage would effect an improvement in the annual rent value of the ground of 30s. an acre, which on 400 acres amounts to 600*l*. The annual improvement rate would be, for twenty years, 180*l*. 7s. 6d. upon the amount

A detailed historical map of Regent's Park in London, showing the park's layout, surrounding streets, and various landmarks. The map includes labels for 'REGENT'S PARK', 'ZOOLOGICAL GARDENS', 'ROYAL BOTANICAL GARDENS', 'ST. JOHN'S LODGE', 'TITCHFIELD', 'BARROW HILL ROAD EAST', 'CHALK FARM', 'GUMBRIDGE TERRACE', 'CHESNEY TERRACE', 'CAMPBELL TERRACE', 'ALLEN PLACE', 'ST. JOHN'S LODGE', 'TITCHFIELD', 'BARROW HILL ROAD EAST', 'CHALK FARM', 'GUMBRIDGE TERRACE', 'CHESNEY TERRACE', 'CAMPBELL TERRACE', 'ALLEN PLACE', 'ST. JOHN'S LODGE'. The map also shows the 'MUSEUM OF NATURAL HISTORY' and the 'MUSEUM OF COMPARATIVE ANATOMY'. A compass rose is located in the bottom left corner.





MR. DONALDSON  
TO RECONSTRUCTION  
OF  
DECEMBER 1946

of the annexed estimates. But the improvement upon the villa grounds may be taken at double what it would be on the same grounds for agricultural purposes.

By a little additional expense, nearly the whole drainage of the Park might be turned into the ornamental water, instead of turning part of it into the sewers at York Gate and St Andrew's Place.

The underwood on the margin of the ornamental water might, in some places, be advantageously thinned out a little, so as to lessen the overshadowing, and consequent dampness of such spots.

The hurtful effects upon the animals and plants in the Zoological Gardens, as stated in the memorial of the Society, and attributed to the wet, cold state of the Park, are only such as are to be expected from the condition of the grounds. In a dry atmosphere, a low state of temperature will not produce such effects; for during frost, although the temperature be then lower, such evils are abated; but it will, I believe, be found that the humid atmosphere prevalent over constantly wet land is ever in a negative electrical condition, which, together with the lowness of temperature always accompanying such a condition of the soil, affects the condition, as to health, of both plants and animals, by lowering temperature, lessening vitality, and thereby predisposing to disease; whereas on dry land, the atmosphere being necessarily dry and in a constant positive electrical condition, it imparts vigour to the vital powers, and is conducive to a healthy condition in both plants and animals.

But the evils ever attendant upon excessive humidity, whatever their agency or mode of operation be, their effects are abundantly apparent, and their abatement or entire removal, is the never-failing result of the removal of the superfluous moisture.

The cost of the drainage would be more than repaid by the increased value of the herbage and timber; and in the course of two or three years, the soil would acquire a condition suitable for the use of liquid manures, of which an inexhaustible supply is ready at hand, and now running to waste, by the use of which the value of the herbage and timber may be still more increased.

No apprehension need be entertained of annoyance from smells from the liquid manure, when the ground has become suitable for its use; for all the smells or emanations arising from it, will not amount to one-tenth of that from the manures now applied as top-dressing; and yet I believe the manures now in use in the parks to be perhaps the least offensive in that respect of any kind of solid manure that can be used.

Appended is an estimate of the probable cost of the application of liquid manure, and the improved value of the herbage thereby; and an estimate of the cost of laying down earthenware pipes for carrying the liquid manure from the sewers for distribution over the Park, and the greater part of the grounds at Primrose Hill, now added to the Park. The lines in which it is proposed to lay down the earthenware pipes are shown by red lines on the annexed map.

I have the honor to be, my Lords and Gentlemen,

Your very obedient Servant,

G. DONALDSON.



# ESTIMATED COST OF DRAINAGE.

## Of the open part of the Park, per acre.

147 rods of cutting and filling drains, from $2\frac{1}{2}$ to 3 feet deep, and 18 feet apart, at $4\frac{1}{2}$ d. per rod	£	s.	d.
No. 2,420 of $1\frac{1}{2}$ in. drain pipes, at 22s. per 1,000	2	12	1
147 rods of adjusting and pressing the turf, when the drains have been filled in, at $\frac{1}{2}$ d. per rod	2	13	3
Proportional cost of mains per acre	0	6	$1\frac{1}{2}$
Cartage of materials	0	4	$4\frac{1}{2}$
	0	17	6
			<u>6 13 4</u>

## Of the Villa Grounds, Zoological Gardens, Pleasure Grounds, &c., per acre.

160 rods of cutting and filling drains from $2\frac{1}{2}$ to 3 feet deep, and $16\frac{1}{2}$ feet apart, at $5\frac{3}{4}$ d. per rod	3	6	8
No. 2,640— $1\frac{1}{2}$ inch drain-pipes, at 1l. 2s. per 1,000	2	18	1
160 rods of adjusting and pressing down the turf over the drains when filled in, at $\frac{1}{2}$ d. per rod	0	6	8
Cartage of materials	1	0	0
			<u>8 1 5</u>

Extent of grounds attached to St Catherine's Villa, St John's Lodge, the Subscription Pleasure Grounds, Hertford Villa, Holford House, the plantations by the Regent's Canal, and the Zoological Gardens, as measured on the map, about 95 acres, at 8l.	760	0	0
The open part of the Park and Primrose Hill, as measured on the map, about 225 acres, at 6l. 13s. 4d. per acre	1,500	0	0
Outfalls into sewers at St Andrew's Place, York Gate, Chester Terrace, and into the Regent's Canal, laid with 6 in. pipes, 1,494 feet, at 1s. 6d. per foot	112	0	0
			<u>£2,372 0 0</u>

Estimated cost of laying down earthenware pipes, of 6 in. bore, for the conveyance of liquid manure, for application to the Park, at per foot.

9,000 feet on the open part of the Park, at 1s. $1\frac{1}{2}$ d. per foot	506	5	0
2,442 feet on Primrose Hill	137	5	0
1,320 feet on the roads from sewers, at 1s. 6d. per foot	99	0	0
			<u>742 12 5</u>

Cost of the hose-pipes required for distributing the manure.			£	s.	d.
150 yards of 3 in. hose-pipe, at 1s. 3d. per foot	.	.	9	7	6
400 yards of 2½ in. hose, with lateral apertures, at 1s. 4d. per foot	.	.	26	13	4
No. 6 unions for connecting the hose-pipes with the earthenware pipes in the ground, at 10s.	.	.	3	0	0
			<hr/>		
			39 0 10		
			<hr/>		

Cost of labour in applying the liquid to the land.

Engine and pumps, at 10s. per day	.	.	0	10	0
Coals for ditto, 5s.; engine man, 4s.	.	.	0	9	0
Six labourers, at 3s. each; ganger, at 5s.	.	.	1	3	0
Wear and tear of hose-pipes, at 1d. per acre	.	.	0	2	2½
			<hr/>		
			2 4 2½		
			<hr/>		

Such a staff, with 396 yards of perforated hose, 66 yards to each man, moving over the ground five yards in ten minutes, for ten hours a day, will manure per day 26½ acres, at 1s. 8d. per acre  
And applied eight times in the year, costs, at the rate of 13s. 4d. per acre

Estimated cost of drainage of the open part of the Park—					
225 acres, at 6l. 13s. 4d. per acre	.	.	1,500	0	0
Outfall drains, with 6 in. pipes, into the sewers of St Andrew's Place, York Gate, Park Place, Chester Terrace, and three outfalls into the canal—1,494 feet, at 1s. 6d. per foot	.	.	112	0	0
			<hr/>		
			1,612 0 0		
			<hr/>		

Drainage of Villa Pleasure Grounds at St Catherine's Villa, St John's Lodge, Subscription Pleasure Grounds, Hertford Villa, Holford House, and the Zoological Gardens—about 95 acres, at 8l. per acre			760	0	0
			<hr/>		
			760 0 0		
			<hr/>		
			2,372 0 0		
			<hr/>		

Application of liquid manure to the open part of the Park, to be applied eight times a year, at the rate of 16 tons to the acre each time—225 acres, at 13s. 4d. per acre					
			<hr/>		
			150 0 0		
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## ABSTRACT OF THE FOREGOING ESTIMATES.

	£	s.	d.	£	s.	d.
Estimated cost of draining the open part of the Park	1,612	0	0			
Ditto ditto of villa grounds . . . . .	760	0	0			
Ditto of laying down earthenware pipes for carrying sewer water . . . . .	742	12	5			
				3,114	12	5
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Estimated improved annual value effected by the drainage upon 320 acres at 1 <i>l.</i> 10 <i>s.</i> per acre . . . . .	480	0	0			
Estimated additional annual value from the use of sewer water—320 acres, at 3 <i>l.</i> per acre . . . . .	960	0	0			
	1,440	0	0			
Less annual improvement rate on 3,114 <i>l.</i> 12 <i>s.</i> 5 <i>d.</i> , at 7 <i>l.</i> 12 <i>s.</i> 6 <i>d.</i> per cent. . . . .	£237	10	1½			
Ditto cost of applying the liquid manure eight times in the year, 320 acres, at 13 <i>s.</i> 4 <i>d.</i> per acre . . . . .	213	6	8			
				450	16	9½
				£989	3	2½

G. DONALDSON.

Metropolitan Sewers.

REPORT OF MR DONALDSON

AGRICULTURAL SURVEYOR.

ON THE

STATE OF REGENT'S PA

JANUARY, 1849.