

MASONS FIELD SOIL SURVEY 2014

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Participants of The John Muir Award Scheme and Barn Hill Conservation Group volunteers collected soil samples from the meadow areas of Masons Field, Fryent Country Park in July 2014. This was part of the Heritage Lottery Fund and Brent Council project to restore the field. Soil samples have been examined by a laboratory (Yara) and the laboratory reports have been received. What do the results tell us; and how do they help towards the restoration of the meadow?

Samples were taken from six areas, selected as representative of the meadow and/or chosen to illustrate possible variation within the meadow. These were:

Sample reference	Description
1.	Made-ground where 1990's demolition/construction works had overlaid material over the level of the earlier sports ground. Raised ground, north-east, near to Larkspur Close and Sedum Close.
2.	Meadow on former sports ground with slightly rotovated / mixed soil prior to seeding, autumn 2012. North-west.
3.	Meadow on former sports ground. Central area, mainly undisturbed, considered typical of much of the meadow.
4.	Near surface, shallow sample, just below / within the turf, but otherwise as for (3) above. Meadow on former sports ground. Central area, mainly undisturbed, considered typical of much of the meadow.
5.	South scrape. The area of the site of the southern scrape to be constructed in late summer 2014. The sample was taken at a greater depth, approximately 20-30cm, to sample the soil at approximately the same depth as that of the proposed scrape, once the top 20-30cm of soil has been removed. South-west in field.
6.	Little Cherrylandes. As a comparison, samples were taken from the adjacent hay meadow of Little Cherrylandes.

pH

Ref.	1.	2.	3.	4.	5.	6.
Location	Made ground	West mixed	Central	Central surface	Scrape	Little Cherrylandes
pH	7.8	6.1	4.6	4.4	5.9	5.9

pH measures the acidity or alkalinity of the soil on a logarithmic scale with 7.0 being neutral with increasing acidity to 0, and increasing alkalinity to 14. Three of the samples were slightly acidic but near to neutral. The two central samples had a low pH indicating acidic conditions. The made ground was alkaline, and possibly a reflection of the quantity of calcareous construction waste (e.g. mortar, lime, concrete) within the ground.

Plant species have preferences as to the pH range within which they will grow and at which they grow best. Information on pH can be used to help interpret the results of botanical surveys and to plan where to plant different species of plant or seed as part of the restoration.

P, Phosphorous

Ref.	1.	2.	3.	4.	5.	6.
Location	Made ground	West mixed	Central	Central surface	Scrape	Little Cherrylandes
ppm	13	11	19	31	17	5
Interpretation	Low	Low		High		Very Low
P (total) mg/kg	952	715	1101	1951	676	568

Phosphorous is one of the most important elements for plant growth. Many plant species produce more vegetative growth where there is more phosphorous. It occurs naturally and agriculturally is often applied as fertiliser. In excess, it is a serious pollutant as agricultural run-off, in watercourses and other environments. While high phosphorous is often sought in agricultural situations, the converse is the case in natural meadows, as high phosphorous means that a few plant species only will succeed in dominating the grassland. As Masons Field is a nature reserve and is managed organically under the Soil Association Organic Standard, artificial fertiliser is not applied to the meadow – nor are farm manures applied.

Yara provide two main measures for phosphorous, as not all of the element is available in a form that is immediately available to plants. The 'index' is a scale used by farmers.

Yara suggest that most of the samples were low or normal (in an agricultural context). A high concentration was noted near to the surface, possibly reflecting the proximity of the thatch from the grass vegetation above. The 'very low' concentration for the meadow at Little Cherrylandes is desirable in that situation, and possibly reflects many years without the application of fertiliser.

K, Potassium

Ref.	1.	2.	3.	4.	5.	6.
Location	Made ground	West mixed	Central	Central surface	Scrape	Little Cherrylandes
ppm	284	176	85	72	157	137
Interpretation	High		Low	Low		

Potassium is one of the most important elements for plant growth. It occurs naturally and agriculturally is often applied as fertiliser. As Masons Field is a nature reserve and is managed organically under the Soil Association Organic Standard, artificial fertiliser is not applied to the meadow – nor are farm manures applied.

N, Nitrogen

Ref.	1.	2.	3.	4.	5.	6.
Location	Made ground	West mixed	Central	Central surface	Scrape	Little Cherrylandes
N (total) mg/kg	2674	3587	4768	6641	2987	4217
Interpretation			High	High		High

Nitrogen is one of the most important elements for plant growth. Many plant species produce more vegetative growth where there is more nitrogen. Nitrogen occurs in the soil in a range of forms, and hence the measure is one of total nitrogen. However, not all of the forms are immediately available for plant growth. It occurs naturally and agriculturally is often applied as fertiliser. In excess, it is a serious pollutant as agricultural run-off, in watercourses and other environments. While high nitrogen is often sought in agricultural situations, the converse is the case in natural meadows, as high nitrogen means that a few plant species only will succeed in dominating the grassland. As Masons Field is a nature reserve and is managed organically under the Soil Association Organic Standard, artificial fertiliser is not applied to the meadow – nor are farm manures applied.

Nitrogen at three of the samples was considered high. The highest was in the surface soil immediately below the turf in Masons Field and that could reflect the high organic content from decomposing plant material. However, it was also considered 'high' in the hay meadow of Little Cherrylandes despite many years without fertiliser applications. However, not all of that nitrogen may be in a form available for plant growth.

Mg, Magnesium

Magnesium is an important element for plant growth. Magnesium was noted as 'high' or 'very high' in each of the six samples. The highest concentration was in the high-clay soils of the scrape area.

Organic matter and Organic Carbon

Ref.	1.	2.	3.	4.	5.	6.
Location	Made ground	West mixed	Central	Central surface	Scrape	Little Cherrylandes
Organic matter (%)	6.8	7.0	9.9	15.5	6.6	9.0
Interpretation			High	High		High
Organic Carbon (%)	3.9	4.0	5.7	9.0	3.8	5.3

Organic matter is the carbon containing material, derived from decomposed or living plants and animals. Carbon is essential for plant and animal growth; and constitutes a high proportion of plant matter. The organic matter compounds will include a range of other elements in addition to carbon, including nitrogen, oxygen and hydrogen.

The highest percentage on both these measures was in soil immediately below the turf of Masons Field, which would reflect the proximity of the thatch layer and rootzone. The slightly deeper soil of the meadow there, and that in Little Cherrylandes, were also noted as having high organic matter.

Soil particle size

Soil particle size provides an indication of the soil constituents; and these are compared within a standard system to describe the Soil Texture (see the Yara analysis results; and soil reference books / websites).

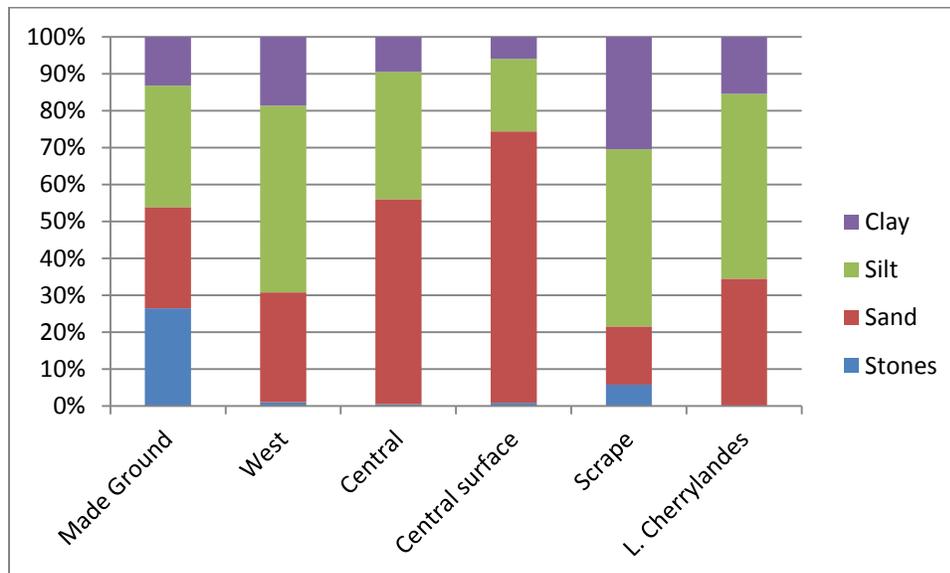
The terms Sand, Silt, and Clay have a more specific meaning than in everyday use of these words. Clay is used to describe particles with a maximum length of less than 0.002 mm. Silt describes particles between 0.002mm and 0.06mm in size. Sand describes particles between 0.06mm and a maximum of 2mm in length. (Note that on the laboratory reports that Yara have subdivided Sand into five sub-categories).

Stones are material of more than 2mm in length and upwards. In reading the results note that in the laboratory, stones are often sieved out of the sample at an early stage, and the percentage of stones is determined at that stage as a proportion of the whole sample. However, the stone component is not included in the remaining tests, nor counted as part of 'the soil'. This means that the remaining soil particle sizes add up to 100% of the remaining soil; in addition to the already calculated proportion of stones. For the purposes of the Masons Field project, in which we are trying to determine the composition of the soil as a whole, the results have been re-stated, so that 'stones' are included as part of the soil.

Results for Masons Field are tabulated here:

Ref.	1.	2.	3.	4.	5.	6.
Location	Made ground	West mixed	Central	Central surface	Scrape	Little Cherrylandes
Clay %	13.21	18.66	9.5	6.02	30.43	15.45
Silt %	32.95	50.59	34.53	19.59	48.02	50.18
Sand %	27.42	29.79	55.47	73.54	15.83	34.47
Stones %	26.42	0.96	0.48	0.84	5.71	0

This data is presented as bar-charts below:



The Made Ground had the highest proportion of stones, characterised by a large quantity of construction waste. The meadow area of Masons Field, and particularly the sample from just below the surface of the turf had the highest levels of sand, possibly a reflection of the application of sand during maintenance of the former sports ground during the 20th century. The soil from the scrape location had the highest proportion of clay (London Clay); the highest proportions of the combined clay and silt (78%) and the lowest proportion of sand. The samples from the west of the field and from Little Cherrlandes were similar to each other.

Little Cherrylandes: comparison with 2002 results

Soils at Little Cherrylandes were sampled also in 2002. Some of the tests may have been different then and measured differently. However, pH, potassium, and soil carbon appear to have been similar. Phosphorous may have declined.

Summary of soil results

Though the soils throughout Masons Field were largely within the range of those on which neutral grasslands occur, the soil survey indicated that there were large differences of soil within the field.

The sample (1) from the 'Made Ground' area confirmed that this area had a high proportion of stones (from construction activities) and a high (alkaline) pH. The land there, in the north-east of Masons Field near to Larkspur Close and Sedum Close was raised compared with the remainder of the field. It is in this area that the restoration project has encountered large quantities of rubble. The made ground area could support species that prefer or are more tolerant of alkaline soils. However, the made-ground appeared compacted and drainage appears impeded compared with that on the lower-lying meadow.

The typical central areas of the meadow (samples 3 and 4) were characterised by a low pH (acid soils), a high proportion of sand (and low clay in the topsoils) and high organic matter. The high sand content was possibly from applications of sand during the 20th century to the sports field in this area. The low pH in this area of meadow suggests that this could support species more tolerant of acid conditions. Visual inspection suggested that this area was relatively well drained.

At the location of the proposed scrape (sample 5), the analysis indicated that the soils that will be exposed will contain a high proportion of clay and small-particle size silt. This area will be suitable for seeding with species of seasonal wet grassland.

In the west of Masons Field (sample 4), the results possibly reflected the slight mixing of topsoils that occurred prior to seeding in 2012. The soil particle size composition there was similar to that in the meadow at Little Cherrylandes (sample 6).

Acknowledgments

The Heritage Lottery Fund is acknowledged for providing a grant for the restoration of Masons Field and partnership funding was provided by Brent Council. Masons Field is owned by the Council as public open space and as part of Fryent County Park. The restoration project is managed by Brent Council in partnership with Barn Hill Conservation Group. The collection of samples was undertaken by participants of The John Muir Award and of Barn Hill Conservation Group.