
MAPLEDURHAM PLAYING FIELDS
READING, BERKSHIRE
FOOTBALL PITCHES
AGRONOMIC ASSESSMENT REPORT

Prepared on behalf of:

RYDER LANDSCAPE CONSULTANTS LTD

TOHA Document Ref:	TOHA/16/3961/CS
Document Revision:	01
Document Status	Issue 2
Current Issue Date:	2 nd March 2016
Original Issue Date:	29 th February 2016

Prepared by:	Tim O'Hare Associates LLP Howbery Park, Wallingford Oxfordshire, OX10 8BA Tel: 01491 822653 Email: info@toha.co.uk www.toha.co.uk
---------------------	---



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

CONTENTS

Section	Page
1 INTRODUCTION.....	1
2 SITE ASSESSMENT.....	2
3 SOIL INVESTIGATION	5
4 TURF ASSESSMENT	8
5 LABORATORY ANALYSIS	12
6 DISCUSSION & RECOMMENDATIONS	15

Appendix 1 – Site Plan Showing Extent of Survey Area

Appendix 2 – Site Plan Showing Trial Hole Locations

Appendix 3 – Site Plan Showing Turf Assessment Locations

Appendix 4 – Outline Trial Hole Record

Appendix 5 – Turf Assessment Results

Appendix 6 – Laboratory Analysis Results

1.0 INTRODUCTION

Tim O'Hare Associates LLP (TOHA) was commissioned by Ryder Landscape Consultants Ltd to undertake an agronomic assessment of the football pitches at Mapledurham Playing Fields near Reading, Berkshire.

Permission to carry out the work is provided by the *Authority to Proceed* form signed and completed by Gethin Owens of Ryder Landscape Consultants Ltd, dated 1st February 2016.

1.1 Aim of Assessment

A sports pitch agronomic assessment was required for 3 No. existing football pitches at the site to determine their current condition and ascertain any improvements that may be required. The assessment was to include an appraisal of soil, turf and site conditions. The specified survey area extent has been marked by the blue outline indicated on the supplied site plan in **Appendix 1**.

1.2 Actions

TOHA has carried out an agronomic assessment to ascertain the current condition of the existing soil and turf in line with Sport England guidelines.

The survey has included an investigation to assess soil fertility, soil depths and types, compaction, aeration, pitch surface evenness, rooting depths, ground cover, weeds, pests and disease.

2.0 SITE ASSESSMENT

TOHA visited the site on 15th February 2016.

2.1 Site Location

The survey site is located at National Grid Reference SU 69771 75696, to the north of Reading. The site was accessed from Upper Woodcote Road (A4074).

The area comprised of an existing grassed playing field area situated to the south of Upper Woodcote Road. A pavilion and hard surface tennis courts are situated to the north of the football pitches. A play area was located adjacent to one of the football pitches. The field was bounded by mature trees and fencing, with residential properties beside the southern and eastern boundaries. Hewett Avenue ran alongside the western boundary. A number of mature trees were located within the central part of the site and between two of the football pitches.

2.2 Current Use and Pitch Layout

At the time of the visit, the 3 No. football pitches were clearly marked out and had fixed goal posts. For the purpose of this survey, these shall be referred to as Pitch 1, Pitch 2 and Pitch 3 (see attached site plan).

Pitch 2 and Pitch 3 were orientated in a shallow northwest /southeast direction with the Pitch 1 in a northeast/southwest direction.

The orientation of the pitch affects play in the direction of the sun when it is low in the sky, potentially putting players at a disadvantage if play is heading directly into it.

With reference to Sport England and SAPCA guidelines, the recommended pitch orientation range for football (goal to goal) is between northwest 285 degrees to northeast 20 degrees. As such, the current orientations appear to fall just inside the recommended range.

2.3 Drainage

Based on observations made during the survey, there appears to be no formal land drainage system (e.g. gravel trenches, manhole covers, headwalls) or open ditches on or around the site.

2.4 Levels

The playing field slopes down towards the east and also towards the south. There appears to have been some modification to levels in the past, with a shallow bank evident between Pitch 1 and Pitch 2. The levels and gradients should be confirmed by the forthcoming topographic survey (currently in progress by others).

2.5 Shade

Parts of the field are affected by shade from trees along the boundary.

2.6 Services

With reference to the supplied underground services plans (supplied by Scottish and Southern Energy and Thames Water) no services are shown within the playing field area itself. High voltage (H.V.) and low voltage (L.V.) mains are shown running along the eastern (playing field facing) side of Hewett Avenue. L.V. lines are indicated in the vicinity of the existing pavilion.



Plate 1: Pitch 1 – facing south



Plate 2: Pitch 2 – facing east



Plate 3: Pitch 3 – facing east



Plate 4: Pavilion



Plate 5: Line of poplars between Pitch 1 and Pitch 2



Plate 6: Play area adjacent to Pitch 3



Plate 7: Mature trees and fencing alongside southern boundary



Plate 8: Shallow bank between Pitch 1 and Pitch 2

3.0 SOIL INVESTIGATION

3.1 Geology and Soils

Geology

The British Geological Survey 1:50,000 mapping indicates that the *bedrock geology* beneath the site is *Seaford Chalk Formation*. A *superficial deposit* referenced *Boyn Hill Gravel Member* is also recorded, which comprises of sand and gravel.

Soils

With reference to the Soil Map of England and Wales (Sheet 6 South East England), the site soils are classified as *Unsurveyed (Urban)*. However, the adjacent area to the west of the site is dominated by the following classification:

Major Group	<i>Brown soils</i>
Group	<i>Paleo-argillic brown earths</i>
Subgroup	<i>Stagnogleyic paleo-argillic brown earths</i>
Soil Association	<i>Hornbeam 1</i>

Stagnogleyic paleo-argillic brown earths are loamy or clayey soils with a reddish or reddish mottled clay-enriched subsoil that reflects pedogenic processes occurring before the last (Devensian) glacial period. They have mottled, slowly permeable subsoils.

Hornbeam 1 soil is described as 'Deep fine and coarse loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging. Some very flinty sandy and loamy soils. Some very acid soils with bleached subsurface horizon.'

3.2 Soil Conditions

The soils across the area were examined by constructing a total of 12 No. trial pits (TH) at representative locations using a spade and soil auger to a maximum depth of 600mm.

The approximate locations of the trial holes are included on the Site Plan in **Appendix 2**. An outline trial hole record documenting the soils encountered is presented as **Appendix 4**.

At each trial hole, the soils were examined with reference to the Soil Survey Field Handbook. Important physical soil characteristics were recorded, including texture, structure, stoniness compaction, drainage and aeration characteristics and soil horizon depth. At the same time, representative soil samples were taken for laboratory analysis.

Based on our observations, 2 No. soil profiles were recorded across the site characterised by a variation in subsoil texture. *Profile 1* was characterised by the presence of a medium textured *clay loam* subsoil, whilst *Profile 2* possessed a lighter textured *sandy loam* subsoil. The topsoil was found to be largely consistent.

The average topsoil depth recorded was 430 mm (range 360-480 mm).

Profile 1

Soil *Profile 1* was encountered at trial holes TH1 – TH5 and TH10 and was typically described as:

GL-390/480mm Topsoil	Brown (Munsell colour – 10YR 4/3) moist, friable, SANDY LOAM. The upper 10-20mm was smeared, with no defined soil structure. A moderately developed, fine to medium granular structure was typically recorded below this depth. The upper 5-10mm of the topsoil contained discernible sand particles, indicating evidence of topdressing. The topsoil was moderately stony, with a concentration of stones typically recorded below 100-150mm from the surface (suggests use of a stone burier in the past). The stones were found to be subrounded to angular flints, predominantly small to medium in size. Occasional larger stones (up to 60mm). No observable foreign matter was recorded. No evidence of anaerobism or restricted drainage (e.g. mottling/gleying) was recorded in the topsoil. <i>Clear to gradual boundary to subsoil</i>
390/480 – 600mm Profile 1 Subsoil	Dark yellowish brown (Munsell Colour 10YR 4/6) to strong brown (7.5YR 4/6), moist, plastic, CLAY LOAM. The subsoil was slightly stony and no observable foreign matter was recorded. Faint mottling and manganese concretions observed.



Plate 9: Topsoil at TH1 showing concentration of stones below 150mm



Plate 10: Profile 1 Subsoil

Profile 2

Soil *Profile 2* was encountered at trial holes TH6 – TH9 and TH11-TH12 and was typically described as:

GL-360/460mm Topsoil	Dark yellowish brown (Munsell colour – 10YR 4/4) moist, friable, SANDY LOAM. The upper 10-20mm was smeared, with no defined soil structure. A moderately developed, fine to medium granular structure was typically recorded below this depth. The upper 5-10mm of the topsoil contained discernible sand particles, indicating evidence of topdressing. The topsoil was moderately stony, with a concentration of stones typically recorded below 100-150mm from the surface (suggests use of a stone burier in the past). The stones were found to be subrounded to angular flints, predominantly small to medium in size. Occasional larger stones (up to 60mm). No observable foreign matter was recorded. No evidence of anaerobism or restricted drainage (e.g. mottling/gleying) was recorded in the topsoil. <i>Gradual to diffuse boundary to subsoil</i>
360/460 – 600mm Profile 2 Subsoil	Dark yellowish brown (Munsell Colour 10YR 4/6), moist, slightly plastic, SANDY LOAM. The subsoil was moderately stony and no observable foreign matter was recorded.



Plate 11: Topsoil profile – TH6



Plate 12: Topsoil arisings – TH6



Plate 13: Profile 2 Subsoil



Plate 14: Profile 2 Subsoil

4.0 TURF ASSESSMENT

An assessment of turf quality was carried out across the playing field in order to provide baseline data. The survey was carried out with reference to the Sport England guidelines.

The turf was examined using a quadrat at several locations across each pitch. A summary of the measurements is presented in the table below. The full results for each performance property at each location examined are presented in the table in **Appendix 5**. A site plan showing turf inspection locations is shown in **Appendix 3**.

Performance Property	Average Score
Length of herbage mm	44
Ground Cover %	48
Bare Area %	52
Weeds %	1
Moss %	0
Algae/Lichen %	0
Undesirable Grass Species %	0
Desirable Grass Species %	100
Disease %	0
Worms %	3
Thatch mm	0
Evenness: 3 m/st/e: mm	15

4.1 Summary of Findings

Length of Herbage

The average grass height across the field (44mm) would be considered suitable for winter sports.

Ground Cover and Bare Areas

The ground cover was generally poor to moderate in the pitch areas, with significant bare areas in play hotspots, including the goal mouths and centre circles. Patches of wear were also observed along spectator lines in some locations. Greater grass cover was recorded 'off-pitch'.

Weed Infestation

There was a low weed population across the survey area, with very occasional broad-leaved weeds, including clover (*Trifolium repens*), dandelion (*Taraxacum officinale*), daisy (*Bellis perennis*) and yarrow (*Achillea millefolium*).

Algae/ Lichen/ Moss

There were no major populations of algae, lichen or moss.

Undesirable Grass Species

Overall, undesirable grass species were not observed across the survey areas.

Desirable Grass Species

The survey area had a high population of desirable grass species comprising perennial ryegrass (*Lolium perenne*), which has a high wear tolerance.

Pests and Diseases

No evidence of pests or disease were recorded.

Worms

A small proportion of worm casts were observed on the playing field surface. Worm casts produce an unpleasant slippery surface in wet weather, and can also affect the mowing of the turf.

Depth of Thatch

There was no significant build-up of thatch across the playing field. Thatch is a layer of living and dead grass and roots which accumulates between the layer of actively-growing grass and the soil underneath. Excessive thatch can restrict movement of air and water to the soil and grass roots.

Evenness

An even playing surface is necessary for the safety of the players and for the consistent roll of the ball for certain sports, including football. There were a number of undulations greater than 15mm along a 3m straight edge recorded, typically in wear hotspots including the goal mouths and centre circles. These areas may need to be infilled and re-graded to improve evenness.

Numerous minor undulations were also noted, either below or up to the recommended maximum of 15mm along a 3m straight edge.

Depth of Topsoil

The average topsoil depth (430mm) was satisfactory across the playing field.

Depth of Grass Roots

Root growth is an important factor for generating satisfactory grass growth at the surface. Root growth was generally good.



Plate 15: Typical grass cover – 'on-pitch'



Plate 16: Bare patch in goal mouth



Plate 17: Worn area in centre circle



Plate 18: Worn area along 'spectator line'



Plate 19: Minor undulation – 7mm measured using wedge under 3 metre straight edge



Plate 20: Significant undulation – 21mm measured using wedge under 3 metre straight edge

4.2 Pitch Maintenance

No information has been provided on the current maintenance programme for the pitches. Based on our observations, evidence was seen for the following operations:

- Mowing – grass height is reasonably consistent and acceptable for winter sports
- Topdressing – sand particles in upper 10-20mm of topsoil
- Shallow Aeration – slit lines seen across Pitches 1 and 2



Plate 21: Slit lines – Pitch 1

5.0 LABORATORY ANALYSIS

A total of 2 No. representative samples of topsoil and 2 No. subsoil samples were submitted to the laboratory for analysis.

The samples were analysed for all or part of the following schedule;

- detailed particle size analysis (% 5 sands, silt, clay)
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage (topsoil only);
- organic matter content;
- major plant nutrients - N, P, K, Mg (topsoil only);
- C:N ratio (topsoil only).

The results are presented on the Certificates of Analyses in **Appendix 6** and an interpretation of the results is given below.

5.1 Results of Analysis – Topsoil

Soil Texture

The topsoil samples fell into the *sandy loam* texture class. The particle size distribution of the samples was broad with largely equal proportions of *very fine sand*, *fine sand*, *medium sand* and *clay*, together with a significant proportion of *silt* sized particles.

Soils with a broad particle size distribution are prone to particle interpacking, whereby finer particles fill the voids between the larger particles, which can lead to reduced infiltration and percolation performance. This can increase the risk of surface water ponding or saturated topsoil after periods of prolonged or heavy rainfall, in turn reducing grass strength and quality. The fineness of the soil also makes it more prone to compaction and smearing caused by winter games, and especially when it is in a wet and plastic state.

As a consequence there will be periods, mainly during the winter season, when ground conditions will reduce the ability to play football or train without causing damage to the soil and grass.

Stone Content

The stone content of the topsoil was moderate, containing sub-rounded to angular stones, sometimes up to 60mm in diameter. The overall proportions of stone and predominant location in the lower part of the topsoil profile should not constitute a major limitation for the sports pitches, provided the soil profile is left undisturbed. However, should any reprofiling works be considered in future, it would be essential to reduce the proportion of stones in the topsoil before re-using as a sports pitch (or informal amenity grass area).

pH Value & Electrical Conductivity

The topsoil samples were acid in reaction (pH 5.1 – 5.5), with pH values that would be considered a little low for the range of grass species and cultivars normally used for sports pitches. Soil pH is a critical property that affects the basic function of the soils and hence the health and growth of the grass that it supports. At low pH levels, nutrient retention and synthesis is greatly reduced and the turf is more prone to disease. The soils will therefore benefit from a lime application every 2-4 years to maintain a target pH range of 6.0-7.0.

The electrical conductivity (salinity) values were very low (51 – 103 $\mu\text{S}/\text{cm}$). The very low salinity itself would not present any growth restrictions on plants; however, the low levels of salts in solution suggests deficiencies in available plant nutrients (as indicated by the nutrient analysis results – see below).

The electrical conductivity values by CaSO_4 extract were low.

Organic Matter & Nutrient Status

The topsoil samples were adequately supplied with organic matter and extractable magnesium, with slight deficiencies in total nitrogen and extractable potassium. The levels of extractable phosphorus were very low. These deficiencies may be addressed by appropriate fertiliser applications as part of the pitch maintenance programme.

5.2 Results of Analysis – Subsoil

Soil Texture

The Profile 1 subsoil sample fell into the *clay loam* texture class (medium texture), whilst the Profile 2 subsoil sample fell into the *sandy loam* texture class with a broad particle size distribution.

Medium textured subsoils such that in Profile 1 are typically reliant on good soil structure to enable adequate soakage. The physical condition of the Profile 1 subsoil currently appears to be satisfactory, however, faint mottling was recorded which suggests at least occasional waterlogging.

The Profile 2 Subsoil may be prone to particle interpacking and self-compaction, whereby smaller particles interpack the pore spaces created between larger particles. The subsoil may restrict the downward movement of water from the overlying topsoil. This may in turn cause seasonal waterlogging within the topsoil as water backs up the soil profile after periods of prolonged rainfall.

Stone Content

The stone content of the subsoil samples was moderate and as such, stones would not constitute a limitation for sports pitch subsoil.

pH Value & Electrical Conductivity

The subsoil samples were found to be acid to slightly acid in reaction (pH 5.9 – 6.2).

The electrical conductivity (salinity) values were very low (22 - 51 $\mu\text{S}/\text{cm}$), indicating that soluble salts were not present at levels that would be harmful to plants.

Organic Matter Content

The subsoil samples contained low levels of organic matter, which is considered typical of subsoil material.

6.0 DISCUSSION AND RECOMMENDATIONS

Tim O'Hare Associates LLP has carried out an agronomic assessment to assess the quality of the existing soils and turf within the 3 No. football pitches at Mapledurham Playing Fields.

6.1 Soil Quality

The topsoil conditions were consistent across the playing field, comprising an acid, moderately stony, non-saline sandy loam with a broad particle size distribution.

The subsoil was slightly variable comprising either a slightly acid, slightly stony, medium clay loam or acid sandy loam with a broad particle size distribution. The variation in particle size distribution would not be considered sufficiently significant in this instance to consider each subsoil type separately with regard to their drainage properties.

There were unusually deep topsoil depths (average 430mm) across the site in relation to sports pitch use. Sports pitch topsoil is often typically between 150-300mm in depth.

The overall stone content of the topsoil was moderate, with most of the stones currently located below the upper 100-150mm of the topsoil. As such, the overall proportions of stone should not constitute a limitation for the sports pitches, *provided* the soil profile remains undisturbed. If any significant regrading works are proposed in future, it would be necessary to reduce the proportion of stones in the upper topsoil.

The chemical composition of the soils is generally acceptable for sports pitch grass cultivars, provided the nutrient levels are supplemented by an appropriate fertiliser regime and the pH of the topsoil is raised slightly and maintained.

The main limitation posed by the topsoil is associated with its broad particle size distribution. Such soils are prone to particle interpacking and compaction, especially when it is in a wet and plastic state. These conditions affect the function and usage of the sports pitch, and this is exacerbated if the usage hours over the winter months are high.

The subsoils may restrict drainage from the overlying topsoil during periods of heavy or prolonged rainfall. The performance of the topsoil and subsoil for sports pitch use could potentially be improved with some form of drainage assistance.

6.2 Turf Quality

The overall quality of the turf is poor to moderate in relation to use for winter sports (football). Evidence of wear was observed in play 'hotspots', such as football goal mouths and centre circles. Significant surface undulations were recorded within these hotspots and as such, localised infilling and regrading may be necessary here.

In order to improve the quality of the sward, a more intensive maintenance programme may be considered (depending on budget constraints etc), e.g. overseeding and heavier / more frequent topdressing application.

6.3 Current Quality and Usage Potential

The overall condition and quality of the existing sports pitches was reasonable, with acceptable pitch orientation, evenness (apart from excessive wear 'hot spots'), soil depths, soil chemistry, root development and grass species.

The limitations for these pitches appear to be high usage levels, compacted surface, limited maintenance and low fertility status. These issues have resulted in a deterioration of the playing surface across parts of each pitch, especially goal mouths and centre circles. If the same level of usage is to be sustained, additional treatments will be required to maintain a satisfactory playing surface.

6.4 Drainage Considerations

The pitches are currently undrained. With the current soil conditions, this would generally allow up to 3 hours of junior play or 1-2 hours of adult play per week without a high risk of deterioration.

Sport England considers the following 'guideline' weekly usage hours to be applicable to the following drainage system types (although this does not necessarily consider other factors, such as soil type, climate and maintenance regimes):

Drainage Type	Adult weekly use hours	Youth (15 years or below) weekly use hours*
Undrained	Up to 2	Up to 3
Pipe Drained	2 – 3	3 – 4.5
Pipe drained with mole drains	2 – 4	3 – 6
Pipe drained with sand grooves	3 – 6	4.5 – 9
Pipe drained with slit drains	3 – 6	4.5 – 9
Pipe drained with topsoil and drainage layer	3 – 6	4.5 – 9
Pipe drained with suspended water table	4 – 6	6 – 9

* Usage hours for players 15 years or younger will increase by approximately 50% compared to that of adults.

To provide a good playing surface, especially for winter games pitches, it is necessary to have well-drained turf. Experience has shown that winter pitches with consistently dry turf will withstand a large amount of play and only require minor renovations. Turf surfaces used for sport should be moist enough to sustain grass growth, but the surface should not be so moist as to adversely affect the quality of play.

Drainage assistance is often necessary in order to enable more play to take place and to reduce the risk of pitch deterioration. Three games a week can damage a pitch intensely and four games a week can be critical if the pitch is too wet and non-drained. One game played on a very wet pitch can damage the sward so intensively that the playing quality is affected for the rest of the season. Management of the pitches to prevent excessive wear when wet is therefore of vital importance (see Section 6.6 below).

Problems of Poor Drainage

Poor drainage quickly becomes apparent as soon as too much play is permitted with wet ground conditions. By then it may be too late to rectify the situation until the winter is over and in the meantime the players have to contend with poor playing conditions, cancellations and disruption to fixture lists. It is however, the long-term effects which are likely to be the most damaging.

Excessive moisture on the surface will generally lead to:

- reduced aeration of the soil
- reduced root development
- no resistance to wear
- less drought resistance
- slow growth in Spring
- susceptibility to disease

The final result is a grass coverage that has no durability and that will not support the amount of play expected from a winter sports pitch.

Pitch Usage and Drainage Design

The extent to which drainage is required depends not only the natural drainage of the site, but also on the amount and type of use. There are a number of possible options for the drainage of the sports pitches, depending on the quality of pitch required, the hours of usage and the level of on-going maintenance provided.

The removal of excess water from the surface can be achieved by a number of means including:

- decompaction treatments (e.g. verti-draining, groundbreaker)
- heavy sand top dressing
- installing a primary land drainage system
- installing sand slits/bands (secondary drainage)
- ameliorating the existing soils with sand
- importing a new rootzone material

In this instance, the performance and the potential usage capacity of the pitches could be improved by some form of positive drainage (e.g. pipe network with sand grooves). Furthermore, the topsoil's resistance to smearing and compaction, and the connection between the surface and the drainage system, could be improved by sand amelioration and/or by heavier and more frequent topdressing applications.

If a piped positive drainage system is to be considered, a suitable outfall will be required. Sustainable drainage principles would need to be considered to retain drainage water on site to manage the flow of the water at the discharge point.

If installation of a drainage system for the existing pitches is not desirable (e.g. due to budget constraints or disruption to fixtures), as a minimum, the drainage of the upper part of the soil profile may need to be improved by other means.

This could be achieved through implementation of the following measures:

- regular decompaction work
- sand topdressing
- installation of sand grooves or sand slits

6.5 Sports Pitch Maintenance Recommendations

It is essential that the pitches are maintained properly to facilitate transmission of water quickly from the surface and ensure the efficacy of any new drainage system.

The following maintenance treatments are recommended in order to support the grass growth and improve drainage (regardless of whether a formal drainage system is installed). Each maintenance treatment is discussed below.

Decompaction

Decompaction of the soil profile improves soil aeration, drainage and microbial activity. It is an essential treatment for winter games pitches. It encourages new root growth and root extension, improves water infiltration, percolation and attenuation, and assists with evenness of the surface. A verti-drainer is the a common tool for decompacting the surface and sub-surface layers, and the aim is to achieve a treatment depth of 250-300mm. Alternatively, or in conjunction with, a groundbreaker may be used.

Aeration

One of the main aims of sports pitch management is to promote rapid infiltration of rainwater quickly from the surface into the soil so that play can commence quickly after rain has fallen. As such, the ground will also require regular aeration work (e.g. slitting, spiking) to aid the transport of air and water within the soil.

Based on our observations, slitting work appears to have recently taken place over Pitch 1 and Pitch 2. This is a particularly useful treatment during the football season as the surface gets increasingly compacted and sealed. However, this treatment must not be carried out when the pitch soils are wet as it will result in smearing and compaction that outweighs the benefits of the treatment.

Topdressing

Heavier and more frequent sand top dressing is recommended to improve wear tolerance and surface evenness. Sand top dressing, especially when used in conjunction with verti-draining, improves and maintains water infiltration. This will be particularly beneficial for fine textured soils such as those on this site.

Application with a drop spreader with drag mat immediately after verti-draining allows some of the sand to enter the voids created, and encourages grass roots to grow deeper. If it is carried out year on year, it partially replaces the surface soil layer and thereby improves the wear and tear properties of the pitch.

Overseeding

Bare patches within the playing field require overseeding (effectively re-seeding) as part of the renovation programme in order to re-establish a grass cover..

It is recommended that overseeding is achieved using a disc/slot seeder working in 3 directions. Broad cast seeding is not appropriate as it offers a low percentage of germination and does not promote deep rooting. Overseeding in Spring should be carried out to enable germination and establishment before the hotter summer months.

Overseeding may not be required each year if the management of usage and on-going maintenance prevents widespread deterioration of the turf. There may be a requirement to overseed certain areas of the playing field, for example where repetitive training is carried out.

A seed mix containing hard-wearing grass species is recommended, such as perennial ryegrass. Shade tolerant seed mixtures may be required for pitch areas affected by shade from trees on the playing field boundaries.

Seed mixtures and sowing rates should be in accordance with Sports Turf Research Institute (STRI) guidelines.

Fertilising

The current overall fertility status of the topsoil is low with slight deficiencies total nitrogen and extractable potassium and very low levels of extractable phosphorus.

The turf will require applications of suitable fertilisers to encourage strong growth and to get the grass into a better condition for each new season. It is important not to overfeed, particularly with nitrogen as this only supports "top growth". Fertiliser application must not be carried out in isolation without first having undertaken the other renovation treatments.

Lime Application

The acid pH of the topsoil should be amended every few years by the application of agricultural-grade lime.

Weed control

The overall weed population across the playing field is low and as such, the current weed control measures in place appear to be effective.

Weed control should typically include application of a suitable broad-leaf selective herbicide suitable for sports pitches as necessary, following manufacturer's specification and health and safety guidelines. A BASIS qualified contractor should be used to apply all herbicides (and pesticides).

Regular mowing will also help to weaken and control weeds.

Scarification

Scarification of the turf helps to prevent build-up of thatch, moss and algae, thus improving aeration and encouraging new grass growth.

Mowing

The mowing height of the grass is currently reasonably consistent and acceptable for winter sports use.

Regular mowing is very important during the grass growing season to produce and maintain a dense sward and consistent surface. It also encourages strong tillering of newly germinated grass following overseeding.

The cutting frequency is likely to be weekly to fortnightly should prevailing weather conditions encourage rapid growth. Care needs to be taken not to mow too short or too frequently if the weather is too hot or dry, as this can seriously damage the turf. The grass height should not be reduced by more than 33% on any one occasion.

6.6 Management of Usage

Careful management of the use of the pitches is important to prevent unnecessary damage and prolong the life of good quality playing surfaces.

Natural turf pitches that are used in the non-growing season for four games a week spread out over a seven day period will not wear as fast as pitches that accommodate four consecutive games on the same day or on consecutive days. Cancelling matches when ground conditions are not suitable will ensure increased use in the long term, as the pitch will not become as severely damaged as if it would if played on in poor weather conditions.

Acceptable limits of usage need to be made so as not to make the game either dangerous or unacceptable, and to enable the structure of the surface to be retained to allow future games to take place without weeks of renovation being required.

When a pitch is played on in poor weather the surface can become denuded very quickly, this may substantially increase the cost of renovation works at the end of the season. One game played upon a pitch after or during inclement weather can seriously destroy the structure of the surface; in some instances making the pitch almost unplayable for the rest of the season.

TOHA would like to thank Ryder Landscape Consulting Ltd for entrusting the practice with this commission. TOHA trusts this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned for further assistance.

Ceri Spears
BSc MSc MScSoilSci
Senior Associate

For and on behalf of Tim O'Hare Associates LLP

Report Qualifications

TOHA's interpretation of the soil conditions is based on observations made during the site investigation. This report presents the site observations and test results and TOHA's interpretation of those observations and results. On any site there may be variations in soil conditions between these exploratory positions. TOHA can therefore not accept any responsibility for soil conditions that have not been exposed by this investigation.

This investigation considers the re-use of the existing soils for sports pitches at Mapledurham Playing Fields, Reading, Berkshire. It should not therefore be relied on for alternative end-uses or for other schemes. This report has been prepared solely for the benefit of the client Ryder Landscape Consulting Ltd. No warranty is provided to any third party and no responsibility or liability will be accepted for any loss or damage in the event that this report is relied upon by a third party or is used in circumstances for which it was not originally intended.

Appendix 1

Site Plan – Extent of Survey Area



— = Survey Area Extent

Appendix 2

Site Plan – Trial Hole Locations



■ - Trial Hole Location (approx.)



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	Ryder Landscape Consultants Ltd		
Project:	Mapledurham Playing Fields - Agronomic Assessment		
Job ref no.:	TOHA/16/3961/CS		
Drawing no.:	3961/1		
Drawing title:	Trial Hole Locations		
Date:	Feb'16	Scale:	NTS
Drawn by:	CS	Checked by:	TOH

Tim O'Hare Associates LLP
Howbery Park Wallingford Oxfordshire OX10 8BA
T: 01491 822653 F: 01491 822644 E: info@toha.co.uk
www.toha.co.uk

Appendix 3

Site Plan – Turf Assessment Locations



■ - Turf Assessment Location (approx.)



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	Ryder Landscape Consultants Ltd		
Project:	Mapledurham Playing Fields - Agronomic Assessment		
Job ref no.:	TOHA/16/3961/CS		
Drawing no.:	3961/2		
Drawing title:	Turf Assessment Locations		
Date:	Feb'16	Scale:	NTS
Drawn by:	CS	Checked by:	TOH

Tim O'Hare Associates LLP
Howbery Park Wallingford Oxfordshire OX10 8BA
T: 01491 822653 F: 01491 822644 E: info@toha.co.uk
www.toha.co.uk

Appendix 4

Outline Trial Hole Record



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Outline Trial Hole Record

Client: Ryder Landscape Consultants
Site: Mapledurham Playing Fields
Job: Agronomic Assessment
Date: February 2016
Our Ref: TOHA/16/3961/CS

TH1
GL – 0.39m Topsoil
0.39m – 0.60m Profile 1 Subsoil
0.60m Excavation terminated

TH2
GL – 0.48m Topsoil
0.48m Excavation terminated (too stony)

TH3
GL – 0.45m Topsoil
0.45m – 0.60m Profile 1 Subsoil
0.60m Excavation terminated

TH4
GL – 0.45m Topsoil
0.45m – 0.60m Profile 1 Subsoil
0.60m Excavation terminated

TH5
GL – 0.45m Topsoil
0.45m – 0.60m Profile 1 Subsoil
0.60m Excavation terminated

TH6
GL – 0.45m Topsoil
0.45m – 0.60m Profile 2 Subsoil
0.60m Excavation terminated

TH7
GL – 0.36m Topsoil
0.36m – 0.60m Profile 2 Subsoil
0.60m Excavation terminated

TH8
GL – 0.46m Topsoil
0.46m – 0.60m Profile 2 Subsoil I
0.60m Excavation terminated

TH9
GL – 0.45m Topsoil
0.45m – 0.60m Profile 2 Subsoil
0.60m Excavation terminated

TH10
GL – 0.39m Topsoil
0.39m – 0.60m Profile 1 Subsoil
0.60m Excavation terminated

TH11
GL – 0.41m Topsoil
0.41m – 0.60m Profile 2 Subsoil
0.60m Excavation terminated

TH12
GL – 0.39m Topsoil
0.39m – 0.60m Profile 2 Subsoil
0.60m Excavation terminated

Appendix 5

Turf Assessment Results



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mapledurham Playing Fields - Turf Assessment - 15/02/2016

Performance Property	Pitch No.	P1	P1	P1	P1	P1	P2	P2	P2	P2	P2	P3	P3	P3	P3	P3	P1	Average
	Location No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	Unit	Score																
Grass Height	mm	35	35	35	60	45	30	45	40	45	45	45	40	40	45	50	65	44
Ground Cover	%	4	91	4	96	26	2	70	2	77	2	44	83	29	43	96	100	48
Bare Area	%	96	9	96	4	74	98	30	98	23	98	56	18	71	57	4	0	52
Weeds	%	0	1	2	0	0	0	0	0	1	0	0	0	0	0	1	10	1
Moss	%	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Algae/Lichen	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Undesirable Grass Species	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Desirable Grass Species	%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Disease	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worms	%	0	2	0	4	3	4	4	2	1	7	0	4	2	3	1	4	3
Evenness	3 m/st/e: mm	30	6	8	12	35	15	12	10	20	21	17	6	6	7	15	21	15

Appendix 6

Laboratory Analysis Results



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	Ryder Landscape Consultants Ltd
Project:	Mapledurham Playing Fields
Job:	Football Pitches - Agronomic Assessment
Soil Type:	Topsoil
Date:	February 2016
Job Ref No:	TOHA/16/3961/CS

Sample Reference		Accreditation
Clay (<0.002mm)	%	UKAS
Silt (0.002-0.05mm)	%	UKAS
Very Fine Sand (0.05-0.15mm)	%	UKAS
Fine Sand (0.15-0.25mm)	%	UKAS
Medium Sand (0.25-0.50mm)	%	UKAS
Coarse Sand (0.50-1.0mm)	%	UKAS
Very Coarse Sand (1.0-2.0mm)	%	UKAS
Total Sand (0.05-2.0mm)	%	UKAS
Texture Class (UK Classification)	--	UKAS
Stones (2-20mm)	% DW	GLP
Stones (20-50mm)	% DW	GLP
Stones (>50mm)	% DW	GLP

pH Value (1:2.5 water extract)	units	UKAS
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS
Electrical Conductivity (1:2 CaSO ₄ extract)	uS/cm	UKAS
Exchangeable Sodium Percentage	%	UKAS

Organic Matter (LOI)	%	UKAS
Total Nitrogen (Dumas)	%	UKAS
C : N Ratio	ratio	UKAS
Extractable Phosphorus	mg/l	UKAS
Extractable Potassium	mg/l	UKAS
Extractable Magnesium	mg/l	UKAS

**Topsoil
Sample 1**

14
31
15
12
15
7
6
55
SL
8
10
3

5.5
51
2035
0.7

3.8
0.14
16
9
102
73

**Topsoil
Sample 2**

15
29
nt
nt
nt
nt
nt
56
SL
10
2
0

5.1
103
2023
0.8

3.7
0.14
15
12
91
55

C. Spears
Ceri Spears
BSc MSc MISOilSci
Senior Associate

SL = SANDY LOAM

nt = not tested

Results of analysis should be read in conjunction with the report they were issued with

The contents of this certificate shall not be reproduced without the express written permission of Tim O'Hare Associates LLP



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	Ryder Landscape Consultants Ltd
Project:	Mapledurham Playing Fields
Job:	Football Pitches - Agronomic Assessment
Soil Type:	Subsoil
Date:	February 2016
Job Ref No:	TOHA/16/3961/CS

Sample Reference		Accreditation
Clay (<0.002mm)	%	UKAS
Silt (0.002-0.05mm)	%	UKAS
Very Fine Sand (0.05-0.15mm)	%	UKAS
Fine Sand (0.15-0.25mm)	%	UKAS
Medium Sand (0.25-0.50mm)	%	UKAS
Coarse Sand (0.50-1.0mm)	%	UKAS
Very Coarse Sand (1.0-2.0mm)	%	UKAS
Total Sand (0.05-2.0mm)	%	UKAS
Texture Class (UK Classification)	--	UKAS
Stones (2-20mm)	% DW	GLP
Stones (20-50mm)	% DW	GLP
Stones (>50mm)	% DW	GLP

pH Value (1:2.5 water extract)	units	UKAS
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS

Organic Matter (LOI)	%	UKAS
----------------------	---	------

**Profile 1
Subsoil**

21
30
nt
nt
nt
nt
nt
nt
49
CL
8
1
0

**Profile 2
Subsoil**

7
21
12
10
23
11
16
72
SL
13
7
0

6.2
22

5.9
51

2.3

2.2

C. Spears
Ceri Spears
BSc MSc MSc SoilSci
Senior Associate

CL = CLAY LOAM
SL = SANDY LOAM

nt = not tested

Results of analysis should be read in conjunction with the report they were issued with

The contents of this certificate shall not be reproduced without the express written permission of Tim O'Hare Associates LLP