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EARL SHILTON WEAVERS SPRINGS

Weavers Fields Feasibility.Docx

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09 April 2024

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EARL SHILTON WEAVERS SPRINGS

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1 INTRODUCTION

1.1 General

Earl Shilton Town Council intend to upgrade the natural turf sports pitches at their site in Earl Shilton, Leicestershire. A site investigation was required to identify those characteristics of the site relevant to the enhancement of natural turf sports pitches and to determine the most appropriate means of achieving this objective.

A site investigation was undertaken on 13 December 2023.

1.2 Contacts

The report was commissioned by Julie Morgan, Strategic Land & Planning Manager:

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1.3 Site location

The centre of the site with which we are concerned is at the location:

Nat. Grid: SP470976
OS X (Eastings) 447089, OS Y (Northings) 297602
Lat: N52:34:27 (52.57420641278492)
Long: W1:18:24 (-1.3065997535955591)
Nearest Postcode: LE9 7BN

Maps showing this location are provided in Figure 1-1.



Figure 1-1 Location of the Site

A Google view of the site, with the area under consideration shown in outline, is provided in Figure 1-2.



Figure 1-2 Contemporary Google Earth image of the site with outline of development

1.4 Existing and proposed sports provision

The area, with which we are concerned, occupies approximately 28 710 m² (2.87 ha, 7.09 acres, 0.0287 km²).

The existing arrangement of sports pitches, consisting of 3 football pitches, has been described in a drawing¹, an extract of which is shown in Figure 1-5. The pitches are labelled F1 to F3.



Figure 1-3 View across the site from the north east with existing pitches marked and labelled

At the northern end of the site, on the highest ground, an area of play equipment had been established. A single junior goal had also been put in place to the west of the play equipment.

¹ Existing provision. WSP. Nov 2022. 42523-WSPE-XX-XX-SK-L-0001_S2_P01



Figure 1-4 Play equipment and single junior goal to the north of the site



Figure 1-5 Layout of existing pitches

The existing football pitches have dimensions and conform to FA recommendations as shown in Table 1-1.

Football pitch		F1	F2	F3
Length (metres)		88.0	92.0	92.0
Width (metres)		60.0	60.0	68.0
Length (inc runoffs) metres		94.0	98.0	98.0
Width (inc runoffs) metres		66.0	66.0	74.0
Over 18 (Seniors) & U17/U18	11v11		X	
Youth U15/U16	11v11			
Youth U13/U14	11v11			
Mini soccer U11/U12	9x9			
Mini soccer U9/U10	7x7			
Mini soccer U7/ U8	5x5			

Table 1-1 Existing football pitch dimensions and conformity to FA recommendations

At the time of the site investigation, a junior pitch was also noted, oriented north-south and situated to the west of F3.

A revised layout for the site, including the construction of car parking, a pavilion and play area, has been put forward² and an extract from this is shown in Figure 1-6. The football pitches are labelled F1 to F6.



Figure 1-6 Provisional pitch arrangement proposal

These pitches have the dimensions and FA conformity as shown in Table 1-2.

² Illustrative pitch layout option. WSP. Nov 2022. 42523-WSPE-XX-XX-SK-L-00002_S2_P02

Football pitch		F1	F2	F3	F4	F5	F6
Length (metres)		100.0	100.0	100.0	73.0	37.0	37.0
Width (metres)		64.0	64.0	64.0	46.0	27.0	27.0
Length (inc runoffs) metres		106.0	106.0	106.0	79.0	43.0	43.0
Width (inc runoffs) metres		70.0	70.0	70.0	52.0	33.0	33.0
Over 18 (Seniors) & U17/U18	11v11	X	X	X			
Youth U15/U16	11v11						
Youth U13/U14	11v11						
Mini soccer U11/U12	9x9				X		
Mini soccer U9/U10	7x7				X		
Mini soccer U7/ U8	5x5						

Table 1-2 Proposed football pitch dimensions and conformity to FA recommendations

1.5 History of the site

The area with which we are concerned was probably used for arable agriculture until its first appearance in the map series with the norther field designated as 'recreation ground' between 1949 and 1973. The mapped history of the site from the mid-19th century onwards is shown in Figure 1-7 to Figure 1-11.



Figure 1-7 Outline of the site on OS 6-inch map 1840'S – 1880's (left) and on contemporary image



Figure 1-8 Outline of the area on OS 25-inch map, 1892-1914 and on contemporary image



Figure 1-9 Outline of the area on OS 1 : 25 000, 1938 - 1961 and on contemporary image

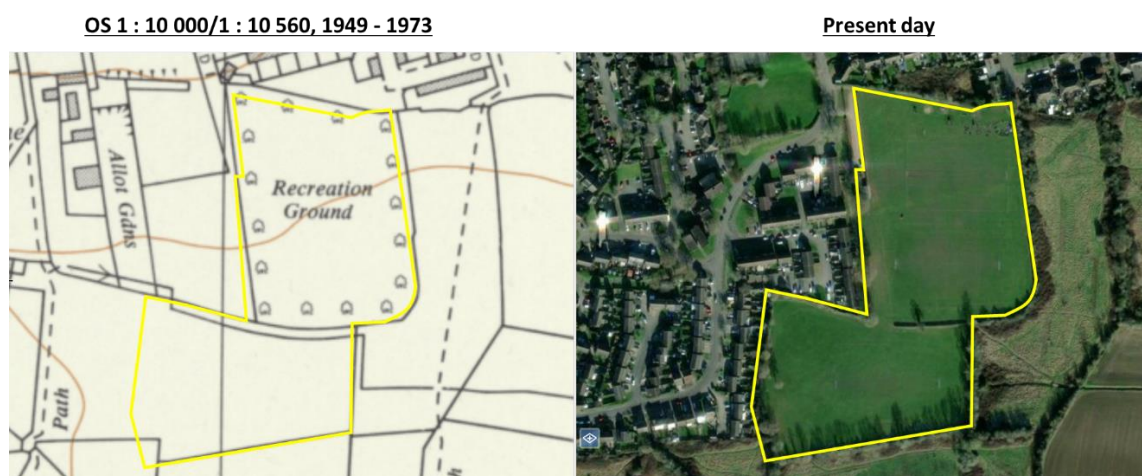


Figure 1-10 Outline of the area on OS 1 : 25 000, 1949 - 1973 and on contemporary image



Figure 1-11 Outline of the area on OS 1 : 25 000 (current) and on contemporary image

2 SITE GEOLOGY, SOIL TYPE AND HYDROLOGY

2.1 Geology

The British Geological Survey classifies the solid (bedrock) geology of the site as:

Edwalton Member - Mudstone. Sedimentary bedrock formed between 237 and 228.4 million years ago during the Triassic period.

Mudstone and siltstone, red-brown and greenish grey, with beds of indurated, variably dolomitic siltstone and very fine-grained sandstone common in the lower half; finely disseminated gypsum common in upper half.

The drift (superficial) deposits are recorded as:

Alluvium - Clay, silt, sand and gravel. Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.

Alluvium is a general term for clay, silt, sand and gravel. It is the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope. Synonym: alluvial deposits. Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.

2.2 Soil Survey of England and Wales

The Soil Survey of England and Wales classifies the soil type as being of the 'Whimble 3 Association'. These are formed on drift over Permo-Triassic and Carboniferous reddish mudstone and are described as 'Reddish fine loamy or fine silty over clayey soils with slowly permeable subsoil and slight seasonal waterlogging. Some similar clayey soils on brows. Slowly permeable seasonally waterlogged fine loamy and fine silty over clayey soils on lower slopes.'

A typical profile is shown in Figure 2-1.

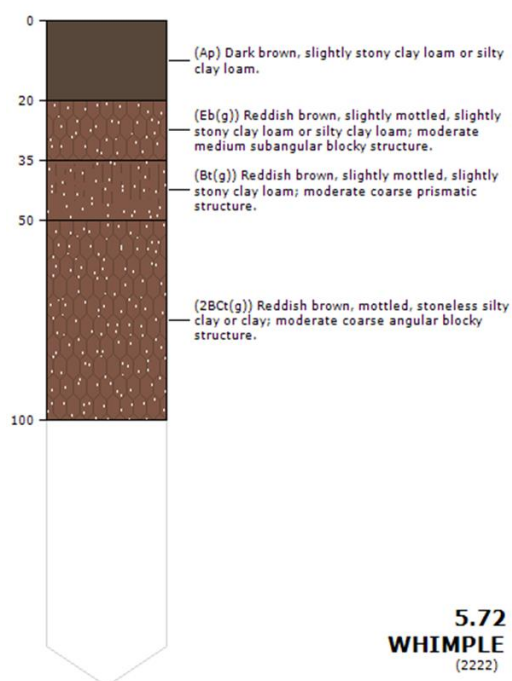


Figure 2-1 Soil Survey of England and Wales profile description of Whimble Association (Cranfield University 2016. The Soils Guide. Available: www.landis.org.uk. Cranfield University, UK. Last accessed 5/01/24)

The Soil Survey goes on to state of the Whimble 3 soils...

Detailed Description

This association of seasonally waterlogged reddish fine loamy or fine silty over clayey soils, developed in thin drift over Permo-Triassic and Carboniferous mudstone or clay shale, is widespread (1,543 km²) in the Midlands and South West England, mainly on moderate slopes. It also includes reddish clayey soils developed directly in the mudstone and wet soils on gently sloping ground. The soils occur mainly over Triassic mudstones, though in Devon they mostly overlie Permian beds. In parts of Staffordshire they are developed in mudstones of the Upper Coal Measures. Altitudes range from 10 to 230 m O.D. though most of the land lies between 50 and 150 m O.D. The dominant Whimble series, of the stagnogleyic argillic brown earths, has fine loamy or fine silty drift horizons overlying slowly permeable mudstone or clay shale and is found mainly on gentle or moderate slopes. ...

Soil water regime

Whimble ... soils suffer slight seasonal waterlogging (Wetness Class III) in many districts but in the drier parts of the region, Whimble soils can have a better water regime (Wetness Class II). ... Little

excess winter rain is absorbed because all these soils have slowly permeable subsoils. All the soils can benefit from underdrainage ...

Cropping and Land Use

Almost all the land is in agricultural use though cropping varies considerably from one district to another. In Worcestershire and Nottinghamshire, arable farming predominates, the main crops being winter cereals sown in rotation with short-term grass and oilseed rape or occasional fodder crops such as kale. Sugar beet and potatoes are included in the rotation in Nottinghamshire. Cultivations are normally confined to slopes of less than 8 degrees and are mostly on Whimple ... soils. The period suitable for landwork is more than adequate in Worcestershire and Nottinghamshire ...

Nutrient reserves are naturally good, the underlying mudstone being rich in potassium, calcium and magnesium. Lime and nitrogen are necessary to maintain fertility though slow permeability ensures that leaching losses are minimal.

2.3 Runoff characteristics

Sustainable drainage system (SuDS) design is based upon the local greenfield runoff rate. Natural turf sports pitches are, of course, green fields usually established on the existing soil so the stipulations concerning the management of runoff need not technically be applied. In many situations, however, it is necessary to incorporate pipe drainage into natural turf sports pitches. The extent to which this affects the runoff characteristics of the surface it is not possible to determine with any accuracy or by means of any established procedure. In effect, the incorporation of pipe drains alters the greenfield runoff rate as opposed to creating a new 'urbanised' feature with particular runoff qualities.

Greenfield runoff following rainfall events is divided into the more immediate 'direct' runoff and the more drawn out 'base' flow which relates to the deeper groundwater flows that come about. Our approach, where applicable, is to consider these base flow rates as indicative of the runoff enhancement that the installation of pipe drainage will bring about.

The computer modelling facility developed by Wallingford HydroSolutions and known as ReFH 2.3 is the recommended method for estimating greenfield runoff rates and volumes. The software is designed to be used in conjunction with the FEH (Flood Estimation Handbook) Web Service which gives local data referring to specific locations within the UK. This is based on rainfall modelling and on soil type. The FEH Web Service is available here:

<https://fehweb.ceh.ac.uk/GB/map>

This approach, utilising ReFH2.3, has been adopted to establish greenfield runoff rates for the present project.

The area used in the calculations is one hectare (0.01 km²).

The FEH point data for the site are shown in Table 2-1.

Key modelling descriptor	Value	Unit
SAAR (61-90)	624	mm
PROPWET	0.3	mm
BFIHOST 19	0.655	

Table 2-1 FEH point descriptors for the site

These data were then used with the ReFH 2.3 software to determine the peak greenfield runoff *rates* for storm events over a range of return periods. These are shown in Table 2-2. For the 30-year and 100-year storm event, an allowance of 40 % for climate change has also been included.

Return period	Peak runoff rates (l/s)		
	Direct	Base	Total
1 year	1.01	0.25	1.17
2 year	1.01	0.25	1.34
5 year	1.17	0.28	1.88
10 year	1.67	0.38	2.26
30 year	2.02	0.45	2.88
30 year 1.4 CC	2.59	0.56	4.25
100 year	3.86	0.80	3.69
100 year 1.4 CC	3.33	0.70	5.51

Table 2-2 Peak greenfield runoff rates (per hectare)

Greenfield runoff is divided into two components in this form of analysis. These are termed 'Direct' and 'Base' and their peak values are shown in Table 2-2. Direct runoff is that which discharges from the specified area over the surface of the natural ground or through the soil. This normally takes place within a few hours of a rainfall event, the time to peak flow varying according to soil type. Base flow is that which permeates deeper in the soil profile and discharges more slowly over a longer period, usually days. These responses may be seen in the flow patterns associated with particular rainfall events.

The greenfield flow pattern for a design storm event taking place with a 1-year return period and over 24 hours is shown in Figure 2-2.

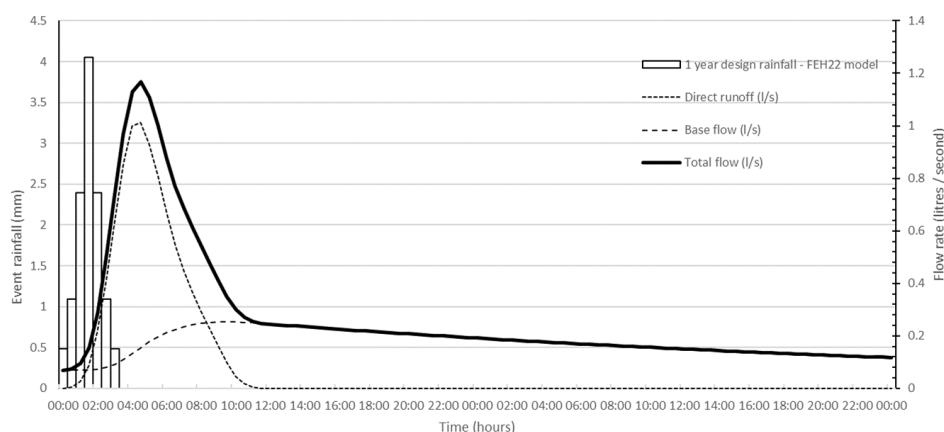


Figure 2-2 Greenfield runoff pattern over 24 hours during the 1-year design rainfall event for the location

Note in particular the differing rates as indicated by the right-hand axis. The equivalent flow patterns may readily be obtained for all of the return periods listed in Table 2-2.

2.4 Hydrology of Soil Types (HOST) classification

The soil type has an 82 % likelihood as being of HOST categorisation 21 (Boorman et al. 1995)³ and a 24 % likelihood of being of categorisation 24.

The HOST category 21 soils have air filled volume (at field capacity) greater than 7.5 % and give rise to seasonal saturated flow through the topsoil and some unsaturated and by-pass flow through the subsoil. These relationships are summarised in Figure 2-3.

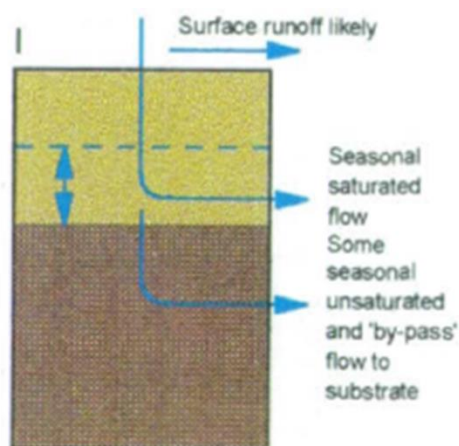


Figure 2-3 Illustration of flow pattern through category 21 HOST soils

³ Hydrology of soil types: a hydrologically-based classification of the soils of the United Kingdom. Report No. 126. Institute of Hydrology. Boorman, D.B., Hollis, J.M. & Lilly, A. (1995)

The HOST category 24 soils give rise to runoff from the surface, prolonged saturated flow through the topsoil and short seasonal unsaturated and by-pass flow through the subsoil. These relationships are summarised in Figure 2-4.

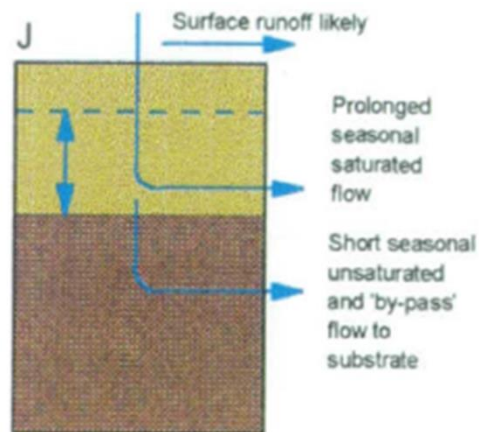


Figure 2-4 Illustration of flow pattern through category 24 HOST soils

3 CONDITION APPRAISAL

3.1 Topography and slope

A topographic survey of the site was not available. On the basis of observation and extrapolation from Ordnance Survey data, the contours of the site are likely to appear something like that shown in Figure 3-1.

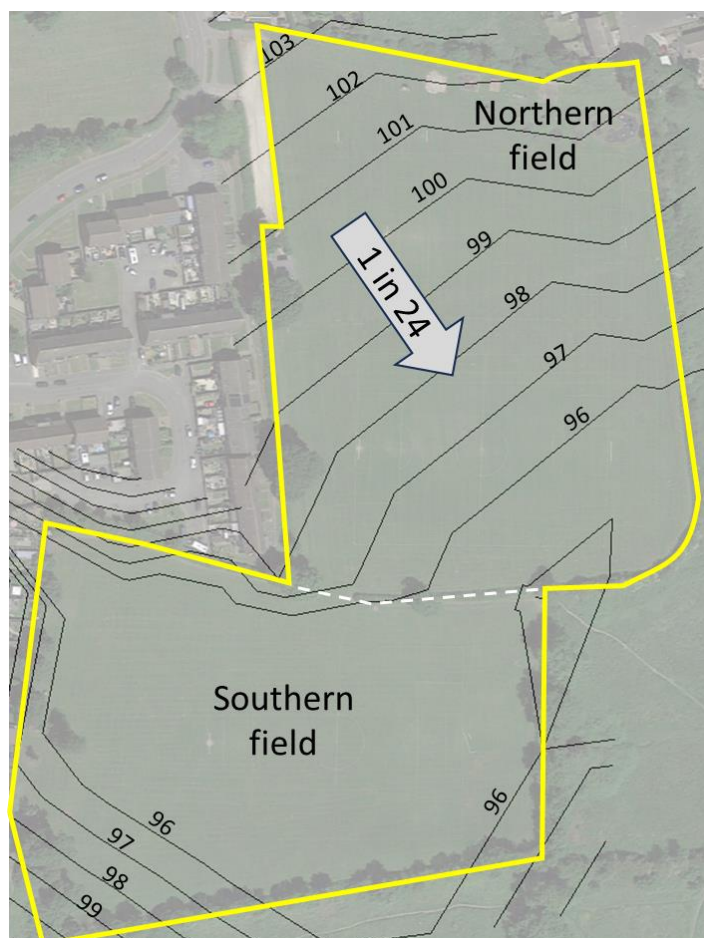


Figure 3-1 Estimated topography of the site. Contours at 1 metre intervals

The site divides into two distinct fields, separated by a section of hedgerow. The larger, northern, field fell by about 5 metres from north to south giving an average incline of around 1 in 24 (4.2 %).

The smaller, southern field lay at the base of a saucer-shaped area, falling slightly to the east and rising significantly in its south-western corner.

3.2 Access, boundaries and surroundings

The main and only formal access point is in the north west corner of the northern field, off Astley Road, where a gated entrance and small car park is situated.



Figure 3-2 Access area off Astley Road

Beyond the site perimeter are houses and gardens to the west and north and rough grassland to the east and south.



Figure 3-3 Houses and gardens to the west



Figure 3-4 Rough grassland to the east and south

An area of children's play equipment has been installed at the north of the north field.



Figure 3-5 Play equipment to the north

The perimeter is composed chiefly of largely un-maintained hedgerow and a section of lower hedgerow partially separates the two fields.



Figure 3-6 Hedgerow separating the north and south fields

3.3 Ground cover

The entire sports ground was maintained as sports turf, mown at approximately 25 mm. Perennial ryegrass dominated the sward and this was in a generally healthy condition. During the growing season, growth may be expected to be quite vigorous.

Broad-leaved species present included buttercup which was widespread and frequent. This implied generally wetter soil conditions. Daisy was occasion confirming the general fertile state of the soil particularly in the more elevated northern area of the northern field.

A substantial amount of worm casting was also noted.

Approximately 1 square metre of ground cover had been lost from the western goalmouth of F1 and F2. While all pitches had been used recently, no other significant losses of ground cover were noted within the pitches although wear from linesmen or spectators was noted, in particular to the west of the Junior pitch.

Images of the goal mouths and centre circles of the 4 marked pitches are provided in Figure 3-7 to Figure 3-10.



Figure 3-7 Ground cover in key areas on F1



Figure 3-8 Ground cover in key areas on F2



Figure 3-9 Ground cover in key areas on F3



Figure 3-10 Ground cover in key areas on Junior pitch

3.4 Drainage

No evidence of artificial or piped drainage was seen within the body of the areas with which we are concerned.

A substantial stream ran from a pipe emerging immediately to the east of F3.



Figure 3-11 Point of emergence of culverted stream

The historic map from the 1940's (Figure 1-9) shows the course of this stream crossing the southern end of the southern field and the lowest point within the site. This indicates that the stream was culverted beneath the site some time after the creation of this map.

3.5 Soil profile

An excavation in F2 appeared as shown in Figure 3-12. Topsoil extended to 250 mm. This consisted of an organic sandy clay loam with occasional rounded pebbles. Root development was extensive in this well-structured soil in which worm activity was substantial.

The subsoil was an easily worked sandy clay containing few stones.



Figure 3-12 Details of the soil profile

The excavation began accumulating ground water very quickly. This settled at a depth of approximately 450 mm.



Figure 3-13 Images of soil profile

3.6 Soil texture

The sand, silt and clay content and the organic matter content of the topsoil and subsoil are shown in Table 3-1.

	Topsoil	Subsoil
	(%)	
Sand	63	61
Silt	23	23
Clay	14	16
Organics	3.4	1.7
Textural class	Sandy loam	Sandy loam

Table 3-1 Sand, silt, clay, organic matter content of the topsoil and subsoil

3.7 Hydraulic conductivity (*in situ*) and soil structure

Hydraulic conductivity was measured using intact cores (50 mm diameter, 50 mm depth), taken from varying depths through the soil profile of the excavation. Total porosity and air-filled porosity (equivalent to field capacity) after the application of 300 mm tension for 24 hours was also determined for each of the core samples from which data the total water content at field capacity was determined. The results, with conductivity measures adjusted to 10 °C, are shown in Table 3-2.

Depth (mm)	Hyd Cond (mm/hr)	AFP 300 (%)	Total P (%)	Field capacity water content
10	36	14.66	58.38	43.72
10	100	12.38	55.95	43.57
75	0	2.20	43.24	41.04
75	0	4.80	45.50	40.70
175	0	4.00	37.84	33.84
175	0	4.86	38.68	33.83
275	0.22	5.20	38.47	33.27
275	0	1.10	34.04	32.94

Table 3-2 Hydraulic conductivity and porosity from intact cores at varying depths

Hydraulic conductivity is found consistently to be proportional to air filled porosity within the range normally encountered in sports topsoils. In Figure 3-14 this structural feature may be seen very clearly to decline with increasing depth in the samples taken from this site.

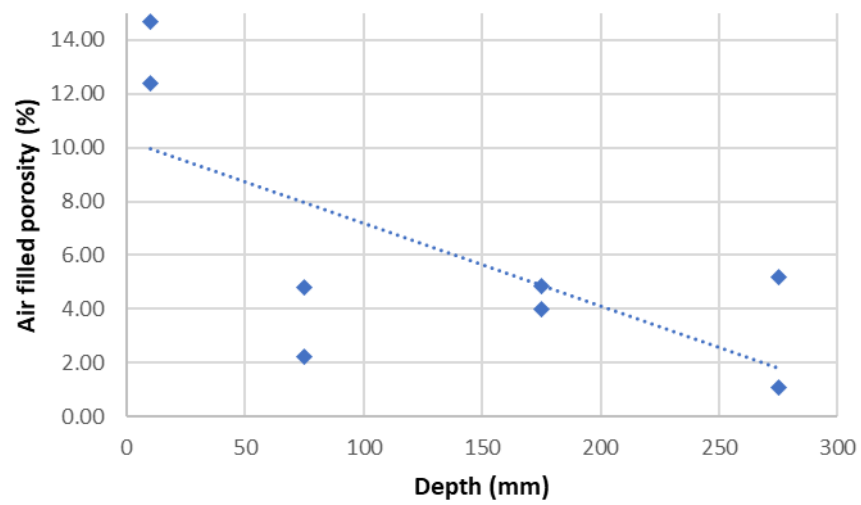


Figure 3-14 Variation in air-filled porosity with depth

4 INTERPRETATION AND COMMENT

4.1 Slope and modified topography

A provisional estimate of the earth-moving requirements of the project was undertaken. This is very far from being accurate, however, due to its being based on the Ordnance Survey data only concerning elevations. For the design documentation, it is essential that a 3D topographic survey of the site is obtained.

Incorporating the pitch layout suggested in Figure 1-6 would result in a topography something like that shown in Figure 4 1. In this, embankments are shown with slopes of a relatively steep 1 in 3 which should be achievable with the soils noted here.

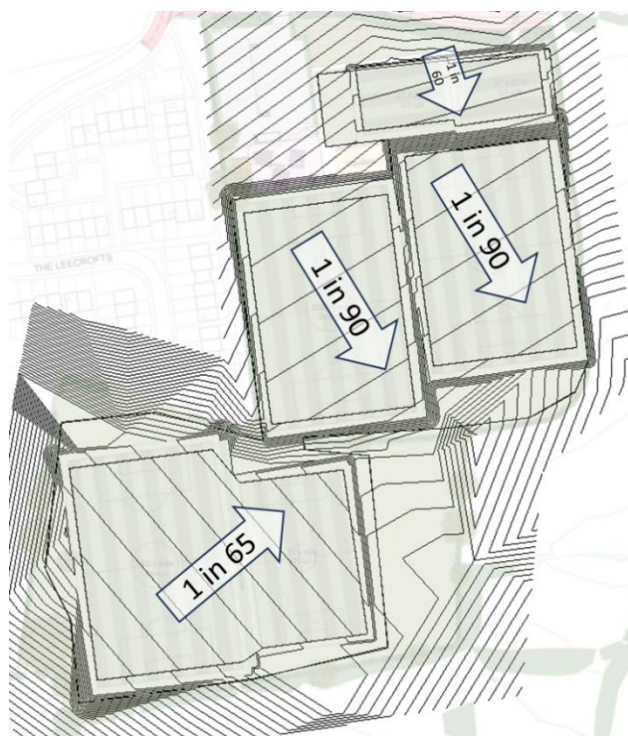


Figure 4-1 Estimated topography after correcting slopes for proposed layout. Contours at 0.25 m intervals

The layout proposal here is indicative only. In the eventual design, based on a topographic survey, appropriate accommodation of embankments will of course be made. This may affect the precise dimensions of the pitches concerned.

4.2 Earthworks

The hypothetical topography shown in Figure 4-1 has been derived by balanced cut and fill operations for each of the platforms. Such an approach would certainly be appropriate to minimise transport of material on and off site. All such soil handling and storage must be undertaken according to the guidelines set down in the Code of Practice for the Sustainable Use of Soils on Construction Sites⁴. In practice, this means that the works should be carried out at the height of summer when the soils are at their driest.

4.3 Drainage

Pipe drainage will most certainly be required for all of the newly formed sports surfaces. Although the drain spacing will be determined on the basis of the eventual design and whether or not levels are adjusted along the lines described above, a close lateral drain spacing of around 5 metres may be anticipated.

In addition, catchwater drains will need to be incorporated into the design in order to intercept surface and ground water moving down the various slopes and embankments that will exist above the playing surfaces.

Discharge to the large ditch in the south should be relatively easy to accomplish.

4.4 Soil structural improvements and surface drainage

As well as pipe drainage incorporated into the subsoil the hydraulic properties of the topsoil should also be improved to achieve the necessary performance standards. Where the topsoil has been stripped for the purposes of releveling, as will be necessary in the northern field, the incorporation of a sand carpet over the playing pitch areas is recommended. If levels and areas of existing grass cover are to be retained, as may be the case in the southern field (eastern side), sand slitting with a heavy sand dressing would be the most appropriate means of achieving this.

4.5 Seed selection

With the progress of climate change and the general need to reduce maintenance inputs as much as possible, a seed mix dominated by grass species that are tolerant of wear, drought and heat stresses would be appropriate. A reduced requirement for nutrient input (fertiliser) would also be advantageous. Accordingly, a seed mixture containing significant amounts of fescues along with the more wear-tolerant smooth stalked meadow grass (SSMG) would be preferable, as opposed to the ryegrass-dominated mixtures that are more conventionally used.

⁴ DEFRA publication. 2009

SSMG has many advantages over ryegrass but requires much warmer soil temperatures in order for the seed successfully to germinate and establish. Sowing with SSMG mixes should therefore be completed before the end of September at the latest if failures in establishment are to be avoided. If the works are undertaken in the summer months, sowing at this time should fall comfortably into a continuous schedule of works that will not require irrigation to sustain grass growth and establishment.

4.6 Timescales

Correcting the slopes in the manner described will entail the complete removal of all vegetation across the areas to be levelled. Following this removal, the topsoil will need to be stripped and set aside while the levels are formed in the subsoil. After replacing the topsoil, the drainage system should be incorporated. A suitable tilth should then be created onto which the sand carpets should then be placed. The grass should be sown into this suitably prepared surface.

The works should be timed so that the grass seed may be sown at the optimum time of year which is between late July and mid-September. Thereafter, the grass will need to establish and, if the appropriate sowing time has been achieved, it should be possible to commence light use of the surface by the following spring. Favourable weather, that is wet and warm, during September and October could bring the start date forward to December.

Although spring sowing can be successful, that success is less reliably achieved than sowing during the period described above. Fortunately, this coincides with the best time of year for carrying out earth-moving operations which is when everything is dry at the height of summer. Work on the grassed areas starting around May or June should therefore be more or less completed by the end of September.

An idealised schedule of works is provided in Table 4-1.

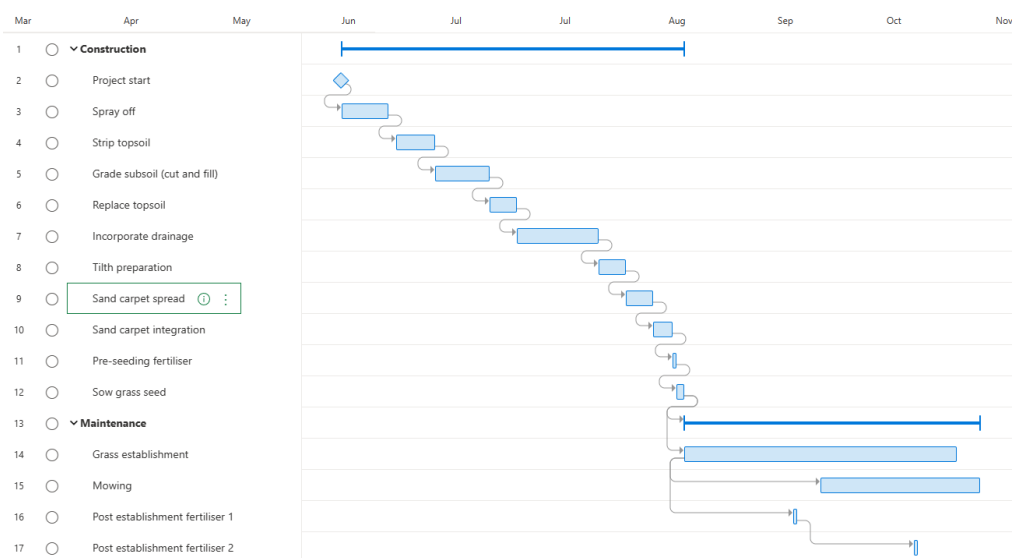


Table 4-1 Idealised schedule of works

The separation of the site into two distinct fields suggests that the development programme could readily be split into two phases, one each year over 2 years, so as to avoid any periods of no provision of natural turf sports surfaces.

4.7 Playability

Conforming to the intended standard of surface will require the treated area of the site to be maintained to an appropriate standard. Contracts for the construction works involved in projects such as this typically cover the period from the sowing of the grass to that time when play may commence on the new surfaces. The subsequent maintenance programme must be taken up by the Client at this point. Agrostis would normally provide a maintenance schedule, tailored to the particular circumstances of the site as it is created, and this should be followed more or less indefinitely after handover.

5 PROCEDURES

5.1 Design and procurement

Having undertaken the site investigation, Agrostis are well-placed to prepare the detailed design documentation for the development of the natural turf surfaces at the appropriate stage.

It is essential that a 3D topographic survey of the site is obtained prior to the preparation of further design documentation.

Our preference would be to work according to the RIBA work stages which we have adapted for sports pitch projects. This report represents RIBA stages 1 and 2. The subsequent design is a two-stage process, RIBA 3 and 4, whereby the details of the procedures to be undertaken are reviewed and revised according to the needs and expectations of the client.

When everyone is satisfied that the work described in the documentation the job may be put out to tender. We would strongly recommend that this is done among contractors who have known capabilities and reputation in this form of work. The work itself constitutes RIBA stage 5 and that work should, ideally, be supervised, with progress reports provided to the client throughout the construction and establishment period.

5.2 Summary of procedures

The procedures involved in the completion of the surfaces will be as follows:

1. Spray off grass cover from area to be treated
2. Strip and set aside topsoil from working areas
3. Grade and firm the subsoil according to design
4. Replace topsoil
5. Incorporate drainage system
6. Prepare suitable tilth
7. Apply sand carpets
8. Sow grass seed
9. Maintain developing sward during establishment period

5.3 Cost estimate

A guideline for the cost of the development as described is provided in Table 5-1. The quantities are based on the data established and described here.

The prices are derived from rates offered by various contractors for the same operations and materials in projects undertaken in the last year and in the south of England. The specification put out to tender, and following negotiations, would of course provide the definitive figures for all aspects of the work as it is determined it should go ahead.

It would be expedient to allow an additional figure of 10 % for contingencies in the contract documentation. Prices do not include VAT.

Description	Unit	Qty	Item cost	Sub-Total
Consultancy services				
Design and specification	Item		£10,133	£26,598
Procurement	Item		£1,267	
Supervision and contract management	Item		£15,199	
Contractor preliminaries				
Insurances	Item	1	£250	£2,250
Transport	Item	1	£2,000	
Vetetation removal				
Spray off	sq m	33240	£1,662	£1,662
Earthworks				
Topsoil strip	sq m	33240	£28,254	£70,673
Subsoil grade (cut volume)	cu m	8325	£20,813	
Topsoil replace	sq m	33240	£21,606	
Drainage				
Main drains	m	300	£3,150	£72,870
Catchwaters	m	400	£4,200	
Laterals	m	6162	£58,541	
Discharge	m	20	£180	
Inspection chambers	No.	8	£4,096	
Spoil handling	cu m	541	£2,704	
Grass establishment				
Tilth preparation	sq m	33240	£9,972	£98,498
Sand carpet (supply)	tns	1817	£56,328	
Sand carpet (apply and incorporate)	sq m	22295	£4,459	
Seed purchase	kg	1662	£13,296	
Pre-seeding fertiliser - supply and apply	kg	1662	£4,471	
Seeding	sq m	33240	£9,972	
Maintenance				
Post establishment fertiliser - supply and apply	kg	1163	£2,781	£7,361
Mowing operations (rotary)	No.	4	£1,800	
Post establishment fertiliser - supply and apply	kg	1163	£2,781	
			Total (Ex VAT)	£279,912
Provisionals				
Selective weed control	sq m	33240	£2,992	£2,992

Table 5-1 Estimate of costs

Signed:

A handwritten signature in blue ink, appearing to read 'Tim Lodge', with a stylized flourish extending from the end.

Dr Tim Lodge
Consultant
9 April 2024



Agrostis
SPORTS SURFACE CONSULTING