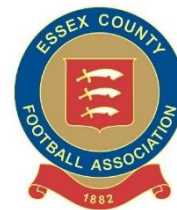




GROUNDS & NATURAL TURF IMPROVEMENT PROGRAMME



Following completion of evidence gathering for the Boroughs Playing Pitch strategy and publication of non-technical visual assessment findings to visit selected sites as directed by Nick Emery, Essex FA County Development Manager nick.emery@essexfa.com

Playing facilities were measured against the Performance Quality Standards **basic** minimum for safe, consistent and fit for play pitches at “Grass Roots” level as published and promoted by the Institute of Groundsmanship (IoG) and endorsed by the Football Association via the “Grounds & Natural Turf Improvement Programme.

Sites selected:

Venue	Post Code	Number of Pitches	Managed type
Stonards Hill Recreation Ground	CM16 4QF	3x 11v11 Adult 2x 7v7 mini	Epping town council parks department
Metropolitan Police Chigwell Sports Club	IG7 6BD	6 x 11v11 Adult 1x 7v7 Mini	In house grounds team
Ninefields	EN9 3EH	1x 9v9 Youth 2x 7v7 Mini 3x 5v5 Mini	Waltham Abbey town council parks department
Townmead Leisure Park	EN9 1JH	3x 11v11 Adult 1x 9v9 Youth 1x 7v7 Mini 1x 5v5 Mini	Waltham Abbey town council parks department

Pitch numbers referenced from Active Places <http://sports-facilities.co.uk/sites/view/6007573>

Results in below table are averaged across each site. Individual anomalies within pitches highlighted in site specific and conclusions and recommendations section.

Red Immediate action required	Amber Improvement required	Green Satisfactory			
Test area results	Benchmark Basic early season (Aug- Nov)	Stonards Hill Recreation Ground	Metropolitan Police Chigwell	Ninefields	Townmead Leisure Park
Grass height	30-50mm	40mm	30mm	20-50mm	20-25mm
Ground cover	Min 80%	95%	60%	80%	80%
Desirable grasses (Dwarf perennial ryegrass)	Min 70%	40%	20%	25%	20%
Undesirable grasses (Annual meadow grass)	Max 30%	45%	60%	55%	60%
Weeds Common annual & perennial turf weeds	Max 15%	5%	20%	20%	20%
Pests and diseases	Max 15%	5% Casting worm activity	10% casting worm activity and moles	5% casting worm activity	5% Casting worm activity
Thatch, Dead and decaying organic matter within turf mat	Max 15mm	10mm	10mm	15mm	15mm

FA Pitch Improvement Programme

5th October 2017




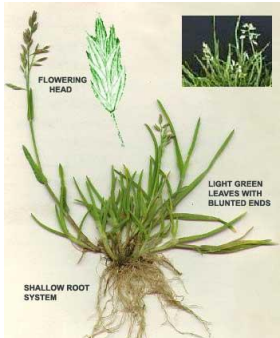
Epping Forest District Council

Root depth Of sufficient density and vigour to effectively bind soil	Min 75mm	100mm	70mm	70mm	60mm
Root zone profile Visual & 'Finger test' textural analysis	Sand dominated loam	Clay loam 100mm+	Clay loam 100mm+	Clay loam 90mm over compacted clay subsoil	Clay loam 120mm+
Compaction	Max 150 gravities	150+ at 175mm	200+ at 75mm	200+ at 120mm	200+ at 150mm
Surface levels	Max +/- 25mm over 3m	20mm	130mm Depression in goal mouths 50mm discrepancies from wear	75mm within sunken drain runs	50mm within sunken drain runs, 30mm surface undulations
Goal Posts	BS 748 compliant	Yes	No	n/a no goals in situ	Yes



*Clay loam type topsoil soil typical of
all sites.*

*National soil survey
<http://www.landis.org.uk/soilscapes/>
describes as 'Slowly permeable
seasonally wet slightly acid but base-
rich loamy and clayey soils with
impeded drainage and moderate
fertility'*

<p style="text-align: center;">Grass Height</p> 	<p>The correct mowing height encourages ‘tillering’ (formation of new shoots at the plant base), provides suitable ball roll without hindrance from long grasses. If cut shorter the plants become stressed and weed grasses are encouraged in addition to increasing likelihood of a bumpy surface. If maintained too long grasses become straggly with reduced density advancing weed and disease infestation plus adversely affecting play and player safety.</p>
<p style="text-align: center;">Ground Cover</p> 	<p>Loss of grass cover results in poor muddy conditions, increased compaction leading to waterlogging. If not remedied during close season renovations weeds and weed grasses proliferate exacerbating poor surface conditions.</p>
<p style="text-align: center;">Desirable grasses</p> 	<p>Dwarf perennial ryegrass (DPR) is the chosen grass species in all football applications. Speed of germination and establishment, tough, hard wearing with speedy recovery and vigorous rooting make it the ideal species. Any re seeding operations using DPR will contribute to raising the composition of desirable grasses.</p>
<p style="text-align: center;">Undesirable Grasses</p> 	<p>Annual meadow grass (AMG). This grass type, though the most common in the UK is considered a weed grass in sports turf. Shallow rooting with minimal disease and drought tolerance the sward is easily kicked out by players. Being an annual the grass dies back during the cooler months leading to a loss of sufficient grass coverage. Displays propensity to produce thatch as the grasses die back.</p>
<p style="text-align: center;">Weeds</p>	<p>Weeds compete with grasses for water and nutrient, smother grasses and result in loss of grass coverage. Two particularly damaging weeds Plantain and knot weed are indicative of compacted soil.</p>



Pests & Diseases



Worms conduct a valuable contribution to plant and soil health, breaking down excess organic matter, creating pore spaces and channels with the soil profile improving ingress of air, water and nutrients. Sadly this benefit is often negated by the detrimental effect of worm castings at the surface where they are easily smeared by foot or machine traffic creating muddy conditions, an uneven playing surface, smothering grasses and providing an ideal environment for weed seeds to germinate. Eradication of the worm population is neither practical nor achievable and managing both the population and the detrimental effects of casts via mechanical and cultural means is the favoured option.

Other common turf diseases include Red thread (indicative of nutrient deficiency), Fusarium (common in mild damp conditions, exacerbated by over applications of nitrogen fertiliser, thatch, annual meadow grass and poor air flow.)

Damping off (caused by over application of seed whereby grasses compete for access to air, water, nutrients and anchorage.)

Thatch



Thatch acts like a sponge, holding water and reducing its ability to pass through the soil profile. Shallow rooting and surface compaction ensue. Compounded by the high meadow grass content. Poor surface traction is also a result leading to grass coverage loss as foot traffic rips out the surface.

Root depth



A vigorous healthy root system of a minimum 100mm is required to effectively bind the soil providing enhanced resilience and recovery. Acting as a conduit for the passage of air, water and nutrients.

Compaction

Compaction is the single greatest contributing factor in the underperformance of winter games pitches. The

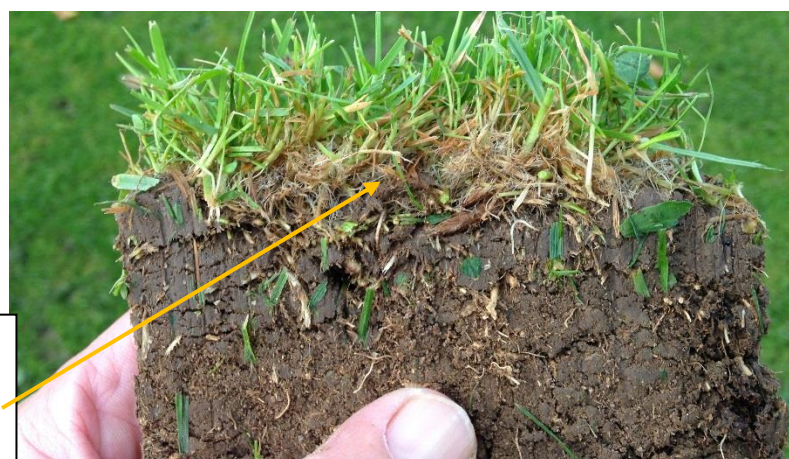
	<p>lack of macro pore spaces limit ingress of water. Air and nutrients denying the plant access and encouraging shallow rooting grasses, the production of thatch. Compacted pitches quickly become waterlogged resulting in postponed matches or played muddy conditions. Unless compaction issues are addressed consistently other actions taken to improve pitches will always be of limited value.</p>
<p style="text-align: center;">Root zone</p> 	<p>A consistent stable rootzone ideally of a stone free sandy loam nature, is the ideal. Providing drainage capacity in excess of 10mm per hour</p>
<p style="text-align: center;">Surface levels</p> 	<p>Surface levels outside of approved parameters adversely affect ball roll, attract standing water increasing grass loss and compaction. In extreme cases can contribute to a lack of player safety.</p>
<p style="text-align: center;">Goal posts & Presetation</p> 	<p>All goals should be compliant with BS748 in respect of construction, installation, anchorage and security.</p> <p>Pleasant aesthetic qualities with a smooth, even striped surface enhance player and spectator appreciation.</p>

Stonards Hill

The dedicated and committed parks department staff continue to conduct maintenance operations in a timely and effective manner.

A comprehensive management programme including regular mowing, line marking, aeration and decompaction supplemented with extensive post season renovations.

In order to enhance the quality of pitches and effect further improvement of pitch quality the addition of a combination turf grooming tool with individual adjustable attachments of surface slit, rake, brush and polishing roller is recommended.



Combination turf grooming tool.
Shallow rooting annual meadow grass

Metropolitan Police Chigwell

The pitches fall below an acceptable standard. Severe reductions in staffing, finance and resources plus groundstaff responsibility for extensive additional duties at the site restrict ground maintenance operations to mowing and line marking only.

Pitches fail to attain the required basic standard in respect of:

- Ground cover
- Surface levels
- Sward composition
- Pest & diseases
- Compaction
- Goal post safety

I strongly recommend the parent club engage with the Grounds & Natural Turf Improvement programme and request an FA Pitch Improvement visit to include full assessment of the playing facilities, machinery, equipment, groundstaff competencies and the production of a comprehensive report with attendant conclusions and recommendations plus access to ongoing and continued support to raise the quality, playability and carrying capacity of the pitches at the site.



Clockwise from top left

Unsafe goals

Bare area

*130mm surface level discrepancies
and devoid of vegetation in goal
mouth*

Mole activity

Ninefields

Scheduled for closure by the turn of the year with loss of 6 youth pitches of various sizes. Pitches are in a good condition with minor surface depressions (sunken drain runs) that can be quickly and effectively rectified, excessive weed infestation and grass height slightly too short.

As the pitches are being lost within a few months weed control is deemed surplus, a raising of mowing heights and filling of localised depressions to make surface safe will suffice.

An area at Townmead Park has been identified as a location to replace lost pitches but work will be required to bring this area up to a like for like or improved quality.

It is disappointing that provision to source, secure and bring to standard an alternative location has not been taken in advance as the user club will suffer some disruption to field availability at least in the short term.



*Depression from sunken drain run
(left).*

*Uneven mowing heights from
incorrectly set mower units (right).*

Townmead Park



Yellow marked area is identified as potential site for location of pitches from Ninefields. This area has been occasionally used as pitches in the past but is liable to flooding, combination of no installed drainage and surface compaction. The area also accommodates the town fair with considerable traffic and foot movements increasing compaction and if ground is soft at time contributing to poor surface levels.

To accommodate sustainable pitches with long term viability effective works to improve surface levels, reduce and manage compaction and improve drainage will be required. Re-location of the town fair and other non-sport related activities would also be ideal.

Drainage options

- Full piped system with primary & secondary drainage
- Primary drainage system with 'mole ploughing'
- Reconstruction and sand amelioration
- None, rely on enhanced maintenance regime.

All the above have benefits and detractions and weighing up the most viable option should encompass on going sustainability and management awareness to appreciate the full cost leading into the future.

Full piped system with primary & secondary drainage.

This system involves the installation of primary drainage at for example 5-7 metre centres supplemented with secondary drainage of sand or gravel banding at 1 metre spacing's.

It needs to be understood that the installation of primary and secondary drainage will not on its own provide enhanced playing conditions and unless an increase in maintenance regime is enacted along with considerable extra input of resource the system will quickly fail.

Bypass drainage by its very nature denies water to the plant so an irrigation supply will be needed. Increased drainage reduces nutrient availability requiring additional fertiliser inputs. To maintain effectiveness annual top dressings of a medium course sports sand will be required for a minimum of 5 years at an approximate cost of 12k per annum.

Add to this inevitable shrinkage of soil leading to requirement to 'top up' drain runs on a number of occasions during the early years Exasperated if no or limited irrigation capacity.



Sunken drainage runs through shrinkage and lack of irrigation.



Capped secondary drainage result of no sand top dressings and shrink/swell after 2 years



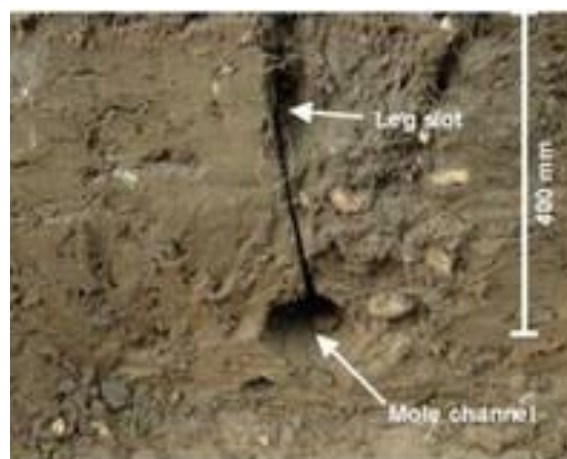
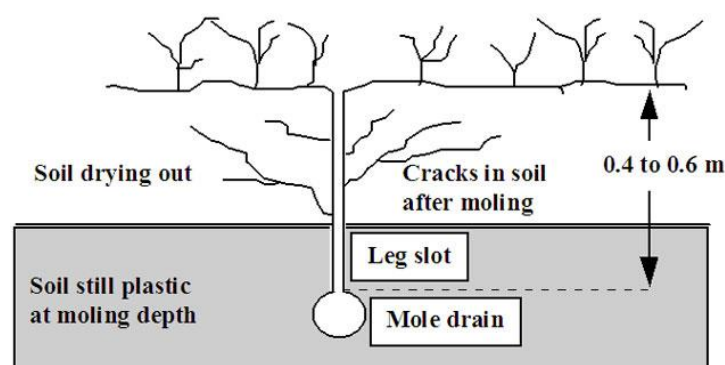
Piped drainage system with 'mole ploughing'

Install primary drainage system connected to a suitable outfall at a maximum 20m spacing's and supplement with 'mole drainage' as opposed to secondary drainage at 1-1.5m centres. A cheaper option and one which allows to revisit and install additional primaries in the future if required.

Mole ploughing should be conducted in the spring months and supplemented with two passes of a linear decompaction machine to reduce severity of surface cracking.

Mole drainage is achieved by pulling a bullet-shaped plough through the soil to create a continuous channel at depth. This channel provides a conduit for water flow. It is pulled through the soil at a depth of at least 400 mm or at a minimum 6 times the diameter of the channel formed, with a slight grade to encourage water flow.

As the plough is pulled through the soil, at approximately 1-2 m spacing, a vertical leg slot is formed, in addition a number of cracks are formed from the foot of the plough up to the surface as the soil is disturbed. These cracks form the principal bypass for water flow, connecting the surface to the mole channel. In agricultural, mole drainage surface heave is encouraged to help loosen the soil. In the drainage of sports surfaces, however, this is undesirable as surface disturbance upsets ball roll and can be a trip hazard.



There is a limited range of soil types that are suitable for mole drainage – essentially heavy, non-dispersive clay soils. The mole channel is cut by the foot, but formed by the expander. The expander forces displaced soil into the walls of the channel. In a sandy soil, the soil would simply collapse following the expander; in a clay soil, the soil is smeared and has sufficient cohesive strength to hold the channel open. As the channel dries it sets to form a hard walled channel, which can last anything from 5 to 10 years.

Further investigation of the soil type will be required before embarking on a mole ploughing operation, but as an inexpensive operation in comparison with installed secondary drainage systems it has been shown to be of benefit in many circumstances.



The first step is to look at the soil profile to a depth of about 500 to 600 mm (20" – 24"). There needs to be a layer of clay soil at 350 to 500 mm deep of a minimum thickness of 200 mm throughout your pitch. Use an auger or dig profile pits in your soil in a number of locations throughout the pitch to determine the extent of any clay layers.

To determine whether the soil is a clay try to roll moist soil into a ball; if the soil forms a strong ball which feels like plasticine, polishes and feels sticky when wet then your soil is most likely to be a clay. If you have clay at the depth and of the thickness specified you must then test whether this soil is suitable for moling. At the depth at which you will be forming your mole channels extract a handful of soil. Mould this soil into a 50 mm (2") diameter ball. You might require some moisture to do this but if the soil will not form a strong ball when moist then the soil is not suitable for moling.

You then place the ball in a container of water and leave it for 24 hours. On the following day, inspect the ball – if it remains intact then it is suitable for mole drainage. See the photographs above. The picture on the left shows two balls of two different soils (Soil 3 & Soil 5) submerged in water. The right hand picture shows the soils after being left 24 hours. Soil 5 remains intact and is suitable for mole drainage, Soil 3 has dispersed and is not suitable for mole drainage.

Reconstruction and sand amelioration.

It must be stressed that if installed drainage is the preferred option then to address poor surface levels within the area then some degree of reconstruction will be required but without incorporating the degree of sand in the initial phase.

Outline methodology

Preliminaries	To include, H&S, welfare, management, Security. site investigation (topography & soil testing) Soil testing to include Particle size distribution, Ph, organic matter, nutrient analysis (P,K, Mg)
Specification of works	Detailed specification to produce final surface that meets PQS basic standard. Including 'growing in period'.
Surface preparation works	Apply non residual total herbicide to kill off all vegetation. By means of a surface planing device (Koro) remove all surface vegetation and organic matter.

	<p>Cultivate through tops to minimum 75-100mm depth to relieve compaction</p> <p>Stone/collect bury as required reducing all aggregate to below 10mm</p> <p>Apply quantity of gypsum as soil amendment and to assist in clay flocculation.</p> <p>Cultivate and grade topsoil to a tilth suitable for any sand amelioration. Levels +/- 5mm over 3m. Import and spread medium course sports sand (exact grade dependant on result of soil testing). 50mm thick fully incorporated into top 50-75mm of topsoil. This will change the texture and structure of top soil to a 'sandy clay loam nature'. It may be possible to reduce quantity of sand used if deemed appropriate.</p>
<p>Top soil finishing works</p>	<p>Final cultivations and grading to provide levels for seeding</p>
<p>Sward establishment</p>	<p>Apply suitable pre seeder fertiliser NPK 6-10-6 or similar.</p> <p>Apply by means of a dimple seeder @ 40 grammes per square metre dwarf perennial ryegrass of at least 3 cultivars suitable for winter games use.</p>
<p>Growing in</p>	<p>With no irrigation capacity conduct works in August/September as weather cools, rainfall increases and soil is warm to encourage germination and establishment.</p> <p>Once germinated apply further fertilizer to encourage growth.</p> <p>Once established (2-3 leaf stage) mow at regular intervals maintaining sward height in 30-40mm range encouraging thickening of the sward.</p>

Prior to making any final decision and embarking on works engage a fully qualified professional consultant to act on your behalf, for example securing the assistance of the Institute of Groundsmanship Turfcare Advisory service. <http://www.iogturfcare.com/>

Operations

Rabbit damage



Rabbit damage is a constant menace on pitches, the practice of filling the holes with soil or sand of limited value as they are almost immediately dug out again. Repair damage with thick turves (wet) as this discourages rabbits from constantly returning to the same place. A

valuable tool to accomplish this is a hexagonal turf cutter as a supply can be kept to hand and the replaced turves are of a consistent size and depth.



Mowing

Throughout the playing season grass height should be maintained at 30-40mm mowing at such a frequency to never remove more than a third of the grass plant in any single operation nor leave visible grass cuttings on the surface. Always ensure mower blades are sharp, correctly adjusted and engine revolutions/ forward/ PTO speed adheres to manufacturers stipulations for maximum clip rate (cuts per metre).

In the closed season allow grasses to grow on to 40-50mm as this will provide protection from drought stress and encourage 'tillering' (formation of new shoots) and a thickening of the sward. Reduce in increments as the playing season approaches. Mowing too short in the summer months stresses the plants reducing vigour of desirable grass species and newly seeded areas plus encouraging proliferation of annual meadow grass (weed grasses) and formation of thatch. Leaving the grasses to grow in excess of 50mm during summer results in long straggly grasses with limited density.

A consistent mowing regime will improve grass density, root and shoot production, reduce weed content and provide a smoother free running surface with greater integrity and resilience. The use of a roller mower fitted with mulching blades and rear 'settling roller' provides a high quality cut and enhances aesthetic qualities.



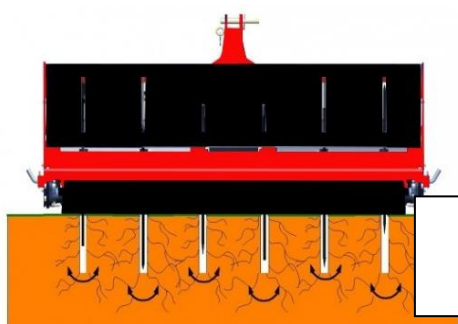
Aeration & Decompaction

Aeration and decompaction are the key to improving the performance, playing quality and recovery of winter games pitches. Through play and traffic surfaces quickly become compacted reducing ingress of water, air and nutrients, restricting rooting and in inclement weather leading to waterlogged, muddy conditions and possible postponements.

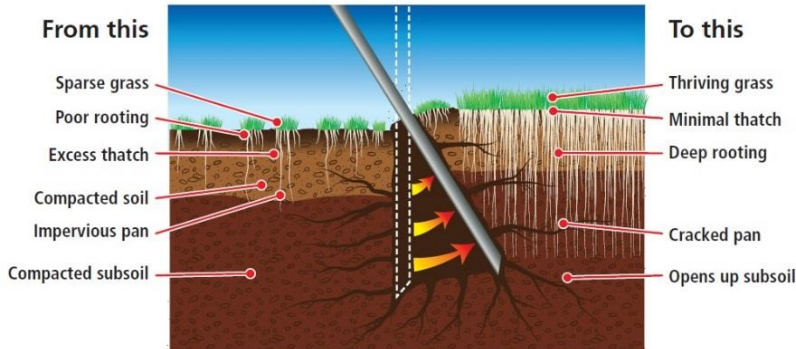
Split into three distinct categories of deep, medium and surface within the soil profile.

Deep

Conducted a minimum twice annually, spring and autumn with either vertical or linear (optional expanding leg slots) acting machinery to maximum depth and heave without disturbing surface integrity.



Linear compaction relief fitted with expanding leg slots



Vertical compaction relief

Medium

Supplement the above with regular slitting using either a drum or disc type machine at 3-4 week intervals when conditions permit. The fitment of a hydraulic top link will ensure maximum penetration (150mm+).



Drum slitter (left) Disc slitter (right) both fitted with firming roller

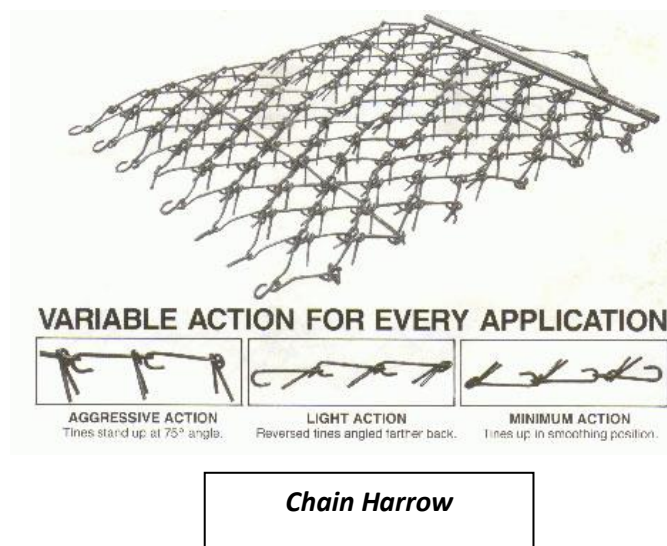


Surface.

Throughout the playing season on a weekly basis the use of a combination turf grooming tool fitted with attachments for surface slitting, rake, brush and polishing roller rotated with chain harrowing will reinstate and re-present the pitches pre and post play.



Combination turf grooming tool



Weed control

Ideally a broad spectrum selective herbicide will be applied to manage common turf weeds when they exceed 10% of surface herbage. I suggest an application prior to seeding next year with subsequent operations in future years after new grasses have fully germinated and established.

In public open access sites I understand this may prove troublesome though with modern spray machines with shrouds over the nozzle booms guaranteeing no drift a weed reduction programme is recommended. Application of substances covered under COSHH <http://www.hse.gov.uk/coshh/> regulations must only be conducted by a trained accredited operator.



Fertiliser Application.

Experience has shown that where best value the major concern one application of a controlled release product in the spring once growth commences (late March). For example a 28-5-5 NPK (or similar) product giving 20% immediate availability of nutrients and the remainder over 4-5 months offers the best combination of value and result. These fertiliser types avoid a rush of soft growth with attendant difficulty of maintaining the desired grass height and provide a 'drip' feed of nutrients over an extended period.

Post season renovations

Ideally two weeks prior to the cessation of the season disc seed with an appropriate machine a dwarf perennial rye grass mix of at least 3 cultivars suitable for winter games use at 35-40grammes per square metre in two or three passes on areas with less than 50% grass coverage. Disc seeding ensures good seed to soil contact avoiding wastage. Seed is planted into the profile offering both protection and a secure anchorage once germinated.

As soon as practicable at the conclusion of the season In areas devoid of vegetation and surface depressions attracting standing water cultivate to create a tilth and relieve compaction before incorporating a sand/soil 50/50 rootzone, firm and restore levels prior to a further light raking and seeding. If possible cover with germination/protection netting (scaffold debris netting will do) and irrigate to keep soil moist.

It is essential that either a medium/course sports sand or suitable 50/50 rootzone is used and fully integrated into the existing soil.



Details	Web Address
The Football Association (FA)	www.thefa.com
The Institute of Groundsmanship (IOG)	www.iog.org
Sport England/IOG Football Groundsmanship	www.groundsmanship.co.uk/football/football-groundsmanship
IOG Pitch training	www.iog.org/winter-pitches-training-courses
Football Stadia Improvement	http://www.fsif.co.uk/
Football Foundation	http://www.footballfoundation.org.uk/

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GROUNDS & NATURAL TURF IMPROVEMENT PROGRAMME

