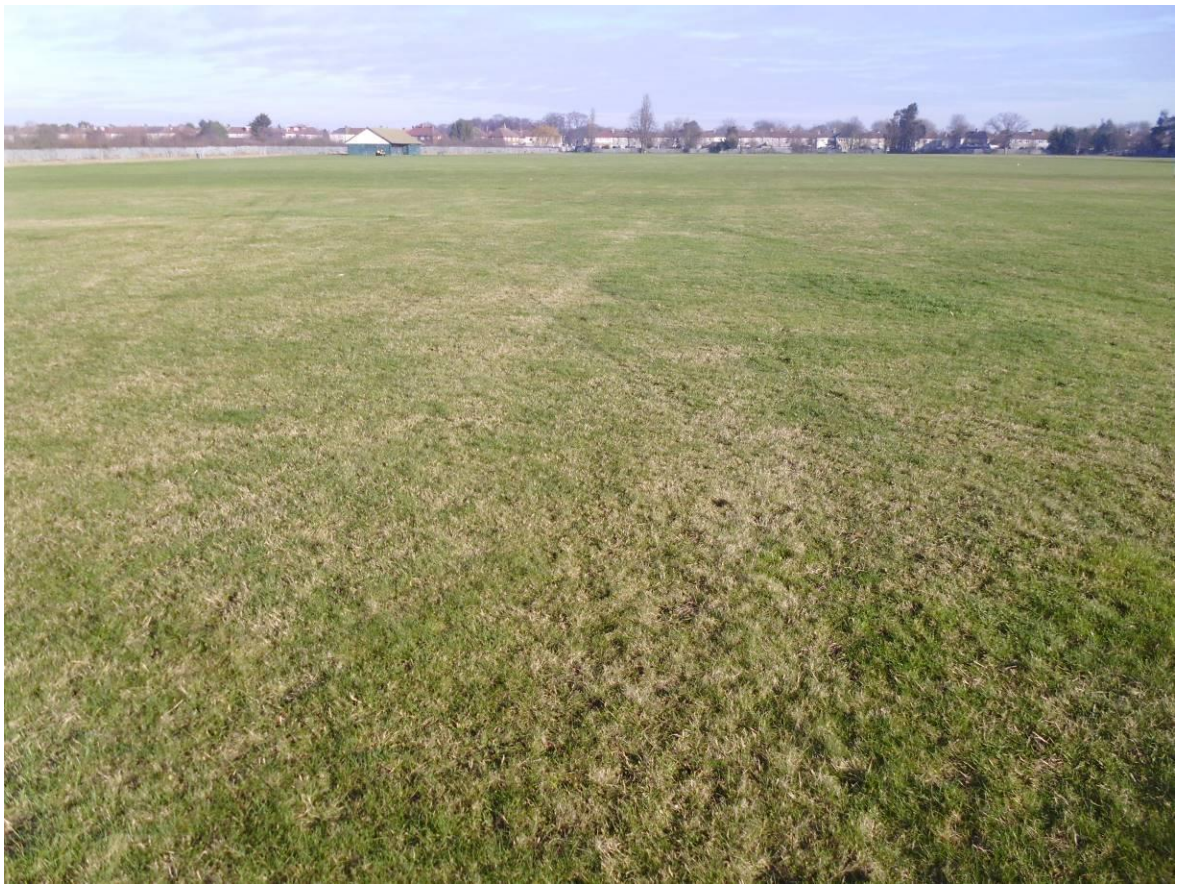
INSTITUTE OF GROUNDSMANSHIP

Consultancy Report

Pitch relocation and improvement feasibility report – London Borough of Redbridge

January 2017



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1.0 Summary

The Ford Company are looking to sell their sports ground in the London Borough of Redbridge for development. Though ultimately it will be for the Ford Company to find an alternative site for the sports pitches, the council are seeking to determine whether it would be feasible to relocate the current sports provision at the Ford Sports Ground to Goodmayes Park Extension both in respect to available space and in respect to soil conditions and potential cost. The relocation would be on a like for like basis with quality standards being as good or better than is currently the case at the Ford site. At present, it is not possible to determine the required quality as that can only be done after measuring the quality of the pitches at the Ford Ground but should this proposal be adopted then this measurement exercise would be needed to ensure final specifications for new pitches at Goodmayes will ensure the required quality is achieved.

The Goodmayes site has a gentle fall suitable for sport but there are some undulations which will require improvement via surface grading. The soils are sand dominated over gravels and are naturally freely drained. Such soils are prone to compaction, however, and this can significantly reduce infiltration rates if it is not managed effectively. Given this, additional drainage may be required to further improve the carrying capacity of the football pitches. The presence of gravel close to the surface should allow infiltration systems to be used for outfalls for any drainage schemes, though the presence of a culverted stream running under the western side of the site offers a positive outfall possibility via an attenuation system should the gravels not be a suitable infiltration receptor.

The corollary to having well drained natural soils is the need for irrigation in the summer to maintain pitch quality and avoid excessive drought stress and an irrigation system will be required for this site to enable pitches to be maintained as a suitable quality level.

The Goodmayes site has been surveyed and using the existing car park and building sizes from the Fords Ground and using FA and ECB recommended pitch sizes it is possible to relocate all the existing current provision onto the Goodmayes Park Extension site in a configuration that is workable. Two layout options are presented, one is a simple like for like replacement with the only betterment being the addition of two extra cricket pitches per square (6 in total) and two additional artificial cricket pitches. This option is the less expensive of the two options at an estimated cost of roughly between **£1,020,965.00 and £1,400,795.00** depending on whether the pitches are formally drained or not. Until pitch quality is measured at the Ford site it is not possible to determine whether full drainage will be required.

The second option is also a like for like replacement but changes one full size natural pitch for a full size synthetic 3-G pitch. This option offers a betterment of 6 additional natural cricket pitches, two additional artificial cricket pitches and up to a maximum of an extra 24 adult games of football per week or youth / junior equivalent. As a result, this option makes a small contribution to meeting the ongoing pitch requirements for the Borough based on the current PPS. This contribution made as a result of constructing a new 3-G pitch can be varied to adult, youth or junior football depending on where the need is by adjusting the use of the 3-G pitch accordingly. The rough estimated costs for this option are between **£1,706,430.00 and £1,985,500.00** depending on whether the pitches are formally drained or not. Until pitch quality is measured at the Ford site it is not possible to determine whether full drainage will be required. All estimated costs are very approximate and do not include VAT or the costs of any new buildings or car park areas.

Though it is feasible to construct new pitches to the desired quality level, for the site to be sustained at a suitable quality level will require investment in new, well qualified staff and

equipment. The council will need to develop a suitable business plan to ensure this maintenance can be provided into the future. To this end, Option 2 is most helpful as it will drive use through the week. The council should also explore other methods to raise revenue such as looking at offering a choice of pitch quality and pricing points around the borough and also explore asset transfer where this may be appropriate. In addition, placing a sum into a bond to cover the first 10 years of maintenance could also be explored.

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Limitations of this report.
Any recommendations contained within this report are not a specification of works, nor can they be guaranteed to fully correct issues or concerns found.

2.0 Introduction

The Ford Sports Ground could be sold for development by the owners but the loss of the sports ground would significantly reduce pitch provision in the London Borough of Redbridge as the pitches are of good quality and well used by tenants, especially in respect to youth football and cricket. Though the Ford Company are responsible for finding an alternative replacement site, the council have identified Goodmayes Park Extension as a possible site to relocate the pitches and facilities to should the site be sold. Though Goodmayes Park Extension used to support football and cricket use in the past, it has not had any formal football use since 2011 and no formal cricket use since 2005, with the site being currently redundant for organised sports use.

The current pitch provision at the Ford site is as detailed in Table 1 along with the proposed provision that this report seeks to assess the feasibility of providing on the Goodmayes site.

This assessment seeks to identify the works required to reinstate the provision currently at the Ford Sports Ground along with the likely works required to ensure such facilities can be sustainably managed at the same quality level the pitches currently meet at the Ford site. It also seeks to determine whether the site is large enough to support a like for like replacement of the pitches to be moved from the Ford site.

Table 1. Current pitch provision at The Ford Sports Ground and proposed pitch provision at Goodmayes Park Extension

Pitch type	Ford Site Current Number	Goodmayes Current number	Goodmayes Proposed Number
Adult football	7	0*	6
Junior football (11 x 11)	1	0	1
Mini football (7x7)	4	0	4
Mini football (5*5)	2	0	2
2G 5x5 pitch	1	0	0
3G adult football	0	0	1
Cricket squares	3 (10-pitch)	0	3 (12-pitch)
NT cricket pitch	1	0	3

*** Goodmayes Park Extension has two permanent goals located within the site which are currently used on an ad-hoc basis but no pitch is marked out and no pitches are maintained.**

3.0 Site assessment

3.1 Site history and present infrastructure

The proposed relocation sites are shown in Figure 1, along with the location of the excavated trial pits. The trial pit locations were chosen based on changes in topography and turf colour as indicated on aerial photography over time. Given the size of the site (Goodmayes Park Extension is approximately 11 ha of amenity grassland, paths and other infrastructure) it was not possible to sample on a close scale, however key locations were considered and a general pattern of soil variability was determined. The majority of the soil under in the park is a Sandy Loam / Sandy Silt Loam topsoil leading to gravel at typically 200 – 300 mm depths. The subsoil becomes more gravel dominated with depth with over 70% of the soil mass comprising gravel below 500 mm depth. The exception to this is a small section to the east and south east of the site shown as being much greener in colour on Figure 1 than the remaining part of the site. This is due to the topsoil being much deeper in this area and though still sand-dominated, with the extra depth of topsoil and gravel-free subsoil (the gravel is not encountered until 700 mm depth) holding more water for the grass to use thus making the sward more drought tolerant in this area. On Figure 1, the distribution of the shallower, gravelly soil is shown by the brown and light brown turf cover with the deeper, less gravelly soils occurring where the grass remains green. This has been roughly marked on Figure 1 to show the approximate location between the two soil types.

There was no evidence of previous drainage under the park though some linear features do show up on the aerial photographs these are more likely to be water pipes running out the old cricket squares, occasional footpaths running over the park between the various gates or the outlines of previous football pitch line marking where the extra Calcium in the lime used to mark the pitches has improved soil structure and turf quality over time.

In addition to the general soil investigations, the two old cricket squares on the site were visually assessed in respect to turf quality and 2 shallow soil pits were excavated in each square to determine the construction profile (Figure 2). Samples from these pits were sent off for analysis to determine the soil texture using the Pipette Method. This is method is the most accurate way to determine the sand, silt and clay content of the soil and is very important for sports such as cricket and lawn tennis. In addition, samples of topsoil and some samples of subsoil were taken from the excavated soil trial pits and sent for analysis to determine soil texture (percentage sand, silt and clay using the less accurate laser method), pH and the relative abundance of Potassium, Phosphorus and Magnesium. The results from this analysis are presented in Tables 2 and 3.

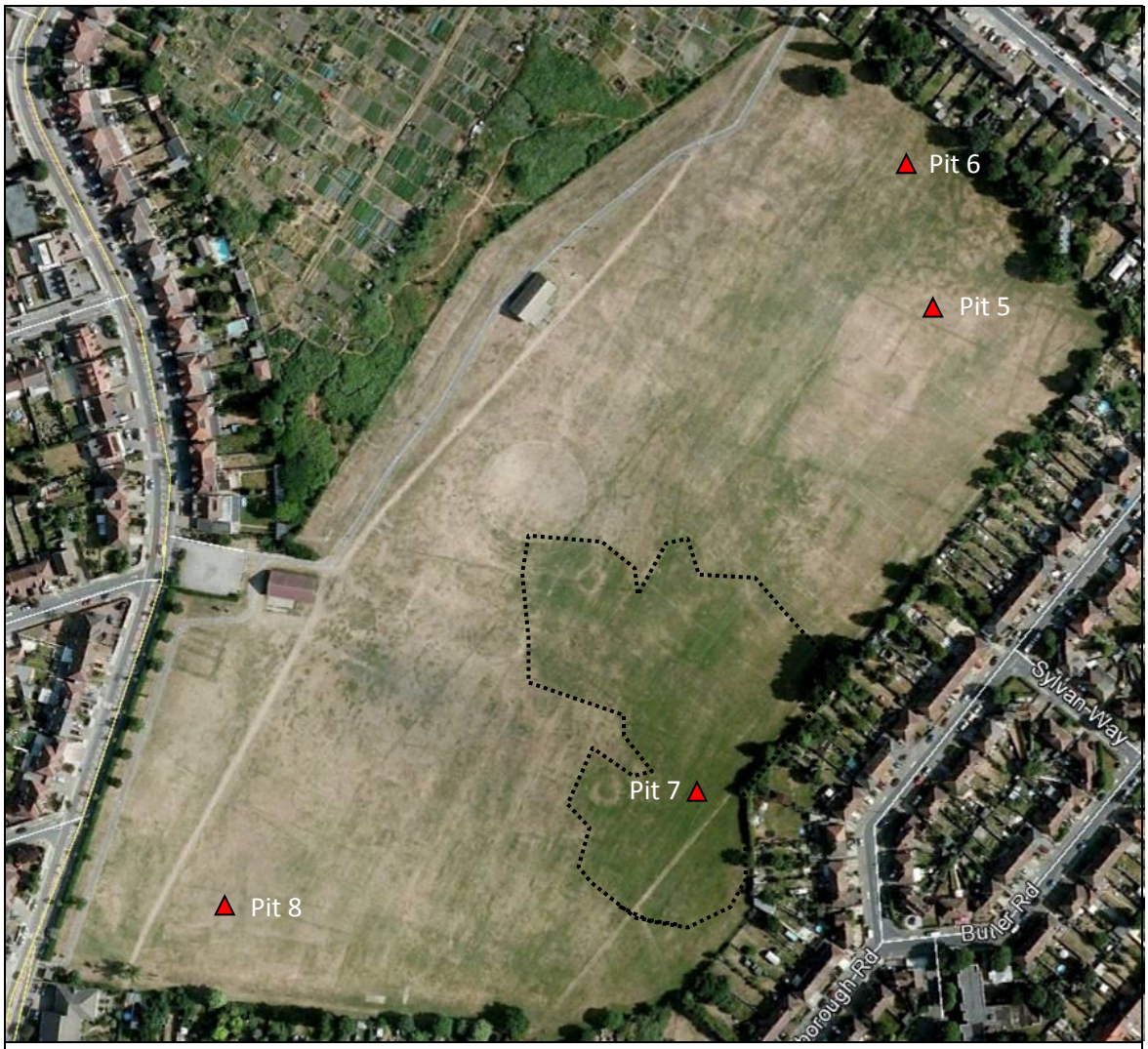

Figure 1. Goodmayes Park Extension and location of trial pits 5-8 (image taken June 2010). Approximate boundary between deeper and shallower soils marked by hashed line with the greener grass denoting the deeper soils.

The differences in soil type are clearly apparent on Figure 1 with the more speckled soils around Pit 6 reflecting small variations in surface levels where shallow depressions hold more water than the higher areas around them. Though the differences in height are small (no more than 200 – 300 mm) this is enough to catch and hold more water relative to the surroundings, thus producing a greener sward in dry periods.

The distinct linear feature running alongside the footpath that flows the western edge of the park is a culverted watercourse that flows from the lakes in Goodmayes Parks to the north, under this part of the site and off to the south. The reinstatement works over the culvert have been poorly carried out with this strip still visible over 16 years after the works were completed. This is due to the soil over the culvert being too shallow and sitting too wet in winter and too dry in summer. Ideally this should be improved if the culvert is to be reinstated properly. Currently the main car park is located off Goodmayes Lane and though sufficient for the current use of the site would need to be expanded significantly if the site is to be redeveloped.

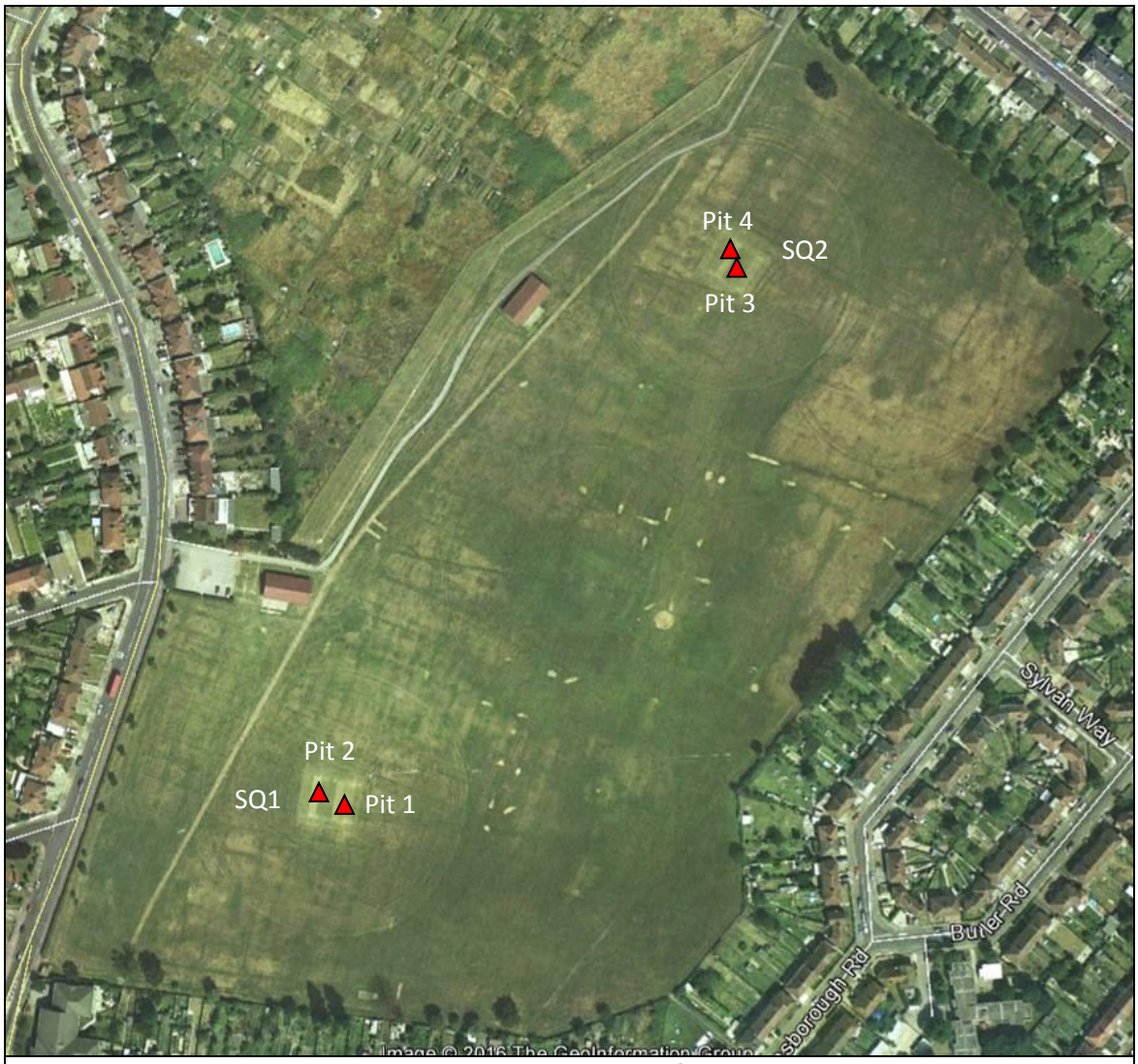

Figure 2. Goodmayes Park Extension and location of the two old cricket squares since abandoned and the shallow trial pits excavated in each square (image taken 2005).

The presence of the culvert could indicate that the site is an active floodplain however this is not the case with the Environment Agency Flood risk maps denoting the whole of the park to be Zone 1 land (land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%) – Figure 3).

It is possible that the culvert could act as an outfall for any drainage works. Given the presence of permeable gravels close to the surface of the site it is more likely that infiltration systems will offer the most viable outfall for any water arising from buildings or roadways and that any pitch drainage needed would also be disposed of into the gravels below. This would need to be confirmed by soakaway tests carried out as part of any detailed planning application.

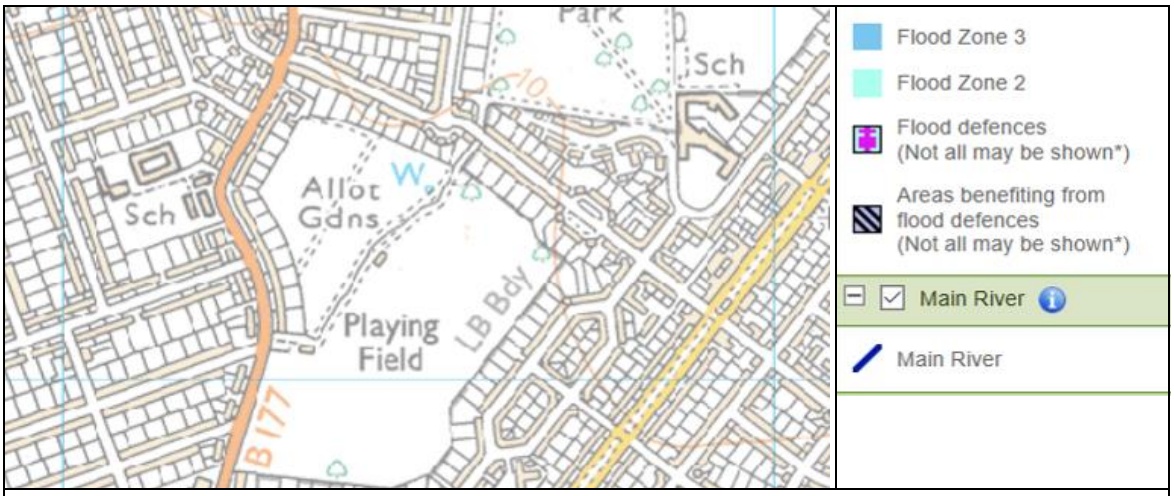

Figure 3. Fluvial flood risk for the site.

3.2 Natural soils, underlying geology and rainfall

According to data from the Soil Survey of England and Wales, the freely draining soils over gravel in this area are classed as belonging to the Hucklesbrook Association. These soils are described as well-drained coarse loamy and some sandy soils commonly over gravel. Some similar permeable soils affected by groundwater – usually occurring on flat land. The remaining soils are classified as belonging to the Hurst Association. These soils are described as being Coarse and fine loamy permeable soils mainly over gravel and variably affected by groundwater.

The British Geological Survey (BGS) reports the soils being formed partly over the Taplow Gravel Member (the south west of the site) and partly over the Hackney Gravel Member, both of which are superficial deposits of mainly sands and gravels. These superficial deposits are underlain by the London Clay Formation, a mix of clay silt and sand but dominated by Clay and Mudstones. Over this site the superficial deposits remain covering the London Clay and as a result the soils tend to be well-drained and sand or silt dominated with distinct gravel layers within the topsoil or subsoil.

The Standard Average Annual Rainfall (SAAR) for the site is 570 mm which for this area gives an estimated One -Year Greenfield Runoff Rate (Qbar) of 3.55 l sec^{-1} ha based on the Institute of Hydrology 124 method:

$Qbar_{rural} = 0.00108 \times (0.01 \times AREA)^{0.89} \times SAAR^{1.17} \times SPR^{2.17}$, m^3/s

where:
$Qbar_{rural}$ is the mean annual flood flow from a rural catchment (approximately 2.3 year return period).
AREA is the area of the catchment in ha (estimated as 35.8 ha for the two sites combined).
SAAR is the standard average annual rainfall for the period 1941 to 1970 in mm (SAAR 41-70).
SPR is Standard Percentage Runoff coefficient for the SOIL category.
The Standard Average Annual Rainfall (SAAR) for the site is 596 mm.
The Standard percentage runoff is 0.47 based on field observations and the mapped values.
Thus for this site:

$Qbar\ (r) = 0.00108 \times (0.01 \times 11)^{0.89} \times (570 \times 1.17) \times (0.3 \times 2.17) = 0.046\ m^3 / s$

Convert to l / s then: 0.046 x 1000 = 45.9 l / s for the whole site. For 1 hectare this is 45.9 / 11 = 4.17 l sec ha.

For the one-year event applying the appropriate growth factor this becomes 4.17 x 0.85 = 3.55 l sec ha for the site.

3.3 Soil variability

To gain a better understanding of the underlying soil conditions and the variability over the area as a whole 8 soil pits were dug (Pits 1 – 8, Figures 1 and 2) with samples taken from some of these pits for analysis to gain determine soil texture, pH and nutrient status. Generally, the soils from Pits 5-8 were classed as SANDY LOAM or SANDY SILT LOAM. This analysis excludes any gravel and is based solely on particles smaller than 2 mm. The results of the analysis are presented in Tables 2 and 3 and are discussed in Section 5.4.

3.3.1 Soil trial pits

Pits 1-4 were located on the old cricket squares to determine that nature of the soil used in the old squares and whether these soils remain suitable for cricket. The results from these trial pits are discussed more in Section 5.1.

Pit 5 was located to the north east of the site (Figure 4) and was located in an area indicated by the aerial photograph to be drought prone and thus likely to be more influenced by gravel. The upper 100 mm of soil was relatively stone-free. At the surface there was a 40 mm deep layer of thatch, a layer of organic matter formed from the gradual decay of roots and leaf matter and forms in grasslands over time. Normally in sportsturf situations thatch is managed by regular removal operations such as scarification, verticutting, harrowing and by top-dressing. As thatch builds up it makes surfaces softer and holds water at the surface which can lead to cancellations even if the underlying soil is dry. It can also produce surfaces which cut up and wear quickly under play creating bare patches of soil which allow weed ingression further reducing soil quality. Between 100 and 250 mm depth the soil was moderately stony, with Flint and Chert stones to 60 mm and a moderate gravel content of around 20% at 250 mm. The topsoil was wet at the surface but became drier by 80 mm but remained friable. The soil had a SANDY LOAM texture.

Between 250 and 400 the soil was very stony with a gravel content of between 40 and 50% with stones to 100mm diameter. The soil became wetter with depth, becoming plastic at around 400 mm and had a SILT LOAM texture.

Between 400 mm and the base of the pit at 660 mm the soil was gravel dominated with around 70% of the soil mass comprised of gravels of a range of sizes. The gravel was not cemented however and there was no evidence of groundwater despite the soil remaining wet and plastic. The soil was, however, slightly mottled at this depth suggesting that the soil is anaerobic due to waterlogging at some points in a year and this may be due to proximity to a water table. The subsoil was a SANDY SILT LOAM.

Mottling is a distinct pattern of orange patches or mottles within a generally grey soil mass. This occurs when a soil is wet for prolonged periods and becomes partly anaerobic. In the anaerobic areas, the Iron in the soil is reduced to its Ferrous form which is almost colourless but the Iron in the aerobic areas remains fully oxidised in its Ferric form which is orange / red coloured. This mottling pattern is indicative of a process called gleying and is typically found in soils which are seasonally waterlogged.

Figure 4. Soil profile in Pit 5, Gravel becomes dominant in the soil below 400 mm.	Gravel associated with the subsoil.

Pit 6 (Figure 5) was located towards the north eastern boundary of the site in an area where the aerial photograph revealed a mixed pattern of droughty areas and less droughty areas. The pit was dug in the base of a wide, shallow channel (approximately 100 mm lower than the surrounding area over a 3m width).

The topsoil was some 200 mm deep, being largely stone free in the upper 130 – 140 mm of the profile but with gravel increasing with depth. The soil was a SANDY LOAM texture, was dry below the upper 60 mm and was friable. The surface once again had a distinct organic thatchy layer of around 40 mm. As the topsoil in this pit was shallower than in Pit 5, the difference in droughtiness shown in the aerial photograph was most likely due to elevation with lower lying areas receiving more water from the surrounding higher areas and thus being less droughty.

The lower topsoil, between 200 and 330 mm was stonier but remained a SANDY LOAM texture. Stones to 50 mm diameter were present with a total stone content of around 20%. The soil was slightly mottled at 330 mm but not wet, and remained friable.

Between 330 mm and 570 mm when the pit was finished, the soil become much stonier with a stone content of around 70% within a SANDY SILT LOAM matrix. The soil was wetter towards the base of the pit and plastic, but was not saturated. There was no sign of groundwater entering the pit at any point.

Pit 7 (Figure 6) was located close to the southern boundary of the site in an area which was distinctly greener on the aerial photograph indicating much less droughty conditions. In contrast to the previous pits, the topsoil extended to a depth of 300 mm and remained largely stone free through this depth, with a stone content of less than 5%, though some stones were up to 75 mm

in diameter. The topsoil was a SANDY SILT LOAM in texture, was dry and friable with no signs of mottling. A 40 mm thatch layer was again evident on the surface.

Figure 5. Soil profile in Pit 6.

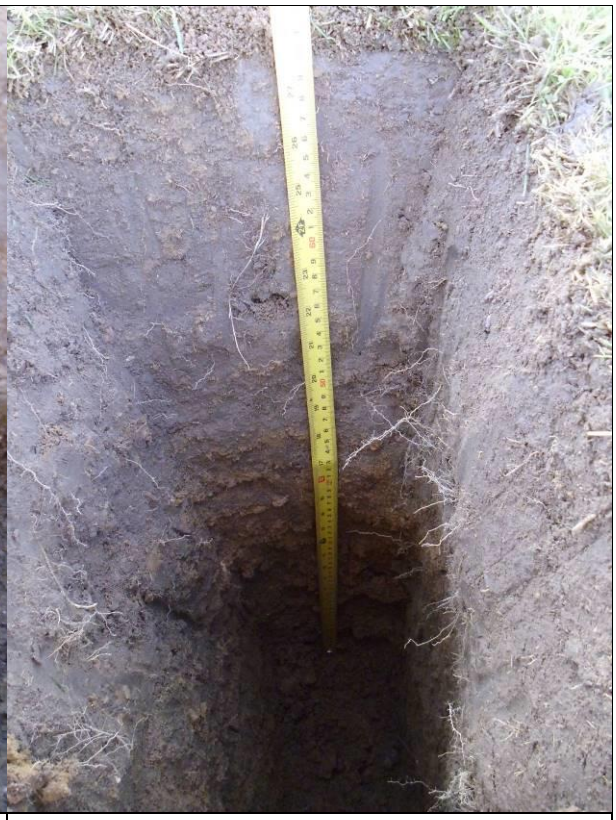

Figure 6. Soil profile in Pit 7.

The lower topsoil extended to a depth of 550 mm and was a SANDY LOAM, again with very few stones. Though becoming slightly wetter with depth the soil remained friable to a depth of 550 mm. Between 550 mm and 750 mm the subsoil became clearly mottled suggesting this layer is occasionally waterlogged at times in winter. Though damper than the layers above, the soil remained friable. Stone content was again less than 5% but increased at around 725 mm with more gravel becoming apparent. At 750 mm the gravel was encountered with stone content increasing to over 70% by a depth of 780 mm when the pit was finished. The difference in grass droughtiness in this area as indicated by the aerial photograph is due to the much greater depth of stone-free topsoil in this location with the soil having a great available water capacity and roots being able to penetrate freely to depth in the soil.

Pit 8 (Figure 7) was excavated towards the south western corner of the site in a very droughty area as indicated by the aerial photograph. As expected, this soil had a shallower topsoil with the gravel being encountered closer to the surface as was the case with Pits 5 and 6. The upper 60 mm of the soil was relatively stone free but between 60 and 110 mm depth gravel was encountered. The topsoil was a SANDY LOAM and in this location the organic thatchy layer was a little thicker at around 50 mm.

The lower topsoil between 110 and 360 mm was much stonier with a stone content estimated to be around 40 – 50%. The soil was friable and not mottled.

Between 360 mm and the base of the pit at 600 mm the soil was very stony with a stone content of around 70%. The soil was damp but not saturated and was slightly mottled at 600 mm.

Figure 7. Soil profile in Pit 8.

Figure 8. Water holding in a worn depression.

The key issues evident from the soils on this site relate to stone content. Though surface levels are reasonable, good quality sports pitches should have an even surface. In some locations surface variability is too high for good quality football pitches and outfields. In these places the surface requires grading to create better levels. The high stone content of the soil makes this more difficult as no sports surface should have stones larger than 20 mm in the upper 50 – 80 mm. At present the topsoil is largely stone free due to the effect of worm casting over many years which has gradually buried the stones under a layer of stone-free topsoil of between 60 and 100 mm. Any cultivation work will mix the stones back through the soil profile risking stones being present on the pitch surface following such works. Grading and levelling works will require a strip of the stone -free topsoil. The subsoil can then be graded and the topsoil returned. This adds some cost and even then, stones may still be an issue so stone burying and picking will be needed as will creating a stone-free layer of a free-draining sports rootzone over the pitch surfaces to ensure any remaining stones have been blinded off.

Where the gravel is close to the surface the soil drainage rates will be moderate or good, but this will be highly dependent on compaction management and maintaining a grassed surface. Where such management does not take place, water can gather in depressions as was seen in a worn area of the site during the visit (Figure 8). This underlines the need for good ongoing management should pitches be re-located to this site and is something that must be considered as part of the sustainability plan for this site. When managed well, new pitches should be able to support at least 4 hours use per week as long as they are maintained effectively. Where the topsoil is deeper not only should turf quality be better but drainage should also remain good as long as pitches are well managed. If very high quality pitches are required then some drainage may be needed.

4.0 Drainage

No previous drainage was evident on the site, though the aerial photograph in Figure 1 does show a number of linear features running both east to west over the site and north to south. A pit was dug over one of these features but no evidence of a land drain was encountered. It is possible that some drains have been installed with ad-hoc additional drains linked to these main drains to relieve water from difficult areas. These may simply have been stone filled trenches linking to the gravel or may have been piped. Aerial photograph evidence suggests that any such drains are likely to be old and may no longer be functioning effectively.

Should it be decided that to eliminate the risk of cancellations due to waterlogging some drained pitches are required, a suitable outfall for water from such drainage will be required. The Sustainable Urban Drainage Hierarchy indicates that for this site an infiltration type system would be most suitable. This could be in the form of direct infiltration from the base of drain lines into the gravel or via a series of soakaways. In any case soakaway testing would be needed ahead of any planning application to confirm the most suitable approach. Connection into the culverted stream running along the western edge of the site should be seen as a last resort.

5.0 Current pitch quality

Should this scheme go ahead it is critical that the current quality of cricket squares and football pitches at the Ford site be measured against IOG and Governing Body Standards. That way replacement facilities can be required to meet as a minimum the same quality levels as the pitches they are replacing. The pitch benchmarking assessment at the Ford site should be carried out when the squares or football pitches are in best condition – thus May is the ideal month for cricket and August / September the ideal months for football. This should be done if the proposed development works are approved ahead of the development of any final design works and before any works take place.

5.1 Cricket squares

Based on aerial photographic evidence the last formal use of Goodmayes extension for cricket was in 2005, though some informal use has probably occurred since that time. Over time the squares have slowly declined and become part of the general amenity grassland. The squares are still visible on the site due to levels differences resulting from many years of top-dressing and repairing of the batting ends which has resulted in the ends being higher than the middle. These saddles are still clearly evident in the place where the squares were located. Two pits were dug in each square with samples taken for analysis using the Pipette Method to determine the soil texture to see whether any of the squares could be re-used for cricket, thereby potentially reducing the costs of renovation.

Pits 1 and 2 were taken from the old square located in the south west of the site. Both pits were shallow, extending only through the topsoil (Figures 9 and 10). Both pits revealed a thatch layer varying between 40 and 50 mm which has developed over time. The underlying soil was stone free to a depth of between 120 and 125 mm when gravel was encountered. It is most likely that this gravel is the same as that occurring over the majority of the playing field rather than being a specific stone base as it was very similar in size, shape and composition to the gravel noted elsewhere. The sward on the cricket squares had long since reverted to the general amenity sward and was a mix of Annual Meadow Grass, Perennial Ryegrass, Daisy, Plantain, Clover and other broad-leafed weeds.

The soil texture results indicate that the soils were SANDY CLAY LOAMS on this square which is not ideal for cricket (Table 4). To reinstate good quality pitches on this area a minimum of the upper 100 mm of grass and soil would need to be stripped, the sub-base levelled and firmed and the surface made up with proprietary cricket loam for re-seeding and establishment. Once re-constructed the square would require 12 months of ongoing management prior to use.

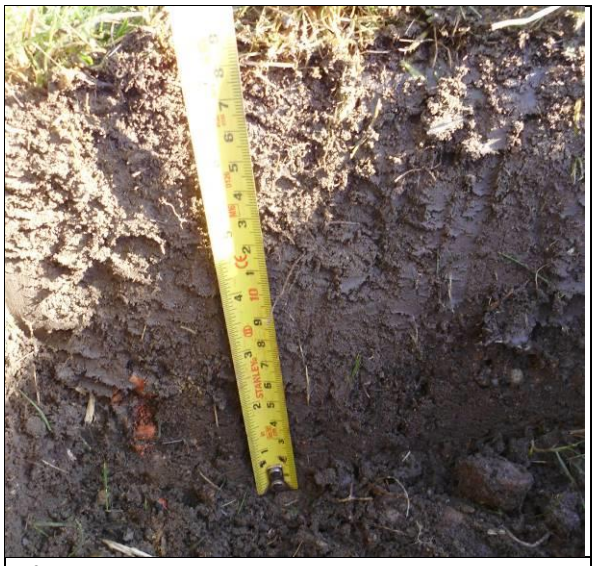

Figure 9. Pit 1.

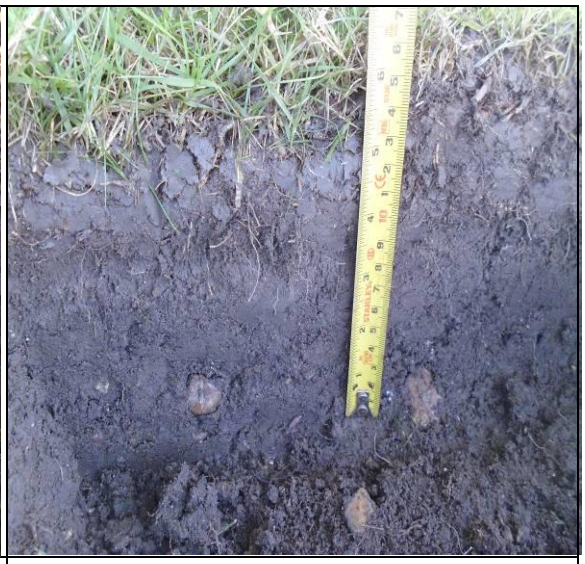

Figure 10. Pit 2

The second square located towards the north of the site was also assessed by digging two shallow trial pits (Figures 11 and 12). This square had a deeper layer of stone free soil, varying between 180 and 200 mm. There was also more thatch on the surface with depths varying between 50 and 70 mm. Again, the squares are underlain by gravel which may have been the natural soil or may have been placed deliberately. Regardless of the origin, such a subsoil is ideal to construct a cricket square over.

Soil textural analysis revealed that these soils were CLAY LOAMS which are generally suitable for cricket though in this case clay content was a little low for high level cricket (Table 4). The key limiting factors to reinstating these squares is the amount of thatch and organic matter in the upper layers of the soil and poor surface levels. To address this a minimum of 80 mm of vegetation and soil should be stripped and removed, the sub-base graded level and 80 mm of proprietary cricket loam laid and compacted ahead of seeding and reinstatement.

As the Ford Ground has three cricket squares, an additional square will need to be constructed. The presence of gravel in the subsoil does remove the need for a stone base however. A synthetic pitch will be needed to meet the current like for like provision with the Ford Ground however it is recommended that a NTP be placed on the edge of each square to maximise use of the cricket facilities as a whole. A high-pressure water supply to the new squares will be needed to maintain the pitches at a high quality.

Any new squares will need to be constructed to a standard that will allow pitches to be prepared to the same quality level or better than the pitches currently on the Ford site but until that quality is measured, it cannot be specified in more detail.

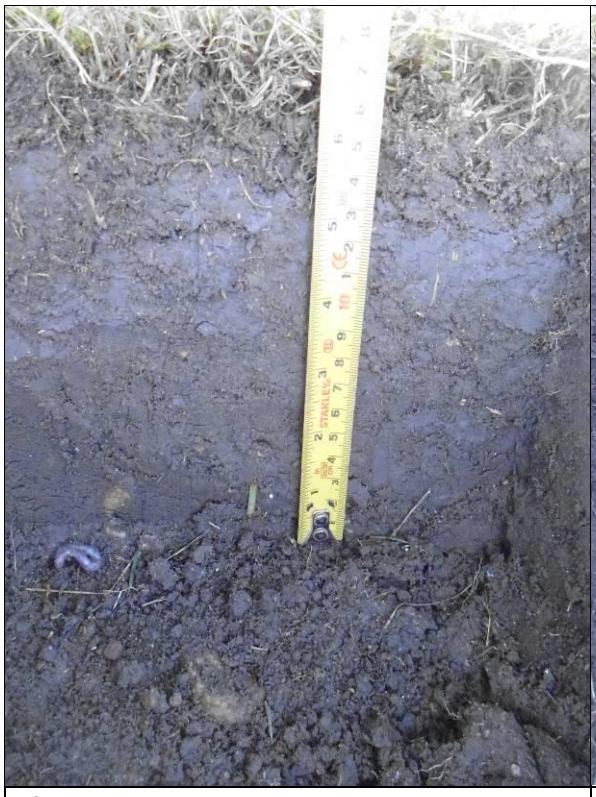

Figure 11. Pit 3

Figure 12. Pit 4

Assuming that each square will consist of 12 pitches and that the squares are built to a high standard and maintained to a high standard then each pitch should be able to support 5 days of cricket per season. This will be a total of 180 games per season over the three squares which would match the current provision at the Ford Ground. The provision of two additional NTP's will further increase the capability of the site to support informal cricket and short-form cricket during the week.

5.2 Football pitches

There are currently no formal football pitches laid out or maintained on Goodmayes Park Extension though some goalposts are provided for informal use. The key constraints to football on this site are poor surface levels in some places, excessive thatch in in the sward, a lack of irrigation capability in the summer and potentially poor drainage if the site is not maintained effectively. The layouts suggested in this report will use pitch sizes recommended by the FA and Sport England as detailed in Table 2 for the relevant age groups.

The removal of thatch, topsoil stripping, grading, topsoil replacement and amendment followed by re-establishment will be required as minimum construction operations. Formal drainage may be required and has been costed as an option in Section 6. Basic irrigation will be required to maintain the pitches at a high standard.

The FA Recommended Pitch Sizes

Age grouping	Type	Recommended size **without** runoff (safety area around pitch) Length x width (metres)		Recommended size **including** runoff (safety area around pitch) Length x width (metres)		Recommended size of goal posts Height x width (metres)	
Mini-Soccer U7/U8	5 v 5	37	27	43	33	1.83 (6')	3.66 (12')
Mini-Soccer U9/U10	7 v 7	55	37	61	43	1.83 (6')	3.66 (12')
Youth U11/U12	9 v 9	73	46	79	52	2.13 (7')	4.88 (16')
Youth U13/U14	11 v 11	82	50	88	56	2.13 (7')	6.40 (21')*
Youth U15/U16	11 v 11	91	55	97	61	2.44 (8')	7.32 (24')
Youth U17/U18	11 v 11	100	64	106	70	2.44 (8')	7.32 (24')
Over 18 (senior ages)	11 v 11	100	64	106	70	2.44 (8')	7.32 (24')

*If a pitch is to be provided for U13/14 it is recommended that 7 x 21 goalposts are provided. However, it should be noted that 8 x 24 would also be acceptable as not all sites will be able to provide specifically for this age group.

Table 2. FA recommended pitch and goal post sizes.

Pitch orientation is within the FA and Sport England guidelines of being between west north west to east north east.

5.3 Slope

Sport England and the Football Foundation recommend no fall greater than 1.25 % along the direction of play and no greater than 2.0 % across the direction of play. Goodmayes Park Extension falls at a gentle grade from the north east to the south west at an average grade of between 0.5 % making it suited for sports use generally. Within this general fall there are some steeper sections towards the centre of the site where slopes increase to between 1.5 and 2% which means some localised land levelling is needed in these areas.

Surface evenness is generally good with gentle undulations occurring in most pitches but over a distance of 5 – 10 m making the surface safe to play on. In some areas changes in slope over short distances are more significant and local levelling in these areas is recommended. Any works to re-grade the surfaces of pitches will need to be undertaken with care to minimise the risk of contaminating the pitch surfaces with stones.

5.4 Soil analysis

Table 3. Soil texture and nutrient status (non-cricket pitch samples)

Sample	Sand %	Silt %	Clay %	P Index	K Index	Mg Index	pH
Pit 5 0-150 mm*	**54**	**30**	**16**	**2**	**2-**	**1**	**7.9**
Pit 5 300-450 mm	**45**	**37**	**18**	**4**	**1**	**0**	**8.3**
Pit 6 0-200 mm*	**71**	**19**	**10**	**3**	**2+**	**2**	**5.8**
Pit 6 200-350 mm*	**53**	**30**	**17**	**2**	**2-**	**2**	**5.6**
Pit 7 0-150 mm	**50**	**35**	**15**	**3**	**1**	**2**	**5.4**
Pit 7 300-450 mm	**47**	**37**	**16**	**2**	**1**	**2**	**6.3**
Pit 7 550-650 mm*	**53**	**32**	**15**	**0**	**1**	**2**	**6.9**

The soils are generally SANDY LOAM (marked with a *) or SANDY SILT LOAM. With the exception of Pit 6 0-200 mm, which has a high sand content, the actual variation in sand and silt is small with the difference being made up with increase in silt just sufficient to change the classification. Clay levels are generally consistent and the combination of clay and silt in the soils is sufficient to potentially lead to drainage issues unless compaction is managed well and turf cover is maintained.

The nutrient status is generally good in respect to Phosphorus, Magnesium and Potassium in the topsoil suggesting the nutrient management of this site has been good. The sward would certainly benefit from additions of Nitrogen during the growing season to encourage grass growth and vigour but it is acknowledged that this will necessitate increased cutting operations. Following any improvement works increased fertiliser applications will be needed to ensure the grass recovers well from use and the required quality levels can be maintained. Soil pH is generally within the ideal range for sports turf of pH 5.5 – 7.5. Pit 5 was very alkaline compared to the rest of the site but given its location on similar soils and the stark difference with the other samples it is likely this is due to lime being used to mark pitch lines in the past with the residual effect of the use of lime seen in localised pH increases where pitch lines used to be. Nutrient status and pH should be monitored and pH adjusted using lime as required to keep it within the preferred range.

Table 4. Soil texture for the cricket squares (Pipette Method)

Sample	Sand %	Silt %	Clay %	Soil texture class
Square 1 Pit 1	**52**	**29**	**19**	**SANDY CLAY LOAM**
Square 1 Pit 2	**54**	**28**	**18**	**SANDY CLAY LOAM**
Square 2 Pit 1	**36**	**40**	**24**	**MEDIUM CLAY LOAM**
Square 2 Pit 2	**36**	**40**	**24**	**MEDIUM CLAY LOAM**

The Pipette Method was used to assess the texture of the cricket square soils as this method is more accurate in respect to clay content than the laser method. The results suggest the soils in Square 1 are unsuited to cricket purposes and would have to be replaced to at least a depth of 100 mm with suitable cricket loam to enable high quality pitches to be created and sustained. The soils in Square 2 are suited to cricket but given the thatch issues some soil will still need to be replaced.

5.5 Timescales

The optimum time to undertake any major ground works is the summer. Though the construction of hard engineering works such as footpaths, roadways, car parks and changing rooms / pavilions can be undertaken year-round, the works to the natural pitches must be carried out in the summer months only.

6.0 Development options and indicative costs

6.1 Pitch layout options

The provision of a like for like replacement of pitches in respect to pitch number and quality will mean that the current carrying capacity at the Ford site can be replicated at Goodmayes Extension as long as the squares are constructed to a high standard and maintained to a high standard. The provision of 2 additional NTP's will add further capacity to support informal cricket, midweek cricket and single wicket competitions on the site. Two layout options are presented. Option 1 is a simple like for like replacement of the pitches at the Ford Site. Option 2 replaces one of the natural adult pitches with a full-size 3G synthetic pitch. The provision of one full-sized 3G pitch in place of one full size adult pitch will significantly increase the provision for all types of football as the need requires due to the additional carrying capacity, providing up to a maximum of 50 hours extra use.

The maximum number of games per week that these options will allow whilst maintaining quality is summarised in Table 5.

Table 5. Maximum number of adult football games each option will accommodate

Pitch quality	Number	Maximum weekly hours of use per pitch	Total maximum hours of use per week	Maximum number of games per week
Option 1				
Good	7	6	42	28
3-G	0	0	0	0
Option 2				
Good	6	6	36	24
3-G	1	56*	56*	28

* assumes floodlights to enable evening play and a minimum of 2 hours maintenance per 10 hours of use. For 3G pitches a 2 hour time period per game is assumed to allow for change over periods between games.

For Option 1 a maximum of 28 adult games of football could be accommodated. For Option 2 a maximum of 52 adult games of football could be accommodated, a maximum betterment on the current provision of 24 games. Junior football is in addition to this and would be the same as is currently the case at the Ford site however the provision of a 3G pitch would allow for a significant increase in youth and junior football to be played.

6.2 Pitch layouts

The optimal location for the required pitches for both options is shown in Drawing Number IOG-LBR-GPE-LAYOUT 1 and IOG-LBR-GPE-LAYOUT 2. The works required and rough estimated costs are considered in Sections 6.3 and 6.3

6.3 Required works and rough indicative costs

6.3.1 Cricket

Options 1 and 2 require the following works:

- Construct 3 new 12-pitch squares, grading into existing levels. Construction depth should be 100 mm over the existing subsoil.
- Install three single pitch artificial turf pitches, one on the edge of each square.
- Supply watering points to three of the new squares.
- Maintain the new squares for 12 months for handover when they meet IOG / ECB **Standard** Level Performance Quality Standard (see Appendix 1).

6.3.2 Football

Option 1 requires the following works:

- Construct 7 new pitches based on the following works:
    - Strip topsoil and grade subsoil to achieve uniform fall over pitch surfaces and blend into surrounding levels.
    - Replace topsoil to final design levels and gently loosen.
    - Stone bury and pick.
    - Apply a 50 mm rootzone carpet over the pitch surface and laser grade to finished levels.
    - Decompact surface using linear aeration machine such as an Earthquake or Shockwave.

- Fertilise, seed and establish.

- Install an irrigation system comprising storage tanks sufficient for 90 m^3, a borehole and pump if possible or other water supply, a distribution pump, ring mains and standpipes plus other infrastructure and 5 travelling sprinklers. Alternatively, a pop-up system can be installed if risk of vandalism allows.
- Should additional drainage be required then install system of lateral, collector and carrier drains linked by 1m centred rootzone slits and increase the depth of rootzone to 80 mm.
- Maintain the new and renovated pitches for 12 months for handover when they meet IOG **Standard** Level Performance Quality Standard for football for the fully drained pitches and the **Basic** Level Performance Quality Standard for the partially or undrained pitches (see Appendix 2).

6.3.3 Rough indicative costs for cricket works for both options

Table 6. Indicative costs for cricket works for both options (ex VAT)

Description	Cost (£)
Mobilisation	£5,000.00
Construct 3 new 12-pitch squares, fertilise, seed and establish	£88,200.00
Install three new full-length Artificial Turf Pitches	£22,500.00
Install new water supply to three squares	£2,850.00
Maintain squares to handover	£24,600.00
Sub total	**£143,500.00**
10% contingency	**£14,350.00**
Total cost of contract	**£157,850.00**

6.3.4 Rough indicative costs for football works under Option 1, undrained and drained

Table 7. Indicative costs for football works under Option 1 **UNDRAINED** (ex VAT)

Description	Cost (£)
Mobilisation	£30,000.00
Construct improved football pitches (7 adult, 1 junior 11x11, 4 mini 7x7 and 2 mini 5x5). Maintain for 12 months to handover	£594,650.00
Irrigation system	£160,000.00
Sub total	**£784,650.00**
10% contingency	**£78,465.00**
Total cost of contract	**£863,115.00**

The combined rough estimate of costs for Option 1 (undrained) is approximately **£1,020,965.00** not including costs of new roads, car parks and buildings and is **exclusive of VAT**.

Note: these are general descriptions of required works only. Should the project proceed, detailed specifications and design drawings will be required ahead of tendering.

Table 8. Indicative costs for football works under Option 1 **DRAINED** (ex VAT)

Description	Cost (£)
Mobilisation	£40,000.00
Construct and drain improved football pitches (7 adult, 1 junior 11x11, 4 mini 7x7 and 2 mini 5x5). Maintain for 12 months to handover	£899,950.00
Irrigation system	£160,000.00
SUDS attenuation scheme	£30,000.00
Sub total	**£1,129,950.00**
10% contingency	**£112,995.00**
Total cost of contract	**£1,242,945.00**

The combined rough estimate of costs for Option 1 (undrained) is approximately **£1,400,795.00** not including costs of new roads, car parks and buildings and is **exclusive of VAT**.

Note: these are general descriptions of required works only. Should the project proceed, detailed specifications and design drawings will be required ahead of tendering.

6.4 Outline works for Option 2 and very rough indicative costs

It is important to stress that these works and costs are for very rough guidance only and cannot be considered as accurate as an outline estimate as without detailed designs and calculated quantities it is not possible to develop reasonably reliable costings. These costs do not include works relating to new access roads, buildings and car parks.

6.4.1 Cricket

The works required are the same as for Option 1 with the same rough, estimated costs.

6.4.2 Football

Option 2 requires the following works:

- Construct 6 new pitches based on the following works:
    - Strip topsoil and grade subsoil to achieve uniform fall over pitch surfaces and blend into surrounding levels.
    - Replace topsoil to final design levels and gently loosen.
    - Stone bury and pick.
    - Apply a 50 mm rootzone carpet over the pitch surface and laser grade to finished levels.
    - Decompact surface using linear aeration machine such as an Earthquake or Shockwave.
    - Fertilise, seed and establish.
- Install an irrigation system comprising storage tanks sufficient for 90 m^3, a borehole and pump if possible or other water supply, a distribution pump, ring mains and standpipes plus other infrastructure and 5 travelling sprinklers. Alternatively, a pop-up system can be installed if risk of vandalism allows.
- Should additional drainage be required then install system of lateral, collector and carrier drains linked by 1m centred rootzone slits and increase the depth of rootzone to 80 mm.

- Maintain the new and renovated pitches for 12 months for handover when they meet IOG **Standard** Level Performance Quality Standard for football for the fully drained pitches and the **Basic** Level Performance Quality Standard for the partially or undrained pitches (see Appendix 2).
- Install one full size 3-G pitch with floodlighting.

6.4.3 Rough indicative costs for football works under Option 2, drained and undrained

Table 9. Indicative costs for football works under Option 2 **UNDRAINED**

Description	Cost (£)
Mobilisation	£40,000.00
Construct improved football pitches (6 adult, 1 junior 11x11, 4 mini 7x7 and 2 mini 5x5). Maintain for 12 months to handover	£532,800.00
Irrigation system	£160,000.00
Construct 1 full-sized 3G pitch with floodlighting	£625,000.00
SUDS attenuation scheme	10,000.00
Sub total	**£1,407,800.00**
10% contingency	**£140,780.00**
Total cost of contract	**£1,548,580.00**

The combined rough estimate of costs for Option 1 (undrained) is approximately **£1,706,430.00** not including costs of new roads, car parks and buildings and is **exclusive of VAT**.

Note: these are general descriptions of required works only. Should the project proceed, detailed specifications and design drawings will be required ahead of tendering.

Table 11. Indicative costs for football works under Option 2 **DRAINED**

Description	Cost (£)
Mobilisation	£40,000.00
Construct and drain improved football pitches (6 adult, 1 junior 11x11, 4 mini 7x7 and 2 mini 5x5). Maintain for 12 months to handover	£806,500.00
Irrigation system	£160,000.00
Construct 1 full-sized 3G pitch with floodlighting	£625,000.00
SUDS attenuation scheme	£30,000.00
Sub total	**£1,661,500.00**
10% contingency	**£166,150.00**
Total cost of contract	**£1,827,650.00**

The combined rough estimate of costs for Option 1 (drained) is approximately **£1,985,500.00** not including costs of new roads, car parks and buildings and is **exclusive of VAT**.

Note: these are general descriptions of required works only. Should the project proceed, detailed specifications and design drawings will be required ahead of tendering.

7.0 Ongoing maintenance requirements

Whilst it is feasible to relocate and construct both the cricket pitches and football pitches to a required standard, for a site to be sustainable longer term, the pitches must be maintained to the required standard. For this site and this number of pitches then at least 1 full-time groundstaff would be required to work only on the sports pitches. This would need to be in addition to the current groundstaff works on the site. Should Option 2 be preferred and a 3-G pitch constructed then this may need to increase to 1.25 full-time staff to cater for the frequent brushing needed to maintain the FIFA certification.

In addition to full-time input, end of season renovations for both cricket and football will need to be carried out to a high level either by a team of in-house staff with appropriate equipment or by a high quality contractor. This is a significant increase in cost outlay for the council and they will need to develop a business plan to ensure maintenance to the required level is possible. This could be in the form of adjusting pricing levels, offering a choice of prices and pitch quality or via asset transfer to tenant clubs. The incorporation of a 3-G pitch would aid income generation as would creative use of the new building. The council could also consider placing a sum in bond to cover the first 10 years of maintenance works.

The ongoing maintenance tasks are detailed in Sections 7.1 and 7.2 and though not exhaustive, carrying out the listed operations to a high standard will ensure the ongoing maintenance of the pitches at a suitable level.

7.1 Cricket squares

Maintaining the squares at the Standard PQS level will involve the following operations in addition to cutting and marking as a **minimum** requirement each year:

- Spray for weeds and moss on a regular basis until less than 1% present on any square.
- Treat for worms at least twice per year or more often until control is achieved.
- Verti-cut and brush at least twice during pre-season preparations and at least once as part of the standard preparation for a new pitch.
- Mow to maintain grass at 8 – 12 mm in season and no longer than 15 mm in winter.
- Aim to have at least 95% grass cover on a new pitch and though this will decline over time with use it should not drop below 90%. If it does, do not use that pitch again but seed and allow to recover before re-using later in the season if needed and when grass cover is back at around 95%.
- Fertilise as required using soil testing every two years to inform fertiliser regime. Apply the equivalent of 1.9 – 2.7 g m^2 Nitrogen per month during growing season initially in the form of a basal feed of slow release methylated urea and with top-dressings as required with conventional release dressing.
- Patch-seed bare areas such as the ends once a pitch has been used and taken out of play by spiking the ends, seeding and then lightly covering with cricket loam. Water until established and if possible protect from play by spacing pitch use over the square to direct play away from repaired ends.
- Switch or brush the square surfaces every morning to remove dew and any casts, without smearing. If casts occur, re-treat for worms.
- Do not spike in season unless it is to repair the ends. During the winter spike the square when the soil is soft enough to allow the tines to penetrate without lifting soil or turf. This should be done with solid pencil tines only, to a range of depths to avoid creating a cultivation pan. This should be done once between October and January only when

conditions allow and is not needed every year – possibly as infrequently as 1 in every 3 – 5 years unless structural breaks are present in the soil profiles.

- Water as required to ensure the sward is healthy. Watering should be deep and less frequent rather than shallow and frequent.
- Spray for disease as required.
- Scarify to a depth of 5mm in three directions as part of the autumn renovations, removing all arisings and blowing any dust clear of the surface. Use a scarifier with blades set at around 10 mm spacing.
- Over-seed using a high-quality dwarf ryegrass seed mix designed for cricket squares at a rate of at least 35 g m^2, drilling the seed into the surface using a sportsturf seed drill in at least 3 directions.
- Apply a 2-3 mm layer of the same cricket loam as used in the construction of the square or previously on the squares. Never change the type of cricket loam used unless it is to a compatible loam proven by testing. The top-dressing must be worked into the low spots using a 2m straight edge working in all directions to ensure low areas are gradually filled. This can be done using a lute or levelling frame mounted onto a small tractor fitted with turf tyres to save time if needed.

7.2 Football pitches (natural)

- Regular mowing with a high-quality triple or 5-deck mower to maintain grass height within the requirements for the IOG Standard PQS level.
- Overseeding throughout the growing season as required to maintain a dense sward. High wear areas such as the penalty areas and centre circles will require more over-seeding.
- Weekly renovations including divot repair and patching using pre-chitted seed in a rootzone mix.
- Irrigation as needed to reinstate grass during post-season renovations or in-season works in early autumn or spring.
- Fertilisation throughout the year based on a programme developed for the pitches. This is likely to include a combination of conventional fertiliser and controlled release fertiliser.
- Pesticide treatment as needed to control turf disease and pests.
- Weed treatment.
- Drag mat / brush as needed.
- Decompaction and aeration as needed, typically 6 operations through the year.
- Linear aeration during spring each year
- Top-dressing during end of season renovations.
- Over-seeding during end of season renovations.
- Marking out and moving goals.
- Leaf blower / collection.

8.0 Conclusion

The re-location of sports pitches from the Ford site to the Goodmayes Park Extension site is technically feasible and would fit into the site. Two options that would enable such a move to take place and meet with Sport England and Governing body requirements have been proposed. The first option is a simple like for like relocation providing the same number of pitches at currently at the Ford Site. The only betterment is in the form of 2 new artificial turf pitches.

Option 2 replaces one adult natural pitch with a full-size synthetic 3-G pitch. This will provide a betterment of up to an extra 24 adult games per week (or youth / junior equivalents). This also includes the 2 additional synthetic cricket pitches. The 24 extra adult games would be equivalent

to 6 good quality grass pitches. The provision of the same total number of pitches does not increase capacity for simultaneous use over that currently possible at the Ford site however.

Very approximate costs for both options have been prepared for illustrative purposes only. In addition, guidance on ongoing maintenance has been included as have the relevant performance quality standards the new pitches should achieve at both handover and thereafter.

Appendix 1. The Performance Quality Standard framework for cricket squares

Performance Standard	Quality Standard		
	High	**Standard**	**Basic**
A. Herbage			
i) Length of herbage: (a) during the growing season (b) during the non-growing season	(a) 6 to 10mm (b) 8 to 13mm	(a) 8 to 12mm (b) 13 to 18mm	(a) 8 to 14mm (b) 16 to 25mm
ii) Bare area, (at start of season) (a) total area (b) diameter of any individual bare area	(a) Max. 5% (b) Max. 25mm	(a) Max. 10% (b) Max. 25mm	(a) Max. 20% (b) Max. 40mm
iii) Total ground cover	Min. 95%	Min. 90%	Min. 80%
iv) Desirable grass species	Min. 90%	Min. 80%	Min. 60%
v) *Poa annua*	Max. 10%	Max. 15%	Max. 30%
vi) Other undesirable grass species	Nil	Nil	Max. 10%
vii) Weeds - Large-leaved	Nil	Nil	Nil
viii) Weeds - Small-leaved	Nil	Max. 2%	Max. 5%
ix) Moss	Nil	Nil	Nil
x) Algae and Lichen	Nil	Nil	Nil
B. Pests and Diseases			
i) Diseases	Nil	Nil	Nil
ii) Earthworms	Nil	Max. 2%	Max. 6%
iii) Pests	Nil	Nil	Nil
C. Profile			
i) Root depth	Min. 150mm	Min. 100mm	Min. 75mm
ii) Thatch depth	Nil	Nil	Max. 2mm
iii) Rootzone medium (of appropriate clay loam)	Min. 150mm	Min. 100mm	Min. 75mm
iv) Rootzone particles: (a) Clay content	(a) Min. 28%	(a) Min. 28%	(a) Min. 25%
v) Evenness: 2m straight edge	Max. variation 4mm	Max. variation 8mm	Max. variation 10mm
vi) Soil pH	5.5 - 7.0	5.5 - 7.0	5.5 - 7.0
vii) Soil nutrient level: P_2O_5 *	Index 2	Index 2	Index 2
viii) Soil nutrient level: K_2O*	Index 2	Index 2	Index 2
ix) Organic matter	to be between 2 to 6%	to be between 2 to 8%	to be between 2 to 10%

Appendix 2. The Performance Quality Standard framework for football pitches

Criteria	High value	Standard value	Low value
Length of herbage during the growing season	25 - 40mm	25 - 50mm	30 - 60mm
Length of herbage during the non-growing season	20 - 40mm	20 - 60mm	20 - 70mm
Bare area	Max. 10%	Max. 15%	Max. 25%
Total ground cover	Min. 90%	Min. 85%	Min. 75%
Desirable grass species	Min. 80%	Min. 70%	Min. 60%
Poa annua content	Max. 10%	Max. 20%	Max. 30%
Other undesirable grass species	0%	Max. 5%	Max. 10%
Weeds: large-leaved	0%	Max. 2%	Max. 10%
Weeds: small-leaved	0%	Max. 5%	Max. 5%
Moss	0%	0%	Max. 2%
Algae and Lichen	0%	0%	0%
Diseases	0%	Max. 2%	Max. 2%
Earthworms	Max. 1%	Max. 5%	Max. 10%
Pests	0%	0%	Max. 2%
Root depth	Min. 150mm	Min. 100mm	Min. 75mm
Thatch depth	Max. 5mm	Max. 10mm	Max. 15mm
Rootzone medium	Min. 200mm	Min. 150mm	Min. 100mm
Rootzone silt and clay content	Max. 6%	Max. 17%	Max. 25%
Infiltration rate: (only measured during autumn-winter period)	Min. 10mm/hr	Min. 5mm/hr	Min. 2mm/hr
Evenness using a 2m straight edge	+ or - 15mm	+ or - 18mm	+ or - 25mm
Evenness using a 0.5m straight edge	+ or - 8mm	+ or - 10mm	+ or - 12mm
Soil pH	6.0 - 7.0	5.8 - 7.5	5.8 - 7.5
Soil nutrient level: P2O5	Index 2	Index 2	Index 2
Soil nutrient level: K2O	Index 2	Index 2	Index 2
Gradient: Lengthways	Greater than 1:200	1:200 - 1:100	1:100 - 1:80
Gradient: Crossways	1:150 - 1:100	1:100 - 1:80	1:80 - 1:50
Appearance	100% uniform texture	Min. 90% uniform texture	Min. 70% uniform texture
Surface debris	0%	0%	0%
Sward colour	100% uniform	Min. 90% uniform	Min. 70% uniform
Visibility of line markings	Visible from a min. 60m	Visible from a min. 45m	Visible from a min. 30m

Goal posts: Uprights	To be at right angles to the surface of the pitch (taking into account the gradient of the pitch)	To be at right angles to the surface of the pitch (taking into account the gradient of the pitch)	To be at right angles to the surface of the pitch (taking into account the gradient of the pitch)
Goal posts: Crossbars	To be at right angles to the uprights	To be at right angles to the uprights	To be at right angles to the uprights